



APMS

The Aquatic Plant Management Society

66th Annual Conference
Phoenix, Arizona
July 13-16, 2026



**Water in the Arid Southwest - Policies,
Allocation & Ecosystem Challenges**



Meeting Sponsors

The Aquatic Plant Management Society appreciates the generous support of the following meeting sponsors. Through their support and contributions, we can conduct a successful and enjoyable meeting.

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Committee Chairs

Special Representatives

Awards	Samantha Sardes
Bylaws and Resolutions	Shaun Hyde
Education and Outreach	Leif Willey
Exhibits	Dean Jones
Finance	Andy Fuhrman
Meeting Planning	Tom Warmuth
Membership	Matthew Johnson
Nominating	Jeremy Slade
Past President's Advisory	Jeremy Slade
Program	Mike Greer
Proposal Review	Jeremy Slade
Regional Chapters	Gray Turnage & Matthew Johnson
Strategic Planning	Mark Heilman
Student Affairs	Andrew Howell

AERF	Jim Petta
Science Policy	Lee Van Wychen
BASS	Jeremy Slade
CAST	Gray Turnage
NALMS	Amy Smagula
RISE	Matthew Johnson
Women of Aquatics	Amy Kay
WSSA	Andrew Howell

APMS Presidents and Meeting Sites

1961	T. Wayne Miller, Jr.	Fort Lauderdale, FL	1991	Joseph C. Joyce	Dearborn, MI
1962	T. Wayne Miller, Jr.	Fort Lauderdale, FL	1992	Randall K. Stocker	Daytona Beach, FL
1963	William Dryden	Tampa, FL	1993	Clarke Hudson	Charleston, SC
1964	Herbert J. Friedman	Tallahassee, FL	1994	S. Joseph Zolczynski	San Antonio, TX
1965	John W. Woods	Palm Beach, FL	1995	Steven J. de Kozlowski	Bellevue, WA
1966	Zeb Grant	Lakeland, FL	1996	Terence M. McNabb	Burlington, VT
1967	James D. Gorman	Fort Myers, FL	1997	Kurt D. Getsinger	Fort Myers, FL
1968	Robert D. Blackburn	Winter Park, FL	1998	Alison M. Fox	Memphis, TN
1969	Frank L. Wilson	West Palm Beach, FL	1999	David F. Spencer	Asheville, NC
1970	Paul R. Cohee	Huntsville, AL	2000	J. Lewis Decell	San Diego, CA
1971	Stanley C. Abramson	Tampa, FL	2001	Jim Schmidt	Minneapolis, MN
1972	Robert J. Gates	Miami Springs, FL	2002	David P. Tarver	Keystone, CO
1973	Brandt G. Watson	New Orleans, LA	2003	Richard M. Hinterman	Portland, ME
1974	Alva P. Burkhalter	Winter Park, FL	2004	Ken L. Manuel	Tampa, FL
1975	Luciano Val Guerra	San Antonio, TX	2005	Eric P. Barkemeyer	San Antonio, TX
1976	Ray A. Spirmock	Fort Lauderdale, FL	2006	Jeffrey D. Schardt	Portland, OR
1977	Robert W. Geiger	Minneapolis, MN	2007	Donald W. Doggett	Nashville, TN
1978	Donald V. Lee	Jacksonville, FL	2008	Jim Petta	Charleston, SC
1979	Julian J. Raynes	Chattanooga, TN	2009	Carlton Layne	Milwaukee, WI
1980	William N. Rushing	Sarasota, FL	2010	Greg MacDonald	Bonita Springs, FL
1981	Nelson Virden	Jackson, MS	2011	Linda S. Nelson	Baltimore, MD
1982	Roy L. Clark	Las Vegas, NV	2012	Tyler Koschnick	Salt Lake City, UT
1983	Emory E. McKeithen	Lake Buena Vista, FL	2013	Terry Goldsby	San Antonio, TX
1984	A. Leon Bates	Richmond, VA	2014	Michael D. Netherland	Savannah, GA
1985	Max C. McCowen	Vancouver, BC	2015	Cody Gray	Myrtle Beach, SC
1986	Lars W. J. Anderson	Sarasota, FL	2016	Rob Richardson	Grand Rapids, MI
1987	Dean F. Martin	Savannah, GA	2017	John D. Madsen	Daytona Beach, FL
1988	Richard D. Comes	New Orleans, LA	2018	John H. Rodgers, Jr.	Buffalo, NY
1989	Richard Couch	Scottsdale, AZ	2019	Craig Aguillard	San Diego, CA
1990	David L. Sutton	Mobile, AL	2020	Mark Heilman	<i>Canceled</i>
			2021	Ryan Wersal	New Orleans, LA
			2022	Ryan Thum	Greenville, SC
			2023	Brett Hartis	Indianapolis, IN
			2024	Jason Ferrell	St. Petersburg, FL
			2025	Jeremy Slade	Providence, RI
			2026	Lyn Gettys	Phoenix, AZ

APMS Award Recipients

Honorary Members

Awarded to persons who have been voting members of the Society for no less than ten years, have contributed significantly to the field of aquatic vegetation management, and must have actively promoted the Society and its affairs during their membership.

William E. Wunderlich	1967
F. L. Timmons	1970
Walter A. Dun	1976
Frank S. Stafford	1981
Robert J. Gates	1984
Herbert J. Friedman	1987
John E. Gallagher, Luciano “Lou” Guerra	1988
Max C. McCowen	1989
James D. Gorman, T. Wayne Miller, Jr.	1995
A. Leon Bates, Richard Couch	1997
N. Rushing	1997
Alva P. Burkhalter	2002
J. Lewis Decell	2004
Paul C. Myers	2005
David L. Sutton	2006
Dean F. Martin	2007
Robert C. Gunkel, Jr.	2008
Allison M. Fox, Randall K. Stocker, Steven J. de Kozlowski	2010
Carole Lembi	2011
Lars W.J. Anderson, David Tarver	2012
Don Doggett, Richard Hinterman	2013
David Spencer	2015
Jim Schmidt	2016
Joseph C. Joyce, Jeff Schardt	2017
David A. Issacs, Vernon V. Vandiver	2018
Eric P. Barkemeyer	2019
Linda Nelson, Ken Manuel, Steve Brewer	2020
Kurt Getsinger, John Rogers, Jr., Terry Goldsby	2021
William Culpepper, Joe Bondra	2022
John Gardner, John Madsen	2023
Scott Nissen	2024
Carlton Layne, Terry McNabb	2025

President’s Award

An individual, designated by the current President, who has displayed "*Many Years of Dedication and Contributions to the Society and the Field of Aquatic Plant Management*".

T. O. “Dale” Robson	1984
Gloria Rushing	1991
William T. Haller	1999
David Mitchell	1999
Jeffrey D. Schardt	2002
Jim Schmidt	2003
Robert C. Gunkel, Jr.	2004
Victor A. Ramey	2006
William H. Culpepper	2007
Kurt Getsinger	2008
Richard Hinterman	2009
Steve D. Cockreham	2010
Donald W. Doggett	2012
Carlton Layne	2013
Ken Langeland, Jeff Schardt, Dan Thayer, Bill Zattau	2014
Greg MacDonald	2015
Linda Nelson	2015
John Madsen, Mike Netherland	2016
Jason Ferrell	2017
Robert Blackburn	2018
Sherry Whittaker	2018
Eric P. Barkemeyer	2019
Dave Petty, Bill Torres, Rob Richardson	2020
Mark Heilman	2021
Ryan Wersal	2022
JJ Ferris	2023
Amy Giannotti, Andy Fuhrman, Justin Nawrocki	2024
Ramon Leon, Dean Jones	2025

Max McCowen Friendship Award

A special recognition given to an APMS member whose demeanor and actions display sincerity and friendship in the spirit of being an ambassador for the APMS. Criteria include warmth and outgoing friendship, sincerity and genuine concern, gracious hospitality, positive attitude and smile.

Judy McCowen	1995
John E. Gallagher	1997
Paul C. Myers	2000
William T. Haller	2002
Bill Moore	2006
Vernon V. Vandiver, Jr.	2012
Tommy Bowen	2014
Steve Hoyle	2015
Ken Manuel	2016
David Isaacs	2017
John Gardner	2018
William A. Ratajczyk	2019
Tom Warmuth	2020
Todd Olson	2021
Dean Jones	2022
Amy Kay	2023
Matt Johnson	2024
Jeremy Slade	2025

T. Wayne Miller Distinguished Service Award

An individual recognized for "*Service to the Society and the Profession*". Considerations include completion of a relatively short-term project taking considerable effort resulting in advancement of aquatic plant management; performance beyond the call of duty as an APMS officer, chair, or representative; or non-member achievement leading to the advancement of APMS goals and objectives.

Gerald Adrian	2005
Linda Nelson	2007
Surrey Jacobs	2009
Amy Richard	2010
Michael Netherland	2011
John H. Rodgers, Jr.	2012
John Madsen	2013
Jim Schmidt	2014
Jeffrey D. Schardt	2015
Craig Aguillard	2016
Tommy Bowen	2017
Tyler Koschnick	2018
Robert J. Richardson	2019
Jeremy Slade	2020
Jason Ferrell	2021
Mark Heilman	2022
Ryan Thum	2023
Brett Hartis	2024
Sherry Whitaker	2025

Outstanding Graduate Student Award

A student recognized for outstanding achievement during graduate studies in the field of aquatic plant management.

Ryan Wersal	Mississippi State University	2010
Joe Vassios	Colorado State University	2011
Sarah True-Meadows	North Carolina State University	2013
Justin Nawrocki	North Carolina State University	2014
Erika Haug	North Carolina State University	2015
Kyla Iwinski	Clemson University	2016
Alyssa Calomeni	Clemson University	2017
Andrew Howell	North Carolina State University	2018
Tyler Geer	Clemson University	2019
Gray Turnage	Mississippi State University	2020
Mirella Ortiz	Colorado State University	2021
Jens Beets	NC State University	2022
Conrad Oberweger	University of Florida	2023
Alyssa Anderson	Minnesota State University	2024
Samuel Schmid	Mississippi State University	2025

Outstanding International Contribution Award

An individual or group recognized for completion of research or outreach activities that is international in nature.

Deborah Hofstra	National Institute of Water & Atmospheric Research	2013
Paul Champion	National Institute of Water & Atmospheric Research	2016
John Clayton	National Institute of Water & Atmospheric Research	2017
Tony Dugdale	Agriculture Victoria	2018
Tobias Bickel	Queensland Department of Agriculture and Fisheries	2023
Daniel Clements	National Institute of Water & Atmospheric Research	2024
Kevin Murphy	University of Glasgow	2025

Outstanding Journal of Aquatic Plant Management Article Award

An award voted by the Editor and Associate Editors for research published in the JAPM during the previous year.

James Johnson, Ray Newman	University of Minnesota	2012
Michael D. Netherland and LeeAnn Glomski	U.S. Army Corps of Engineers	2014
Greg Bugbee, M. Gibbons, and M.J. Wells	Connecticut Agricultural Experiment Station	2016
Justin Nawrocki, Robert Richardson and Steve Hoyle	North Carolina State University	2017
Ryan A. Thum, Syndell Parks, James N. Mcnair, Pam Tying, Paul Hausler, Lindsay Chadderton, Andrew Tucker, and Anna Monfils	Montana State University	2018
Alyssa J. Calomeni, Ciera M. Kinley, Tyler D. Geer, Maas Hendrikse, and John H. Rodgers Jr	Clemson University	2019
Melaney Dunne and Raymond Newman	University of Minnesota	2020
John Madsen and Kurt Getsinger	USDA and USACE	2022
Kathryn A. Gannon, Raymond M. Newman, Ryan A. Thum	Montana State University	2023
Alyssa J. Calomeni, Andrew D. McQueen, Ciera M. Kinley-Baird, Gerard A. Clyde Jr.	USACE and Aquatic Control, Inc.	2024
Paul C. Kusnierz and Timothy D. Tholl	Avista Corporation	2025

Outstanding Research/Technical Contributor Award

An individual or group recognized for completion of a research project or technical contribution related to aquatic plant management that constitutes a significant advancement to the field.

Michael Netherland, Dean Jones, and Jeremy Slade	University of Florida	2010
Kurt Getsinger	U.S. Army Corps of Engineers	2011
Mark Heilman	SePRO Corporation	2013
John Rodgers	Clemson University	2015
Rob Richardson	North Carolina State University	2016
Ryan Thum	Montana State University	2017
Scott Nissen	Colorado State University	2018
John D. Madsen	United States Department of Agriculture	2019
Patrick Moran and the DRAAWP	United States Department of Agriculture	2020
Tera Guetter	Pelican River Watershed Dist.	2021
Stephen Enloe	University of Florida	2022
Michael Greer	U.S. Army Corps of Engineers	2023
Ryan Wersal	University of Minnesota, Mankato	2023
Deborah Hofstra	National Institute of Water & Atmospheric Research	2024
Gray Turnage	Mississippi State University	2025

Michael D. Netherland Graduate Student Research Grant

Student initiatives are among the most important core values of the Aquatic Plant Management Society. High on the list of student support programs is the Michael D. Netherland Graduate Student Research Grant. This \$40,000 academic grant, co-sponsored by APMS and the seven regional APMS chapters, provides funding for a full-time graduate student to conduct research in an area involving aquatic plant management techniques (used alone or integrated with other management approaches) or in aquatic ecology related to the biology or management of regionally or nationally recognized nuisance aquatic vegetation.

Recipient	Affiliation	Year	Amount
Mary Bremigan	Michigan State University	1999	\$34,000
<i>The Indirect Effects of Sonar Application on Lake Food Webs</i>			
Katia Englehardt	University of Maryland	2001	\$40,000
<i>Controlling Non-native Submersed Aquatic Macrophyte Species in Maryland Reservoirs: Plant Competition Mediated by Selective Control</i>			
Susan Wilde	University of South Carolina	2005	\$40,000
<i>Investigating the Role of Invasive Aquatic Plants and Epiphytic Cyanobacteria on Expression of Avian Vacuolar Myelinopathy (AVM)</i>			
John Madsen and Ryan Wersal	Mississippi State University	2007	\$60,000
<i>The Seasonal Phenology, Ecology and Management of Parrotfeather [<i>Myriophyllum aquaticum</i> (Vellozo) Verdecourt]</i>			
Rob Richardson, Sarah True, Steve Hoyle	North Carolina State University	2010	\$40,000
<i>Monoecious Hydrilla: Phenology and Competition</i>			
Ryan Thum	Grand Valley State University	2012	\$40,000
<i>A Quantitative Genetics Approach to Identifying the Genetic Architecture of Herbicide Susceptibility, Tolerance, and Resistance in Hybrid Watermilfoils (<i>Myriophyllum spicatum</i> x <i>sibiricum</i>)</i>			
Scott Nissen	Colorado State University	2014	\$40,000
<i>Exploring the Physiological Basis of 2,4-D Tolerance in Northern Watermilfoil x Eurasian Watermilfoil Hybrids</i>			
Rob Richardson	North Carolina State University	2015	\$40,000
<i>Aspects of Monoecious Hydrilla Physiology and Response to Herbicide Combination Treatments</i>			
Christopher R. Mudge and Bradley T. Sartain	Louisiana State University	2016	\$40,000
<i>Exploring Alternative Giant Salvinia (<i>Salvinia molesta</i> D.S. Mitchell) Management Strategies</i>			
John Rodgers and Tyler Geer	Clemson University	2017	\$60,000
<i>Evaluation of Management Options for <i>Nitellopsis obtusa</i> (Desvaux in Loiseleur) J. Groves, (1919) (Starry Stonewort) in the United States</i>			
Ryan A. Thum and Greg M. Chorak	Montana State University	2018	\$40,000
<i>Identifying Eurasian and Hybrid Watermilfoil Gene Expression Differences in Response to Frequently Used Herbicides for Improved Adaptive Management</i>			
Rob Richardson and Jens Beets	North Carolina State University	2020	\$40,000
<i>Evaluation of Effect of Biotype on Biology and Response to Herbicides of Aquatic Macrophyte Species</i>			
Alyssa Anderson and Ryan Wersal	Minnesota State University – Mankato	2022	\$40,000
<i>The Photosynthetic Ecology of Parrotfeather (<i>Myriophyllum aquaticum</i>) and Implications for Future Spread</i>			
Del Hannay and Ryan Thum	Montana State University	2024	\$40,000
<i>Resolving Species Boundaries of Closely Related <i>Myriophyllum</i> Species for Improved Native Identification</i>			

Sustaining Members



AgroShield has been serving the Agriculture and Aquatic industries since 2015. Our Vodaguard product was developed to cure infections in the upper water column. Vodaguard's unique follow the bloom technology concentrates the cure where it is needed the most. Vodaguard C is a copper sulphate pentahydrate product. Vodaguard O is a sodium percarbonate that becomes hydrogen peroxide when introduced to water.

Both products have a patented formulation that allows them to be buoyant for 24 to 36 hours. Reduces manpower, machinery, and un-necessary product which reduces cost. Please visit us at: <https://www.agro-shield.com/our-products/algaeicides>.



AquaTechnex, LLC is a lake and aquatic plant management firm that operates in the Western United States. The company is expert in the use of aerial and boat GIS/GPS technologies to assess aquatic environments. The firm is also expert in the management of invasive aquatic weed species and phosphorous mitigation to

suppress toxic cyanobacteria blooms. Our web site is www.aquatechnex.com; please drop by regularly to get news updates as we have moved our blog onto the site.



Aquatic Control, Inc. has been managing aquatic resources since 1966. As a distributor of lake management supplies, floating fountain aerators, and diffused aeration systems, Aquatic Control represents all of the major brands of quality supplies and equipment. Aquatic Control offers aquatic resource services

including vegetation mapping, vegetation management services, phosphorus mitigation, fish management, fountain and aeration system installation, equipment maintenance, and factory-trained service and warranty repair throughout the Midwest. Harmful Algae Bloom monitoring programs with our in-house laboratory allow us to customize treatment plan design through control of the algae causing taste and odor or toxin production issues. Learn more at www.aquaticcontrol.com.



Aquatic Vegetation Control, Inc. (AVC) is a Florida corporation founded in 1986 offering vegetation management and general environmental consulting services throughout the southeast. Since its establishment as an exotic/nuisance vegetation management company specializing in the control of invasive wetland, aquatic and upland species, AVC has broadened its scope of capabilities to include; certified lake management, fish stocking, re-vegetation, mitigation and restoration services, mitigation monitoring services, aquatic, roadside, forestry and utility vegetation management, and environmental/ecological consulting.



Brewer International is a family-owned manufacturer of specialty adjuvants serving aquatic and vegetation management applicators and distribution partners nationwide for more than 50 years. Headquartered in Vero Beach, Florida, Brewer specializes in surfactants designed to improve pesticide penetration, wetting, bonding, and drift control. Our products help applicators maximize treatment effectiveness, improve efficiency, and reduce chemical footprint through enhanced pesticide uptake. Committed to quality, innovation, and customer partnership, Brewer International has built a reputation for delivering reliable solutions that meet and exceed industry standards.



Chem One is a national leader of Organic Copper Sulfate for aquatic management. With eight standard EPA label grades; Fine 20, 25, 30, 100, 200, Small, Medium and Large. Chem One has a grade to meet every customer's needs.

With our corporate offices and 78,000+ square foot warehouse in Houston, Texas, Chem One is a national wholesale company that is certified to ISO 9001, ISO 14001, OHSAS 18001.



Compliance Services International (CSI) is a leading regulatory consultancy providing innovative solutions for organizations faced with regulatory and environmental challenges. CSI's experienced scientists and regulatory specialists in the USA and the EU provide innovative approaches to solving regulatory and environmental challenges – combining traditional sciences with developing technologies to deliver economically sensible and scientifically sound results.



Cygnets Enterprises, Inc.

Cygnets Enterprises, Inc. is the largest, single source distributor of aquatic management products in the United States. With strategically placed offices and warehouses in Michigan, Indiana, Pennsylvania, North Carolina, California, and Idaho we provide quick access to any product you may need for your lake, pond, reservoir, or irrigation district. Our dedicated and experienced staff assures aquatic managers receive outstanding service to manage our valuable water resources.



Duke Energy “Building a smarter energy future”. **Duke Energy** (NYSE: DUK), a Fortune 150 company headquartered in Charlotte, N.C., is one of the largest energy-holding companies in the U.S. It employs 30,000 people and has an electric generating capacity of 51,000 megawatts through its regulated utilities, and 3,000 megawatts through its nonregulated Duke Energy Renewables unit. Duke Energy is transforming its customers' experience, modernizing the energy grid, generating cleaner energy, and expanding natural gas infrastructure to create a smarter energy future for the people and communities it serves. More information about the company is available at duke-energy.com. Follow Duke Energy on Twitter, LinkedIn, Instagram and Facebook.



Since 1973, **Diversified Waterscapes, Inc.** has offered lake management services and ecological products to professional applicators. Our proven field experience in pond and lake cleaning enabled us to develop an eco-friendly line of products that show dramatic results in any aquatic environment. With more than 45 years of experience, we have been providing aquatic treatment products and maintenance service for some of the world's best water features, including the famous Bellagio Fountain in Las Vegas – delivering clearly better results without harming the environment. Our mission is to combine extensive industry experience, mechanical aptitude and scientific knowledge to bring clarity, cleanliness and beauty to water features across the country.



Lake Restoration, located in MN, has specialized in controlling pond weeds, lake weeds, and nuisance algae since 1977. Lake Restoration's product line-up includes: Mizzen, a copper-based algaecide, Spritflo and Dibrox herbicides, a variety of pond dyes and nutrient reducers. Lake Restoration also manufactures the TORMADA product application boat, Vitaflume floating fountains, and the retractable Goose D-Fence system. For more information, visit www.lakerestoration.com.



The Lee County Hyacinth Control District was formed by the Florida Legislature in June 1961 to curtail excessive growths of water hyacinth. That same year, water managers from across the state convened in Lee County and formed the Hyacinth Control Society, now APMS, to share control strategies and develop a comprehensive management approach to Florida's most prolific aquatic plant. T. Wayne Miller, Jr. of Lee County served as the Society's President for the first two years and Lee County has been a supporting member of APMS since its inception.



Nutrien Ag Solutions is a full-service vegetation management company, providing innovative solutions and quality products for the aquatic plant management industry. The cornerstone of our success is our highly educated and trained field staff. With strong commitments to environmental stewardship, innovation, and technology, Nutrien Ag Solutions provides customized programs tailored to specific locations throughout the U.S. We are the country's leading vegetation management provider, and we're excited to introduce you to everything Nutrien Ag Solutions has to offer. Visit: NutrienAgSolutions.com/Specialty.




Oase (Oh-ah-suh) Professional, with US headquarters in Aurora, Ohio, is a global leader in fountain and water technology. We supply award-winning, innovative products, that are holistic and environmentally friendly, to lake and pond management companies, golf courses, municipalities and zoos. We offer the most effective solutions to your toughest lake and pond problems, whether it's too much organic sludge, too many nutrients or too little oxygen. Our proprietary formulations are developed and engineered in Germany to the highest quality standards in the industry and are now made and distributed in North America after decades of success in Europe. We use nature to our advantage, leaving nothing behind but beautiful, healthy water. And you receive the most value for your dollar with quick and sustainable results when following our suggested treatment plans. Be prepared to improve results, save time, reduce site visits, and exceed all of your lake and pond management goals with Lake Therapy by Oase Professional.





SOLitude Lake Management is a nationwide environmental firm committed to providing sustainable solutions that improve water quality, enhance beauty and preserve natural resources. SOLitude's team of aquatic scientists specializes in the development and execution of customized lake, stormwater pond, wetland and fisheries management programs. Services include water quality testing and restoration, algae and aquatic weed control, installation and maintenance of fountains and aeration systems, shoreline erosion control, muck and sediment removal and invasive species management. SOLitude partners with

homeowners associations, golf courses, private landowners, businesses and municipalities. For more information, visit SOLitude Lake Management at solitudelakemanagement.com.

 Invasive weeds can devastate both natural and commercial habitats. [Syngenta](#) provides high performance products to control destructive weeds while helping to restore the habitat of aquatic environments. Syngenta offers proven aquatic herbicides like Reward® and Tribune™ that provide fast burn-down, work well in cool weather and are rainfast in as little as 30 minutes. The active ingredient, diquat dibromide, has been used successfully in sensitive aquatic areas for over 25 years.



[TIGRIS](#) is revolutionizing surface water management. Formed in 2022, we operate as a platform company, bringing together the industry's most talented and respected veterans alongside top-performing providers across the nation. We are an organization dedicated to ensuring our waters and people thrive. Our goal is to forge a unique organization with a new approach to water management. Instead of relying on one-size-fits-all solutions or a limited service spectrum necessitating multiple vendors, TIGRIS provides comprehensive solutions from a single source. Our team of local specialists tailors these solutions to the specific needs of our clients' environments. Combined with the support and resources of a large national organization, TIGRIS introduces a transformative approach to surface water management. "One call covers it all," when it comes to your lake, pond, and wetland management and stormwater solutions.

  [UPL NA, Inc.](#) is a premier supplier of crop protection products and technologies designed for the agricultural, specialty, fumigation and aquatic markets. The [Aquatics Division is part of the Environmental Solutions group](#) which has manufactured aquatic herbicides and algaecides for the management of lakes, ponds, rivers and irrigation canals for more than 40 years. These products are marketed as Aquathol®, Hydrothol®, AquaStrike®, Current®, Symmetry®, Cascade®, Teton®, and Top Deck™. Most recently the development and commercialization of the ADAPT aquatic drone boat for improved application accuracy and efficiency was launched. With a customer-centric focus, UPL is committed to providing product stewardship and technical support to ensure your plant management operations are successful. Visit us at: <https://uplaquatics.com/>

Exhibitors

The Aquatic Plant Management Society thanks the following companies for exhibiting their products and services. This list was current when the Program was submitted for printing. Please visit the exhibit hall in the Gallery for all Exhibitors, including not-for-profit organizations*.

AERF*

Alligare

AquaMaster

Aquatic Control, Inc

Biosafe Systems

Brandt

Cygnat Enterprises Inc

FAPMS*

Kasco Marine

Keycolour-Synthesis

Nufarm

Nutrien Solutions

Oase Professional

Optix Technologies

The Orion Companies

Phoslock Environmental Technologies

RISE*

SePRO Corporation

Sharda CropChem Ltd

Syndel

Syngenta

UPL Environmental Solutions

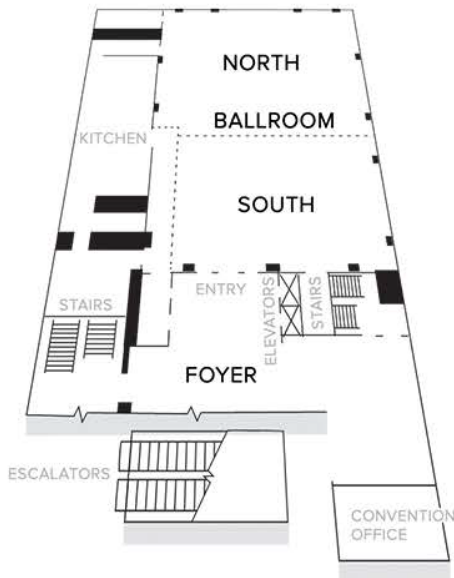
Vertex Aquatic Solutions

Conference and Event Rooms Floor Maps

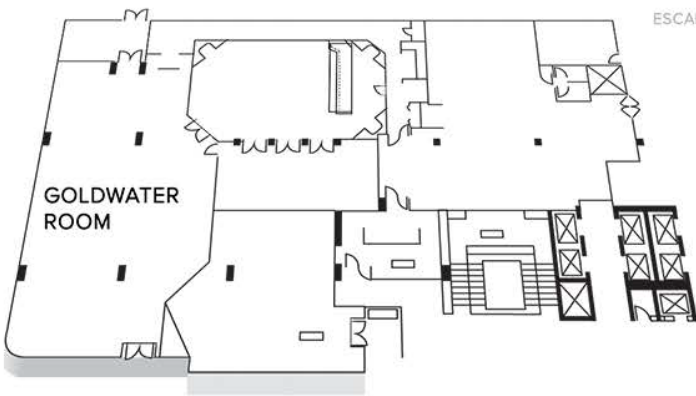
FIFTH FLOOR (Outdoor)



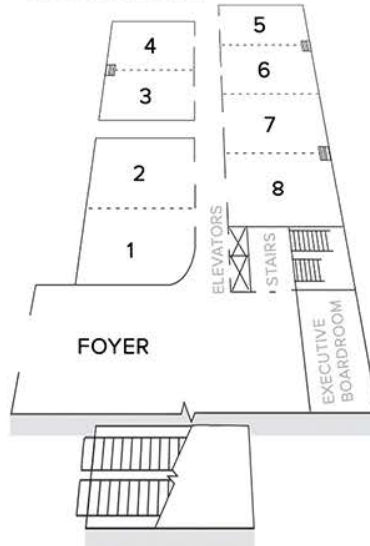
BALLROOM LEVEL



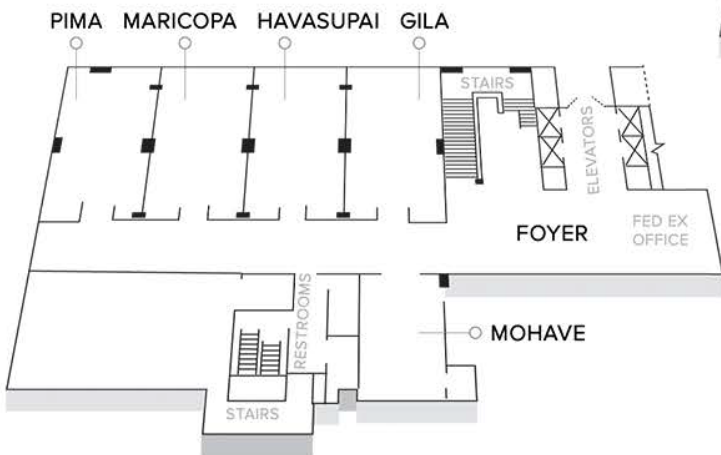
LOBBY LEVEL



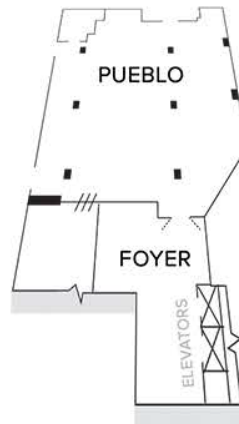
SALON LEVEL



LOWER LEVEL



STREET LEVEL



General Information and Events

Program Organization

The agenda is organized by day and time. For more event information, please see the Agenda at a Glance page for each day in this Program. Messages will be posted at the meeting registration desk. Most events will take place in the North and South Ballrooms. See the hotel site map on previous pages for event locations.

Name Badges

Your name badge is your ticket for all events at the meeting. Wear it to all activities during the meeting. All individuals participating in meeting events or activities must be registered and have a name badge. Non-registered guests may purchase tickets for the President's Reception, Poster Session Reception, and Awards Banquet at the meeting registration desk.

Meeting Registration Desk

The meeting registration desk will be in the Ballroom Foyer. Operating hours are noon until 4:30 pm on Monday July 13, 7:00 am until 4:30 pm on Tuesday and Wednesday July 14 and 15, and 8:00 am until 10:40 am on Thursday July 16.

Exhibits

Exhibits will be open from 7:00 am Tuesday July 14 through 5:00 pm Wednesday July 15 in the North Ballroom.

Continental Breakfasts / Networking Breaks

Continental breakfasts and mid-morning and afternoon networking breaks will be served each day in the North Ballroom. Please see the Agenda at a Glance for specific times. Also, take time to visit with Exhibitors while enjoying your breakfast or break.

Spur of the Moment Meeting Room

We can have room set up for breakout discussion and conference needs. Check at the meeting registration desk with Mr. Bill Torres to reserve.

APMS Board of Directors Pre-Conference Meeting:

Monday, July 13, 8:00 am to 4:00 pm Executive Boardroom

Officers, directors, and committee members will attend the pre-conference board of directors meeting.

Student Meet-and-Greet (at the hotel):

Monday, July 13, 6:00 pm to 7:00 pm, Dust Cutter, Renaissance Phoenix Downtown

All students registered for the meeting are invited to gather at Dust Cutter in the hotel to get to know other students prior to the Presidents' Reception. Beverages and light snacks will be provided. ***This students-only event is open to all students who are registered for the meeting.***

President's Reception (at the hotel):

Monday, July 13, 7:00 pm to 9:00 pm, Dust Cutter, Renaissance Phoenix Downtown

Join your APMS friends and colleagues at the President's Reception to "kick off" our annual meeting while enjoying a game atmosphere with food and beverages. The President's Reception is open to all registered delegates, guests, and students. Non-registered guests may purchase tickets at the meeting registration desk.

Past Presidents Luncheon:

Tuesday, July 14, 12:10 pm to 1:20 pm, Salon II

All APMS Past Presidents are invited to attend the Past Presidents' Luncheon to provide insight into matters facing APMS and aquatic plant managers. Jeremy Slade, Immediate Past President, will be the moderator. Please contact Jeremy to confirm your attendance.

Student Affairs Luncheon:

Tuesday, July 14, 12:10 pm to 1:20 pm, Salon I

All students registered for the meeting are invited to attend. This luncheon, provided by our sponsors, is a great opportunity to meet other students, interact with guest speakers and APMS leadership, and learn how to become more involved in the Society. Andrew Howell, Student Affairs Committee Chair, will be the moderator. Please contact Andrew to confirm your attendance.

Poster Session Reception:

Tuesday, July 14, 5:00 pm to 6:30 pm, North Ballroom

Posters will be available for viewing from 7:00 am Tuesday to 5:00 pm Wednesday in the North Ballroom. Poster presenters will be on hand during the Evening Poster Reception on Tuesday, July 14, 5:00 pm to 6:30 pm.

Regional Chapters Luncheon:

Wednesday, July 15, 12:10 pm to 1:20 pm, Salon I

Two representatives from each APMS regional chapter are invited to attend the Regional Chapter Discussion, provided by APMS sponsors. Regional Chapters Co-Committee Chairs Gray Turnage and Matt Johnson will be the moderators for discussions on aquatic plant management activities in each region. Please contact Gray to confirm your attendance.

Women of Aquatics Meeting (no lunch provided):

Wednesday, July 15, 12:10 pm to 1:20 pm, Salon II

Rosa Michaelson will host the Women of Aquatics Meeting to discuss opportunities for women in the field of aquatic plant management. Please contact Rosa to confirm your attendance.

Awards Reception/Banquet:

Wednesday, July 15, 7:00 pm to 10:00 pm, Reception (Ballroom Foyer), Banquet (South Ballroom)

Registered delegates, guests and students are invited to the Awards Banquet to be held in the hotel. After dinner, we will recognize those who have served APMS, and welcome new officers and directors. Our evening will conclude with a fund-raising raffle to support APMS students and other education initiatives.

APMS Post-Conference Board of Directors Meetings:

Newly elected officers, directors, and committee members will attend the post-conference board of directors meeting. Members will be provided with a web link for the meeting which will be held virtually following the conference.

Agenda at a Glance

Monday – July 13:

8:00 am - 4:00 pm	APMS Board of Directors Meeting (Executive Board Room)
7:00 am - 5:00 pm	Student Tour (Field sites)
12:00 pm - 5:00 pm	Exhibits and Poster Setup (North Ballroom)
12:00 pm - 4:30 pm	Registration (Ballroom Foyer)
6:00 pm - 7:00 pm	Student Meet & Greet (Dust Cutter, Renaissance Hotel)
7:00 pm - 9:00 pm	President's Reception (Dust Cutter, Renaissance Hotel)

Tuesday – July 14:

7:00 am - 5:00 pm	Exhibits (North Ballroom)
7:00 am - 7:50 am	Continental Breakfast (North Ballroom)
7:00 am - 4:30 pm	Registration (Ballroom Foyer)
8:00 am - 4:10 pm	General Session (South Ballroom)
12:10 pm - 1:20 pm	Student Affairs Luncheon (Salon I)
12:10 pm - 1:20 pm	Past President's Luncheon (Salon II)
5:00 pm - 6:30 pm	Poster Session Reception (North Ballroom)

Wednesday – July 15:

7:00 am - 5:00 pm	Exhibits (North Ballroom)
7:00 am - 8:00 am	Continental Breakfast (North Ballroom)
7:00 am - 4:30 pm	Registration (Ballroom Foyer)
8:00 am - 4:30 pm	General Session (South Ballroom)
12:10 pm - 1:20 pm	Regional Chapters Luncheon (Salon I)
12:10 pm - 1:20 pm	Women of Aquatics Meeting (Salon II)
4:30 pm - 5:00 pm	APMS Business Meeting (South Ballroom)
7:00 pm - 7:45 pm	APMS Awards Banquet Reception (Ballroom Foyer)
7:45 pm - 10:00 pm	APMS Awards Banquet (South Ballroom)

Thursday – July 16:

7:00 am - 8:00 am	Continental Breakfast (North Ballroom)
8:00 am - 10:40 am	Registration (Ballroom Foyer)
9:00 am - 11:40 am	General Session (South Ballroom)
12:00 pm	Meeting Adjourn

PROGRAM

TUESDAY MORNING - JULY 14, 2026

7:00 AM Continental Breakfast (North Ballroom)

Tuesday Plenary Session

Water in Arid Southwest – Policies, Allocation and Ecological Challenges

LOCATION: South Ballroom
TIME: 8:00 AM – 9:15 AM
MODERATOR: Mike Greer - APMS President-Elect
US Army Engineer Research and Development Center, Buffalo, NY

BOLD = PRESENTER

08:00 AM Presidential Address – Lyn Gettys

08:15 AM Key-Note Address - Water in the Arid Southwest Policies, Allocation & Ecosystem Challenges

Haley Paul – Senior Policy Director, Audubon Southwest, The National Audubon Society, Phoenix, AZ

08:55 AM Arizona Department of Forestry and Fire Management: Managing Invasive Species, Restoring Habitats and Reducing Fire Risk

Kelly Wolff¹ – Wildlife Program Manager
Aly McAlexander¹, Jessica Szopinski¹, Jacob Draper¹
¹Arizona Department of Forestry and Fire Management

09:15 AM Networking Break (North Ballroom)

Student Oral Competition: Session 1

LOCATION: South Ballroom
TIME: 9:40 AM - 12:00 PM Mountain Time
MODERATOR: Matt Johnson

BOLD = PRESENTER; ALL ARE PARTICIPATING IN THE STUDENT CONTEST

09:40 AM Preliminary Phenological Trends of Vallisneria Grown in Mesocosms

Maxwell Gebhart¹ and Gray Turnage¹
¹Geosystems Research Institute, Mississippi State University, Starkville, MS

10:00 AM Blurry Species Boundaries in Myriophyllum: Genomic Insights into Identification Challenges

Del Hannay¹ and Ryan Thum¹
¹Montana State University, Bozeman, MT

10:20 AM Phenology of *Hydrilla verticillata* subsp. *lithuanica* in the Connecticut River

Amber Riner¹, Nathan Harms², Benjamin Sperry³, Blake Derossette², Donald Faughnan⁴, Jonathan Glueckert¹, Jeremiah Foley⁵
¹Center for Aquatic and Invasive Plants, University of Florida, Gainesville, FL
²US Army Engineer Research and Development Center, Lewisville, TX
³US Army Engineer Research & Development Center, Gainesville, FL
⁴U.S. Army Corps of Engineers, New England District, Concord, MA
⁵Office of Invasive Species, Connecticut Agricultural Experiment Station, New Haven, CT

- 10:40 AM A Comparative Analysis of the Ecophysiology Between the Invasive Macroalgae Starry Stonewort (*Nitellopsis obtusa*) and the Native Macroalgae Chara (*Chara sp.*) to Predict Invasion Potential**
Thomas Zellmer¹, Ryan Wersal¹, Michael Greer², Christopher Ruhland¹
¹ Minnesota State University, Mankato, Mankato, MN
² US Army Engineer Research & Development Center, Buffalo, NY
- 11:00 AM Ecological Impacts of *Azolla caroliniana* on a River-fed Reservoir in Southwest Missouri**
Ben Cooper¹, Teresa Kruit¹, La Toya Kissoon-Charles¹
¹ Missouri State University, Springfield, MO
- 11:20 AM Investigating Surface-Applied Submersed Treatments for Crested Floating Heart (*Nymphoides cristata*) Control**
Corrina Vuillequez¹, Benjamin Sperry², Christopher Mudge³, Brett Bultemeier⁴, Lyn Gettys⁵
¹ Center for Aquatic and Invasive Plants, University of Florida, Gainesville, FL
² US Army Engineer Research and Development Center, Gainesville, FL
³ US Army Engineer Research & Development Center, Vicksburg, MS
⁴ UF/IFAS Pesticide Information Office, University of Florida, Gainesville, FL
⁵ Ft. Lauderdale Research and Education Center, University of Florida, Davie, FL
- 11:40 AM Beyond Code and Robots: Updates on Water Chestnut (*Trapa natans*) Adaptive Management in Long Island**
Carlos Morantes Ariza^{1,2}, Catherine McGlynn², Steven Pearson²
¹ Stony Brook University
² New York State Department of Environmental Conservation
- 12:00 PM Lunch on Your Own**
- 12:10 PM Past Presidents Luncheon (Salon II)**
- 12:10 PM APMS Student Affairs Luncheon (Salon I)**

TUESDAY AFTERNOON - JULY 14, 2026

Student Oral Competition: Sessions 2 and 3

LOCATION: South Ballroom
 TIME: 1:30 PM – 4:10 PM
 MODERATOR: TBA

- 01:30 PM New kid in the pond: How does florpyrauxifen-benzyl treatment impact various strains of Eurasian and hybrid watermilfoil?**
Olivia Schwartz¹, Ashley Wolfe¹ and Ryan Thum¹
¹ Montana State University, Bozeman, MT
- 01:50 PM Establishing Aquatic Herbicide Control Methods for European Frogbit (*Hydrocharis morsus-ranae* L.)**
April Moffett¹, Ryan Wersal¹, Ian Knight², and Michael Greer¹
¹ Minnesota State University, Mankato, MN
² US Army Engineer Research and Development Center, Vicksburg, MS
³ US Army Engineer Research & Development Center, Buffalo, NY
- 02:10 PM Assessing injury on *Eleocharis interstincta* after foliar applications of commonly used aquatic herbicides.**
Abigail Schulken¹, Julie Stich¹, Benjamin Sperry², Gregory MacDonald¹, Eli Russell¹
¹ Center for Aquatic and Invasive Plants, University of Florida, Gainesville, FL,
² US Army Engineer Research and Development Center, Gainesville, FL
- 02:30 PM Sponsor Updates**
- 02:50 PM Networking Break (North Ballroom)**

- 03:10 PM Assessing herbicide rainfastness for giant salvinia (*Salvinia molesta*) management**
Samantha Prinsloo¹, Christopher Mudge²
¹ Louisiana State University, Baton Rouge, LA
² US Army Engineer Research and Development Center, Baton Rouge, LA
- 03:30 PM Response of Four Vallisneria Species to Combination Herbicide Treatments**
Delaney Davenport¹, Kara Foley¹, Jens Beets², Robert Richardson¹
¹ North Carolina State University, Raleigh, NC
² Invasive Species and Pollinator Health Unit, USDA-ARS Davis, CA
- 03:50 PM Herbicide application timing can influence alligatorweed (*Alternanthera philoxeroides*) management.**
Kara Foley¹, Delaney Davenport¹, Robert Richardson¹
¹ North Carolina State University, Raleigh, NC

TUESDAY EVENING - JULY 14, 2026

Poster Session

LOCATION: North Ballroom
 TIME: 5:00 PM - 6:30 PM

BOLD = PRESENTER, † = STUDENT CONTEST

† Initial Concentration-Exposure Time Relationships for *Vallisneria × pseudorosulata* with Select Herbicides

Maxwell Gebhart¹ and Gray Turnage¹
¹ Geosystems Research Institute, Mississippi State University, Starkville, MS

† Seasonal Influences on Water Hyacinth (*Pontederia crassipes*) Response to Herbicides

Corrina Vuillequez¹, Benjamin Sperry², Mike Durham², Jonathan Glueckert¹, Amber Riner¹
¹ Center for Aquatic and Invasive Plants, University of Florida, Gainesville, FL
² US Army Engineer Research and Development Center, Gainesville, FL

† Management of Connecticut River Hydrilla (*Hydrilla verticillata ssp. lithuanica*) Turions with Imazamox and Florpyrauxifen-benzyl

Amber Riner¹, Gregory Macdonald¹, Eli Russell¹, Jeremiah Foley³, Joseph Bisesi¹, Benjamin Sperry²
¹ Center for Aquatic and Invasive Plants, University of Florida, Gainesville, FL
² US Army Engineer Research & Development Center, Gainesville, FL
³ Office of Invasive Species, Connecticut Agricultural Experiment Station, New Haven, CT

† Does Light Influence Herbicide Efficacy When Targeting Giant Salvinia (*Salvinia molesta*)?

Melissa Rucker¹, Christopher Mudge², Korey Pham¹, Benjamin Sperry³, Samantha Prinsloo²
¹ Louisiana State University, Baton Rouge, LA
² U.S. Army Engineer Research and Development Center, Baton Rouge, LA
³ US Army Engineer Research & Development Center, Gainesville, FL

† Screening aquatic labeled herbicides for efficacy on torpedograss (*Panicum repens*) and West Indian marsh grass (*Hymenachne amplexicaulis*)

Abigail Schulken¹, Julie Stich¹, Eli Russell¹
¹ Center for Aquatic and Invasive Plants, University of Florida, Gainesville, FL

† Assessing direct and indirect herbicide and surfactant toxicity to salvinia weevils (*Cyrtobagous salvinia*)

Samantha Prinsloo¹, Christopher Mudge²

¹ Louisiana State University, Baton Rouge, LA

² US Army Engineer Research and Development Center, Baton Rouge, LA

† **Phenological Study of Four Vallisneria Species in a Humid Subtropical Climate**

Delaney Davenport¹, Kara Foley¹, Jens Beets², Robert Richardson¹

¹ North Carolina State University, Raleigh, NC

² Invasive Species and Pollinator Health Unit, USDA-ARS Davis, CA

† **Does cold period affect the dormancy of curly-leaf pondweed (*Potamogeton crispus*) turions?**

Anna Agi¹, Kara Foley¹, Robert Richardson¹

¹ North Carolina State University, Raleigh, NC

† **Beyond final biomass: Modeling herbicide combination interactions in monoecious hydrilla (*Hydrilla verticillata*) management**

Maria Grazia Corrales-Jimenez¹, Kara Foley¹, Ramon Leon-Gonzalez, Robert Richardson¹

¹ North Carolina State University, Raleigh, NC

Maintenance Control of Hydrilla (*Hydrilla verticillata*) and Associated Sedimentation Rates

Michael Durham¹, Benjamin Sperry¹, Corrina Vuillequez², Jonathan Glueckert², Amber Riner²

¹ US Army Engineer Research & Development Center, Gainesville, FL

² Center for Aquatic and Invasive Plants, University of Florida, Gainesville, FL

Wingleaf Primrose-Willow (*Ludwigia decurrens*) in Northern California

Jens Beets¹, Whitney Brim-DeForest², Caryn Futrell¹, Vanessa Varela², Troy Clark², John Miskella¹, Luis Espino³, Sarah Marsh Janish⁴

¹ Invasive Species and Pollinator Health Unit, USDA-ARS Davis, CA

² University of California Cooperative Extension, Yuba City, CA

³ University of California Cooperative Extension, Oroville, CA

⁴ University of California Cooperative Extension, Colusa, CA

Geographic and genetic patterns of *Cyperus blepharoleptos* morphology in the invaded range

Gray Turnage¹, Samuel Schmid^{1,2}, Dean Williams³, Christopher Mudge⁴, Patrick Belk⁵, Stephen Enloe⁵

¹ Geosystems Research Institute, Mississippi State University, Starkville, MS

² University of Scranton, Scranton, PA

³ Texas Christian University, Ft. Worth, TX

⁴ US Army Engineer Research & Development Center, Baton Rouge, LA

⁵ Center for Aquatic and Invasive Plants, University of Florida, Gainesville, FL

Effect of ambient temperature after herbicide application on jointed spikerush (*Eleocharis interstincta*) injury

Julie Stitch¹, Abigail Schulken¹, Eli Russell¹

¹ Center for Aquatic and Invasive Plants, University of Florida, Gainesville, FL

Evaluating nonaquatic labeled herbicides for efficacy on torpedograss (*Panicum repens*) and West Indian marsh grass (*Hymenachnae amplexicaulis*)

Eli Russell¹, Abigail Schulken¹, Julie Stitch¹

¹ Center for Aquatic and Invasive Plants, University of Florida, Gainesville, FL

Chemical Control of Hydrilla (*Hydrilla verticillata*) in Small Plots with High Water Exchange

Jonathan Glueckert¹, Benjamin Sperry², Michael Durham², Ian Markovich³, Corrina Vuillequez¹, Amber Riner¹

¹ Center for Aquatic and Invasive Plants, University of Florida, Gainesville, FL

² US Army Engineer Research & Development Center, Gainesville, FL

³ US Army Corps Engineers, Jacksonville District, Palatka, FL

WEDNESDAY MORNING - JULY 15, 2026

7:00 AM Continental Breakfast (North Ballroom)

LOCATION: South Ballroom
TIME: 8:00 AM - 12:00 PM
MODERATOR: TBD

BOLD = PRESENTER

08:00 AM Endangered Species Act on Pesticide Labels: Yes, It Will Happen in Aquatics

Brett Bultemeier¹

¹ UF/IFAS Pesticide Information Office, University of Florida, Gainesville, FL,

08:20 AM A field demonstration of dioecious hydrilla (*Hydrilla verticillata*) control in the Spring Creek arm of Lake Seminole

Michael Durham¹, Benjamin Sperry¹, Corrina Vuillequez², Jonathan Glueckert², Amber Riner²

¹ US Army Engineer Research & Development Center, Gainesville, FL

² Center for Aquatic and Invasive Plants, University of Florida, Gainesville, FL

08:40 AM Assessment of Integrated Pest Management Control Strategies for Cuban Bulrush (*Cyperus blepharoleptos*)

Christopher Mudge¹, Gray Turnage², Samantha Prinsloo³

¹ U.S. Army Engineer Research and Development Center, Baton Rouge, LA

² Geosystems Research Institute, Mississippi State University, Starkville, MS

³ Louisiana State University, Baton Rouge, LA

09:00 AM Scaling Submersed Aquatic Herbicide Research: 4D Chess vs. Checkers

Benjamin Sperry¹

¹ US Army Engineer Research & Development Center, Gainesville, FL

09:20 AM Giant water sensitive plant (*Aeschynomene fluitans*) biology and management

Stephen Enloe¹

¹ Center for Aquatic and Invasive Plants, University of Florida, Gainesville, FL

09:40 AM Special Representative Reports – AERF, BASS

10:00 AM Networking Break (North Ballroom)

10:20 AM Response of Lake Tohopekaliga Hydrilla (*Hydrilla verticillata*) to Endothall and Fluridone

Lyn Gettys¹, Jennifer Bishop¹, Kelli Gladding¹

¹ Ft. Lauderdale Research and Education Center, University of Florida, Davie, FL

10:40 AM Application of Remote Sensing for HAB Management: 2024 APMS Symposium Highlights and Case Study

Andrew McQueen¹, Alyssa Calomeni-Eck¹, Molly Reif¹, Gray Turnage², Ciera Kinley-Baird³, Thomas Howard⁴

¹ US Army Engineer Research and Development Center, Vicksburg, MS

² Geosystems Research Institute, Mississippi State University, Starkville, MS

³ Aquatic Control, Inc., Seymour, IN

⁴ Resolve Hydro LLC.

- 11:00 AM Special Session – 20 Years of Aquatic Plant Management: What’s Changed?**
Rob Richardson¹, R. Wersal², M. Heilman³, L. Gettys⁴, B. Bultemeir⁵, C. Mudge⁶, N. Harms⁷, L. Van Wychen⁸, T. McNabb⁹, T. Goldsby¹⁰, and J. Petta¹¹
¹ North Carolina State University, Raleigh, NC
² Minnesota State University, Mankato, MN
³ SePRO Corporation, Carmel, IN
⁴ UF/IFAS Pesticide Information Office, University of Florida, Gainesville, FL
⁵ Ft. Lauderdale Research and Education Center, University of Florida, Davie, FL
⁶ U.S. Army Engineer Research and Development Center, Baton Rouge, LA
⁷ US Army Engineer Research and Development Center, Vicksburg, MS
⁸ Weed Science Society of America, Alexandria, VA
⁹ Aquatechnex, LLC, Bellingham, WA
¹⁰ Jones Lake Management, Guntersville, AL
¹¹ Aquatic Ecosystem Restoration Foundation, Marietta, GA

12:00 PM Lunch on Your Own

12:10 PM Regional Chapters Luncheon (Salon I)

12:10 PM Women of Aquatics Meeting – No Lunch Served (Salon II)

WEDNESDAY AFTERNOON - JULY 15, 2026

LOCATION: South Ballroom
TIME: 1:30 PM - 4:30 PM
MODERATOR: TBA

BOLD = PRESENTER

- 01:30 PM Determining the response of *lyngbya (Microseria wollei)* to consecutive annual algaecide applications**
Rob Richardson¹, Jessica Baughman¹
¹ North Carolina State University, Raleigh, NC
- 01:50 PM Multi-Barrier Phosphorus Control: Integrating Lanthanum-Modified Bentonite, Coagulants, and Peroxides for Durable Cyanobacteria Suppression**
Bush Heathman¹, Anja Brey², Andrew Skibo³
¹ Phoslock Environmental Technologies, Milwaukee, WI
² East Bay Regional Parks, Orinda, CA
³ Amaruq Environmental Services, Missoula, MT
- 02:10 PM The Lake's Thumbprint: Algal Community Structure in Littoral Zones of Lake Springfield, A Reservoir in Southwest MO.**
Teressa Kruit¹, Alex Geeslin¹, La Toya Kissoon-Charles¹
¹ Missouri State University, Springfield, MO
- 02:30 PM Special Representative Reports – Women of Aquatics, CAST**
- 02:50 PM Networking Break (North Ballroom)**
- 03:10 PM Nuisance plant or nitrogen cycling powerhouse? *Azolla caroliniana* responses to mild winters in a polluted river-fed system**
Sarah Guymon¹, Anna Schwarm¹, Jaslyn Johnson¹, Anna Faust¹, La Toya Kissoon-Charles¹
¹ Missouri State University, Springfield, MO

- 03:30 PM Preliminary results of field trials for reduction of invasive *Vallisneria spiralis* in Florida**
Gray Turnage¹, Dean Jones², Max Gebhart¹, Andrew Black³
¹Geosystems Research Institute, Mississippi State University, Starkville, MS
²Nutrien Solutions, Auburndale, FL
³Florida Freshwater Fish and Wildlife Commission, Tallahassee, FL
- 03:50 PM Macrophyte Management and Harmful Algal Blooms: Risk Predictors and Proactive Strategies**
Alyssa Calomeni-Eck¹, Andrew McQueen¹, Paige Krupa¹, Benjamin Sperry², Bradley Sartain¹
¹US Army Engineer Research and Development Center, Vicksburg, MS
²US Army Engineer Research & Development Center, Gainesville, FL
- 04:10 PM Predicting Benthic Exposure of Solid-Peroxide Algaecides for HAB Control**
Alyssa Calomeni-Eck¹, Claire Middendorf², Andrew McQueen¹, Justin Wilkens¹, Ciera Kinley-Baird³, Tom Warmuth⁴, Jeff Kline⁴
¹US Army Corps of Engineers - Engineer Research and Development Center, Vicksburg, MS
²Purdue University, West Lafayette, IN
³Aquatic Control Inc., Seymour, IN
⁴BioSafe Systems, East Hartford, CT
- 04:30 PM Annual Business Meeting (South Ballroom)**
- 07:00 PM APMS Awards Banquet Reception (Ballroom Foyer)**
- 07:45 PM APMS Awards Banquet (South Ballroom)**

THURSDAY MORNING - JULY 16, 2026

7:00 AM Continental Breakfast (North Ballroom)

LOCATION: South Ballroom
 TIME: 8:00 AM - 11:40 AM
 MODERATOR: TBD

BOLD = PRESENTER

- 08:00 AM From Strains to Strategies: Integrating Genetics and Herbicide Response in Aquatic Plant Management**
Ashley Wolfe¹, Ryan Thum¹, Greg Chorak¹
¹Montana State University
- 08:20 AM Fast and Furious: Measuring the Efficiency of an Upgraded Harvester on *Nuphar advena***
Hannah Oswalt¹
¹Lee County Hyacinth Control District, Lehigh Acres, FL
- 08:40 AM Precision Mapping and Volume Measurement for Pesticide Applications**
Harry Knight¹
¹Optix Technologies, Waverly, AL
- 09:00 AM Response of Monoecious Hydrilla to Intermittent Herbicide Exposures**
Jens Beets¹, Erika Haug², Benjamin Sperry³, Ramon Leon-Gonzalez⁴, W. Gregory Cope⁴, Wesley Everman⁵, Robert Richardson⁴
¹Invasive Species and Pollinator Health Unit, USDA-ARS Davis, CA
²North Carolina Department of Environmental Quality, Raleigh, NC,
³US Army Engineers Research Development Center, Gainesville, FL
⁴North Carolina State University, Raleigh, NC
⁵Iowa State University, Ames, IA

09:20 AM Hydrilla (*Hydrilla verticillata*, subsp. *lithuanica*) Control on Riverine Littoral Zones in Connecticut

Benjamin Sperry¹, Michael Durham¹, Jonathan Glueckert², Amber Riner², Bailey Coomes¹, Donald Faughnan³

¹ US Army Engineer Research and Development Center, Gainesville, FL

² University of Florida Center for Aquatic and Invasive Plants, Gainesville, FL

³ US Army Corps of Engineers, New England District

09:40 AM Impacts of Invasive Mollusks on Aquatic Ecosystems and Effective Management
West Bishop¹

¹ SEPRO, Whitakers, NC

10:00 AM Networking Break (North Ballroom)

10:20 AM Best Practices for Sonar Data Collection & Waypoint Management

Ryan Sullivan¹

¹ BioBase LLC., Nashville, TN

10:40 AM Utilizing Herbicide Impregnated Paper-Based Granules for Water Lettuce Control

Eli Russell¹, Abigail Schulken¹, Julie Stich¹, Gregory MacDonald¹

¹ University of Florida Center for Aquatic and Invasive Plants, Gainesville, FL

11:00 AM Chemical Control of Hydrilla (*Hydrilla verticillata*, subsp. *lithuanica*) in Tidally Influenced Sections of the Connecticut River

Jonathan Glueckert¹, Benjamin Sperry², Michael Durham², Amber Riner¹, Bailey Coomes², Donald Faughnan³

¹ University of Florida Center for Aquatic and Invasive Plants, Gainesville, FL

² US Army Engineer Research and Development Center, Gainesville, FL

³ US Army Corps of Engineers, New England District

11:20 AM Can Planting Native SAV Suppress Hydrilla (*Hydrilla verticillata*) Regrowth After Herbicide Treatment?

Lyn A Gettys¹, Jennifer H Bishop¹, Chad Keates¹, Megan K Reid¹

¹ Ft. Lauderdale Research and Education Center, University of Florida, Davie, FL

11:40 AM Conference Concludes

SAVE THE DATE FOR AUSTIN, TEXAS!! July 11-16, 2027



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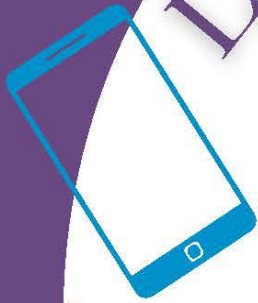


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Thank you!



The **Aquatic Plant Management Society, Inc.** is an international organization of scientists, educators, students, commercial pesticide applicators, administrators, and concerned individuals interested in the management and study of aquatic plants. The membership reflects a diversity of federal, state, and local agencies, universities and colleges around the world, corporations, and small businesses. Membership applications are available at the meeting registration desk and online at www.apms.org.

The **Vision** of the Aquatic Plant Management Society is to be the leading international organization for scientific information on aquatic plant and algae management.

The **Mission** of the Aquatic Plant Management Society is to provide a forum for the discovery and dissemination of scientific information that advances aquatic plant and algae management policy and practice.

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ABSTRACTS

Abstracts are listed in alphabetical order by presenter's last name; poster and presentation abstracts are combined.

Does cold period affect the dormancy of curly-leaf pondweed (*Potamogeton crispus*) turions?

Anna Agi¹, Kara Foley¹, Robert Richardson¹

¹ North Carolina State University, Raleigh, NC

Curly-leaf pondweed (*Potamogeton crispus*, CLP) is an invasive aquatic weed species that was introduced to the United States in the 1840s. This species is commonly found in eutrophic, alkaline waters that are rich in phosphorus and cooler in temperature. CLP disperses and becomes established in freshwater ecosystems through vegetative reproductive structures called turions that overwinter and form new plants. This research evaluates the effect of overwintering duration on turion sprouting time. Turions were collected from Chautauqua Lake, New York in June 2025 and were brought back to NCSU to be placed in a cold chamber. Two turions were planted in 88 ml cups 2cm below the surface in a soil substrate and capped with sand. Planted turions were stored in a cold chamber (approximately 4.4°C) for 2, 4, 6, 8, 10, 12, 20, or 24 weeks. All treatments were replicated three times (n=24). Following cold dormancy, planted turions were transferred to greenhouse tanks (approximately 18.3°C) to mimic the change in seasons to spike spring growth. Results showed that regardless of time spent in cold chamber, once transferred to greenhouse, most turions initiated sprouting around the 20 to 24-week mark post-initial cold chamber exposure. These findings would mimic the natural environment as CLP tends to overwinter for 5 to 6 months under field conditions. A second trial is set to occur in June of 2026. Increased understanding of the phenology of this species could better help practitioners with management efforts in the future.

Wingleaf Primrose-Willow (*Ludwigia decurrens*) in Northern California

Jens Beets¹, Whitney Brim-DeForest², Caryn Futrell¹, Vanessa Varela², Troy Clark², John Miskella¹, Luis Espino³, Sarah Marsh Janish⁴

¹ Invasive Species and Pollinator Health Unit, USDA-ARS Davis, CA

² University of California Cooperative Extension, Yuba City, CA

³ University of California Cooperative Extension, Oroville, CA

⁴ University of California Cooperative Extension, Colusa, CA

Wingleaf primrose-willow [*Ludwigia decurrens* (Walter) DC] is a pervasive rice weed native or naturalized to South America, the Caribbean and the Southeastern United States. While it was first noted in California in 2011 and provided with the highest pest rating "A" by California Department of Food and Agriculture, enforcing eradication or quarantine it was relatively disregarded and did not appear to spread significantly past its initial infestation area. Here, we report the spread within four counties (Butte, Placer, Shasta, and Tehama) of California, spanning 184 km and the expansion of the initial infestation within Butte County. As a problematic rice weed in parts of Asia, Africa, India, and the United States, monitoring new infestations is pivotal to prevent negative economic and environmental consequences to California and the United States.

Response of Monoecious Hydrilla to Intermittent Herbicide Exposures

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Hydrilla (*Hydrilla verticillata*) is a persistent aquatic weed in many lakes and reservoirs across the United States. In flowing environments, increased flow and water exchange rates commonly result in shorter herbicide exposure times using traditional application techniques. This research evaluated the concept of intermittent herbicide exposure as a potential management strategy to overcome operational challenges in high water exchange environments. Monoecious hydrilla response to intermittent exposure to florpyrauxifen-benzyl, endothall, and fluridone at multiple concentrations and non-treatment intervals was evaluated in greenhouse-scale mesocosm experiments. Decreased efficacy was not observed when non-treatment intervals between exposures were introduced in florpyrauxifen-benzyl treatments. Monoecious hydrilla treated with 30 µg ai L⁻¹ florpyrauxifen-benzyl and a 6-day non-treatment interval resulted in 89% reduction in aboveground biomass. Non-treatment intervals did not influence endothall efficacy and biomass reduction increased with herbicide concentration (66 to 93%). Fluridone treatments at 5 µg L⁻¹ resulted in 82% biomass reduction while treatments at 10 and 15 µg L⁻¹ resulted in 89% biomass reduction. Biomass reduction was slightly lower in fluridone applications with a 12-day non-treatment interval (83%) compared to other non-treatment intervals (85 to 91%). The high biomass reduction and similar response between treatments observed suggests the need for additional refinement and operational verification of intermittent herbicide exposures for monoecious hydrilla control to increase cost-effectiveness and efficiency in public hydrilla control programs.

Impacts of Invasive Mollusks on Aquatic Ecosystems and Effective Management

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Invasive mollusks can alter nutrient cycling and energy flow in aquatic ecosystems, with significant implications for harmful cyanobacterial blooms, mat forming algae and macrophyte growth. From island apple snails decimating aquatic vegetation and rice production to quagga mussels increasing water clarity and promoting expansive *Cladophora* mats, these species drive significant ecological change. Beyond ecological impacts, invasive mollusks impose substantial economic costs across multiple water-use sectors, including recreation, drinking water supply, industrial operations, irrigation infrastructure, and aquaculture. This presentation will synthesize key ecological and economic impacts of invasive mollusks across the United States and highlight research evaluating U.S. Environmental Protection Agency registered molluscicides for their control to enhance awareness and systems focused management opportunities.

Endangered Species Act on Pesticide Labels: Yes, It Will Happen in Aquatics

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The United States Environmental Protection Agency (EPA) has had to make radical changes to pesticide labels as it relates to the Endangered Species Act. As part of the settlement from a mega lawsuit they have agreed to develop new language for Insecticides, Fungicides, and Herbicides. The plan for Insecticides and Herbicides is done and being implemented currently. Agriculture is the first to see these changes and they are happening quickly. Although the EPA started in agriculture it is clear the intent is for "all non-residential pesticides" to comply with these new rules as well. This presentation will explain these changes, show how they have been implemented in agriculture, and explain how they are likely to show up on aquatic labels. After this talk aquatic plant managers will be better prepared to proactively have conversations with EPA and various stakeholders to be ready for compliance with the Endangered Species Act once it shows up on Aquatic labels.

Macrophyte Management and Harmful Algal Blooms: Risk Predictors and Proactive Strategies

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Management of invasive aquatic plants is necessary to maintain ecological functions and designated uses of water resources. However, a particular concern often shared by resource managers and stakeholders that has delayed macrophyte management is the potential for harmful algal blooms (HABs) to occur following plant die-off. Although concerns highlight the importance of this issue, there has been limited synthesis of peer-reviewed literature to comprehensively characterize and contextualize the current scientific understanding. Therefore, the objective of this literature review was to summarize the scientific literature on the topic and to assess potential strategies and approaches that may help mitigate associated risks. Eleven relevant studies were identified: five were field monitoring assessments exploring the relationship between macrophyte management, water quality, and algal parameters; three were microcosm or mesocosm experiments focused on specific aspects of macrophyte-HAB interactions; and three were perspective or social science papers. Hypotheses derived from this literature review were that certain conditions, such as shallow waterbodies with a history of HABs, intensive management actions (e.g., whole-lake treatments), and nutrient-rich environments may promote conditions more favorable for HAB formation following macrophyte management. This literature review aims to serve as a foundation to encourage future research and support decision-making focused on practical solutions.

Predicting Benthic Exposure of Solid-Peroxide Algaecides for HAB Control

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Solid-peroxide algaecides have been used to preventatively treat overwintering cyanobacteria in sediment prior to a bloom as well as active benthic harmful algal blooms (HABs). However, the effectiveness of these treatments hinges upon achieving appropriate exposures to the lake bottom where cells are located. This experiment evaluated the impacts of algaecide prill radii as well as the environmental variables (e.g., water temperature and column depth) on settling and dissolution rates to develop predictive exposure models for benthic applications. Increased prill radii enhanced settling rates and decreased dissolution rates, while elevated water temperatures increased both settling and dissolution rates. Predictive exposure models using settling and dissolution rates allow the estimation of lake bottom exposures, inform selection of appropriate benthic algaecides, provide a practical approach to adjust algaecide treatments, and can increase treatment efficacy across different aquatic systems.

Ecological Impacts of *Azolla caroliniana* on a River-fed Reservoir in Southwest Missouri

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Lake Springfield, a shallow reservoir in southwestern Missouri fed by the James River and Galloway Creek, is known to experience frequent algal blooms. Point and non-point pollution sources have led to high *Escherichia coli* concentrations in these inflow sources and high algal abundance in the reservoir. Several aquatic plants inhabit Lake Springfield, including *Azolla caroliniana*, which was first observed in 2020. *Azolla* is a fast growing, free-floating aquatic fern that has a symbiotic relationship with nitrogen-fixing *Anabaena azollae*. Due to this symbiosis, it quickly forms thick mats on the surface of water, shading out submerged vegetation. Decomposing *Azolla* mats can release nitrogen and phosphorus leading to algal blooms, which can result in decreased dissolved oxygen and biodiversity. Widespread growth of this macrophyte can further enrich Lake Springfield with nutrients and compound its excessive algae problem.

Monitoring and controlling Azolla growth can limit a chain reaction of these negative impacts. Our goal was to determine how Azolla influences seasonal water characteristics of Lake Springfield, and how it impacts other macrophytes in the reservoir. We hypothesized that when Azolla is dormant and senescing, nutrient concentration and algal abundance will increase, and macrophyte abundance will decrease when Azolla is present. We collected surface water samples from the outflow, reservoir, and inflow every month during Azolla's growing season and every three months outside the growing season. We analyzed these samples to quantify phosphate, nitrate, ammonia, and chlorophyll-a. We will also conduct plant surveys in June when Azolla is absent, and in August, when it's present. Preliminary results showed that nitrates were higher when Azolla was absent and senescing than when it was present. Chlorophyll-a was higher when Azolla was present than when it was absent and senescing. The increased nitrates could indicate nutrient release by decaying Azolla and lack of plant uptake outside the growing season. High algal abundance could be due to a combination of symbiotic relationships and environmental conditions that favor both Azolla and algae. Our findings will inform lake managers of this newly introduced species' impact on the reservoir and help with making decisions regarding macrophyte control and nutrient management.

Beyond final biomass: Modeling herbicide combination interactions in monoecious hydrilla (*Hydrilla verticillata*) management

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Hydrilla (*Hydrilla verticillata* (L.f.) Royle, Hydrocharitaceae) is a submerged aquatic macrophyte introduced to the United States in the early 1950s. It has become a highly invasive species and is considered the most economically damaging invasive aquatic species. It also poses great ecological threats to freshwater ecosystems. The most common management strategies for hydrilla include biological, mechanical and chemical approaches. Fluridone is a systemic herbicide from WSSA Group 12 (PDS Inhibitor) and has been one of the most used herbicides for hydrilla management. The use of herbicide mixtures has been recommended to reduce the selection of herbicide resistant plant populations, increase the level of control for a given weed, and allow the use of lower herbicide rates. Herbicides in a mixture may exhibit one of three possible interactions: synergism, additivity, or antagonism. Given the range in plant responses and the potential for both negative and positive outcomes for weed management, determining herbicide interactions before using mixtures would be of great value to weed managers. The objective of this study is to determine the effects of fluridone mixtures for managing monoecious hydrilla, with an emphasis on understanding interactions among herbicide chemistries. Monoecious hydrilla apical stem fragments were established in small-scale mesocosms and treated with ten herbicide treatments. These included applications of fluridone, diquat, flumioxazin, penoxsulam and endothall individually, as well as combinations of each herbicide with fluridone. Herbicides were applied via surface injection with an exposure time of 45 days. Plant response was evaluated through weekly visual control assessments, and final biomass was collected via destructive harvest in order to determine the percent reduction six weeks after treatment completion. Results showed an additive interaction between the herbicides that composed all mixtures, and no significant differences in percent control of hydrilla between the treatments.

Response of Four Vallisneria Species to Combination Herbicide Treatments

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Vallisneria is a genus of submersed aquatic macrophytes that have been historically prioritized for revegetation projects across the Eastern United States. Previously, all populations within the United States were classified as *Vallisneria americana*, which is valued for its many ecosystem services. In recent years, genetic evaluations have revealed that there are two native species (*V. americana* and *V. neotropicalis*) and more concerningly, three non-native populations (*V. australis*, *V. spiralis*, and *V. x pseudorosulata*) within the US. The establishment of these non-native species presents challenges for management due to a lack of knowledge surrounding their ecology and response to chemical control regimes. The primary objective of this work aims to evaluate the efficacy of herbicide combinations containing endothall, copper, diquat, and

bispyribac on four *Vallisneria* taxa. All products listed were used alone, and in combination with one another. Each experimental unit containing two mature plants sustained a 72-hour exposure time and were moved into untreated water to end the exposure. Destructive harvests occurred at 56 and 112 DAT in order for dry weight data to be analyzed. Results from 2 runs demonstrate that endothall applied alone at 3ppm reduced aboveground biomass of all tested *Vallisneria* species by at least 95% 16 weeks after treatment. Regrowth potential for all species following endothall applications was significantly different than the nontreated controls, indicating that endothall may be a useful tool in controlling non-native *Vallisneria* species where extended exposure times are achievable. More research is needed to determine if selective control of *Vallisneria* species can be achieved with other chemistries and exposure times.

Phenological Study of Four *Vallisneria* Species in a Humid Subtropical Climate

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The genus *Vallisneria* has over a dozen species distributed globally across freshwater ecosystems, occupying several climatic zones. *Vallisneria* is a dioecious herbaceous monocot that can spread via sexual and asexual reproduction. Several species have a meadow-like growth form, facilitating beneficial habitat for fish and macroinvertebrates. In addition to the native species *V. americana*, several other species belonging to the genus have been identified in United States waterbodies. A native (*V. neotropicalis*) and three non-native species (*V. australis*, *V. spiralis*, and *V. x pseudorosulata*) have been detected through genetic analyses. With alarmingly similar morphology, identifying these species visually is often unreliable. The objective of this work was to examine both morphological and phenological characteristics displayed by these species when grown in Raleigh, North Carolina, a humid subtropical climate (Köppen classification Cfa). Species were planted according to a common garden design and allowed to grow for a total of 8 months. Throughout the study visual evaluations (e.g., leaf length, leaf width, ramet count, flower production) occurred monthly, and biomass harvests occurred bimonthly. Notable differences in flower production rates and timing were documented between *Vallisneria* species, with *V. australis* producing the most flowers in November. Differences in flower production may aid in appropriately timing herbicide applications for certain *Vallisneria* species in the future. *Vallisneria neotropicalis* produced the most ramets in October, but by January of the following year *V. x pseudorosulata* produced a comparable number of ramets. Future research should investigate whether different climatic conditions will influence these findings, or if they remain consistent.

Maintenance Control of Hydrilla (*Hydrilla verticillata*) and Associated Sedimentation Rates

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Research demonstrates that maintenance control of invasive aquatic plants (i.e., maintaining plant populations at the lowest feasible level) is the most effective strategy for reducing both management costs and invasive plant impacts. However, a common concern is that herbicide use exacerbates organic matter deposition within waterbodies due to decaying plant material, contributing to algal blooms and reductions in water clarity. Both chemical control and mechanical harvesting techniques are used for management of hydrilla (*Hydrilla verticillata* (L.f.) Royle). The objective of this study was to evaluate the effects of chemical control and mechanical harvesting on water quality parameters, sedimentation rates and turion production associated with treating hydrilla when plant stands were at 50 or 100 percent volume inhabited (PVI) of the water column. Hydrilla sprigs were planted in 900 L concrete mesocosms and evaluated every 2 weeks until meeting the 50 or 100 PVI threshold. Once the threshold was met, the tank was treated with endothall at 3 ppm for 48 hours or clipped at the hydrosol surface. This cycle was allowed to continue for two years before the tanks were drained and the sediments were analyzed and the axillary and subterranean turions densities quantified. Minimal differences of organic sedimentation between treatments were observed and all forms of intervention resulted in higher DO and lower water temperature. High frequency

herbicide use resulted in 88% less tuber production than the untreated while high frequency harvesting only resulted in a 30% reduction.

A field demonstration of dioecious hydrilla (*Hydrilla verticillata*) control in the Spring Creek arm of Lake Seminole

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In December of 2025, simultaneous applications of dipotassium salt of endothall and imazamox at 5 ppm and 150 ppb, respectively, were applied as metered drips to the Spring Creek arm of Lake Seminole to suppress an infestation of about 475 ha of dioecious hydrilla [*Hydrilla verticillata* (L.F.) Royle]. The application was made over two consecutive 9-hour days. Rhodamine water tracer (RWT) dye was applied in conjunction with the herbicide treatment to monitor in situ water exchange processes with both continuous monitoring by deployed sondes and discrete point sampling with a hand-held sonde. Twelve, 4-hectare plots were established to monitor treatment efficacy through collecting water column biovolume density with sonar equipment and species frequency and density by twist-rake point intercept sampling. Temperature data was collected throughout the water column along multiple transects to monitor potential thermoclines. At application, no surface mats of hydrilla were present, typical of winter-time growth in Southern Georgia. Results from this study are forthcoming and should provide insight into hydrilla management in flowing systems using novel herbicide combinations.

Giant water sensitive plant (*Aeschynomene fluitans*) biology and management

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Giant water sensitive plant (*Aeschynomene fluitans*) is a perennial leguminous forb with hollow, spongy stems, small pinnately divided leaves, and yellow, pealike flowers. It is native to southern Africa but has been in the aquatic plant trade in the US for over two decades. It was first documented spreading on Lake Dosson in Hillsborough County, Florida in 2011. Although spread to other water bodies has been limited, recent eradication efforts with triclopyr alone have not been successful. Furthermore, there is interest in better understanding its invasion biology to develop more effective IPM strategies. To address this, floating stems were collected from Lake Dosson in February 2025 and greenhouse propagated in 75-liter tubs filled with potting soil. Following establishment, tubs were placed at a 15-degree angle in 900 L concrete aquatic mesocosms to simulate conditions along a lake margin. Plants were grown for sixty days until floating mats were well established across each mesocosm. Foliar herbicide treatments were then applied to three replicate mesocosms each in September 2025 and included glyphosate (2.21 kg ha⁻¹), triclopyr (0.8 kg ha⁻¹), 2,4-D (2.1 kg ha⁻¹), and two-way combinations of each. Plants were grown for 90 days following treatment. Data collection included visual evaluations of defoliation at 30, 60, and 90 days after treatment (DAT) and final biomass harvests at 90 DAT. Additionally, fruits were collected from untreated controls monthly to assess seed fill and germinability. We found glyphosate and triclopyr applied alone and in combination resulted in greater than 90% defoliation and 97% total biomass reduction. Treatments of 2,4-D applied alone or in combination with triclopyr were significantly less effective than triclopyr or glyphosate applied alone. No herbicide treatment eliminated all living tissue, and some regrowth was evident in almost all mesocosms. Fruits but not seeds were buoyant for more than seven days. Seed fill was greater than 95% among fruits tested. Initial germination studies also indicated seed require scarification for successful germination. These results indicate the species can rapidly establish from stem fragments and produce numerous floating fruits and viable seeds. The plant is very susceptible to both glyphosate and triclopyr, but retreatments will be required. Future research should examine herbicide retreatment intervals and factors affecting recruitment via seed and stem fragments.

Herbicide application timing can influence alligatorweed (*Alternanthera philoxeroides*) management.

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Alligatorweed (*Alternanthera philoxeroides*) is an emergent aquatic plant that was introduced to the Southeastern United States in the 1800's where it now poses serious ecological and economic threats that include increased flood risk, interference with navigation, and sheltering vectors of human disease. Alligatorweed management is most often accomplished through herbicide applications. Our study investigates how the intersection of plant biology, environmental conditions, herbicide chemistry, and application timing might influence management efficacy. In a temperature-controlled greenhouse environment, three 10-cm rooted stem tips of alligatorweed were planted in saturated soils and allowed to establish for three weeks. Then, triplicate plants were treated with diquat (4.48 kg ai/ha) or triclopyr (0.57 kg ae/ha) via foliar spray at 12 time periods over a 24-hr period centered around key solar events (i.e. solar noon, solar midnight, sunrise, and sunset). Treatments were conducted in September 2025 (Run 1) and February 2026 (Run 2). At each treatment timing, the angle of representative alligatorweed leaves was recorded. Post-treatment, all alligatorweed plants were assigned a weekly visual injury rating and were destructively harvested 4 weeks after treatment. Our study observed leaf angle changes (tropism) in alligatorweed throughout the course of the 24-hour study. Additionally, at the conclusion of the trial, treatment by triclopyr resulted in an average of 89% visual injury and 76% biomass reduction of alligatorweed, with no differences observed by treatment timing. All diquat treatments resulted in 100% visual injury and 100% biomass reduction of original aboveground alligatorweed stems. However, post-treatment stem regrowth occurred after all treatments by diquat, and regrowth biomass differed over time, where treatments occurring at solar noon resulted in nearly ten-fold more regrowth biomass (0.10 g DW) than treatments occurring at solar midnight (0.016 g DW) ($p = 0.0326$). Findings from this research reveal that the timing of herbicide applications can influence long-term alligatorweed management.

Preliminary Phenological Trends of *Vallisneria* Grown in Mesocosms

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Vallisneria is a genus of submersed macrophytes in the Hydrocharitaceae family which several species are invasive in North America. Previous research on the genus has been confounded by numerous taxonomic changes, necessitating research into life history and phenological trends to improve management efforts. *Vallisneria americana*, *V. neotropicalis*, *V. × pseudorosulata*, *V. spiralis*, and *V. australis* are the most prevalent *Vallisneria* taxa in North America; the first two, native, and the latter, invasive. In this project, each taxon is being grown in separate mesocosms for two years. Environmental metrics (temperature and photoperiod) are being monitored for the duration of the project. Once a month, 30 samples are harvested per species, then separated into aboveground and belowground tissues, ramet number and flower density are recorded. Once dried, tissue weight is recorded and converted to g DW/m². As expected, invasive *Vallisneria* grow more quickly and produce more biomass and ramets than native *Vallisneria*, overall. As of April 2026, *Vallisneria spiralis* produced the most ramets (7,795 per m²; January 2026), though sharply declined after freezing temperatures occurred. *Vallisneria × pseudorosulata* produced 5,788 ramets per m² in December and maintained this density after freezing temperatures, suggesting more tolerance to freezing conditions than *V. spiralis*. *Vallisneria australis* and *V. americana* achieved peak aboveground biomass, 461 and 57 g DW/m² respectively, in September and October 2025 with gradual decline afterwards. Finally, *V. neotropicalis* reached peak aboveground biomass in December 2025 (35.8 g DW/m²), though continued growing and flowering throughout winter. Initial results suggest management for invasive *Vallisneria* may optimally occur in late spring before plants can begin rapid growth in the summer period, particularly *V. × pseudorosulata* which doubled its ramet density from 833 to 1,809 ramets per m² from April to May 2025. This project is still ongoing and includes a starch analysis that may provide detail of internal energy storage, thus clarifying critical management periods.

Initial Concentration-Exposure Time Relationships for *Vallisneria* × *pseudorosulata* with Select Herbicides

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Vallisneria × *pseudorosulata* is an invasive plant in the southeastern U.S. and currently lacks robust herbicide management research. Therefore, assessing the rates and necessary exposure times for efficacious herbicides on *V.* × *pseudorosulata* is critical for the development of its management program. The assessed herbicides include: carfentrazone, flumioxazin, diquat, endothall, bispyribac-sodium, rimsulfuron, trifloxysulfuron, and sulfometuron-methyl. Testing was grouped by herbicide translocation ability (systemic vs. contact) and aquatic vs. non-aquatic labelling, resulting in three major testing groups (Aquatic Use Contacts, Aquatic Use Systemics, and Non-Aquatic Use). For each herbicide, three application rates and three exposure times were selected, resulting in 30 unique treatments, including references, for the Aquatic Use Contacts and Non-Aquatic Use groups, and 21 for the Aquatic Use Systemics. Each treatment was replicated five times and the entire trial was repeated a week later for temporal replication. Twelve weeks after treatment (WAT), above and belowground biomass was harvested from half of the pots in each mesocosm; at 52 WAT, the remaining pots will be harvested. Overall, contact herbicides were initially effective, causing rapid chlorosis; however, at 12 WAT all treatments recovered, suggesting multiple applications may be necessary to achieve control. Endothall was highly effective at all tested rates and exposure times providing >80% biomass reduction. Similarly, bispyribac-sodium reduced biomass at all tested rates and exposure times, though only achieved 40% aboveground biomass reduction, 52% belowground biomass reduction, and 40% ramet density reduction all at the maximum label rate (0.045 ppm), regardless of exposure time. Finally, the tested sulfonylurea herbicides reduced biomass 12 WAT at all tested rates and exposure times (>80% reduction). Further investigation should refine effective herbicide rates and exposure times for endothall and sulfonylurea herbicides due to their efficacy reducing *V.* × *pseudorosulata* biomass.

Response of Lake Tohopekaliga Hydrilla (*Hydrilla verticillata*) to Endothall and Fluridone

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Fluridone resistance is well-documented in many Florida populations of hydrilla (*Hydrilla verticillata*). As a result, most resource managers employ other active ingredients when treating hydrilla as part of a maintenance control program. Endothall has been used extensively for fluridone-resistant hydrilla management in Florida. Endothall-resistant hydrilla has been suspected on a small scale in Florida, with a few lakes in Central Florida reportedly showing resistance to endothall-containing products, but this has not been reported elsewhere in the state until recently. Endothall treatments applied in February 2025 to manage hydrilla in Lake Tohopekaliga did not perform as expected with regards to controlling hydrilla on the north end and in Goblet's Cove. Operator error was ruled out, and one potential explanation for this treatment failure is development of endothall resistance in these populations of hydrilla. We sampled hydrilla from two locations in Lake Tohopekaliga and screened these populations for endothall sensitivity and for fluridone resistance, which was first reported in 2004 and was confirmed to still be present in 2012. Our first run of these experiments revealed that hydrilla from North Toho and Goblet's Cove experienced biomass reductions of >90% when treated with endothall at concentrations ranging from 1.25 to 10 ppm, which does not provide evidence to support development of endothall resistance. Fluridone applied at concentrations of 10 to 300 ppb failed to reduce biomass of Goblet's Cove hydrilla by >90%, but North Toho hydrilla biomass was reduced by >90% when fluridone was applied at concentrations of >10 ppb. We are currently repeating these experiments to confirm our results.

Can Planting Native SAV Suppress Hydrilla (*Hydrilla verticillata*) Regrowth After Herbicide Treatment?

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Hydrilla (*Hydrilla verticillata*), an invasive submersed plant, is one of the most intensively managed aquatic weeds in Florida and other areas where the species has been introduced. Herbicides are typically used to control hydrilla, but regrowth after treatment is common and ongoing applications are required to keep the species at levels that do not interfere with the use of impacted waters. This is at least partly due to the open niches left after hydrilla populations are treated with herbicides; these niches are then quickly filled by surviving hydrilla fragments or recruitment from the tuber and turion bank. In these greenhouse experiments, we aimed to determine whether planting herbicide-treated areas with native submersed aquatic vegetation (SAV) affected re-establishment of hydrilla in empty niches. Hydrilla plants were treated with the aquatic herbicide endothall, then unrooted cuttings of Illinois pondweed (*Potamogeton illinoensis*) were planted at different densities 2, 4, and 6 weeks after endothall application and maintained for a 16-week growout period before a destructive harvest was performed. Hydrilla regrowth biomass in treatments where pondweed was planted 2 or 4 weeks after endothall treatment was reduced by 70% to 99% compared to hydrilla regrowth in treatments without pondweed. These results are very promising and could be an important tool for resource managers that are tasked with aquatic habitat and ecosystem restoration and enhancement. Additional research, including field trials, is underway to confirm the findings of these greenhouse experiments.

Chemical Control of Hydrilla (*Hydrilla verticillata*) in Small Plots with High Water Exchange

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Hydrilla verticillata is often challenging to control in flowing systems using traditional boat-based herbicide application techniques. Elevated water exchange rates reduce concentration-exposure time, limiting the effectiveness of herbicides with higher exposure time requirements. As a result, treatment selection must often be tailored to localized hydrologic conditions at different sites within a single waterbody. This presentation focuses on a field demonstration of small-plot herbicide treatments conducted in Spring Creek, Lake Seminole. In March of 2025, eight hydrilla infested treatment plots ranging in size from 4 to 18 surface hectares were established across varying hydrologic conditions and treated with either diquat, copper, imazamox, flumioxazin, dipotassium salt of endothall, or a combination, using traditional submersed application techniques. Rhodamine water tracer dye was applied in conjunction with herbicide to evaluate herbicide dispersion and monitor site-specific water exchange dynamics. An initial reduction in hydrilla biovolume for two months post treatment was observed in most plots. Three months after treatment, regrowth occurred in plots with faster water exchange, such as shallow water littoral zones on main channels, while treatments in plots with slower water exchange such as coves remained effective. These results demonstrate that efficacy can vary significantly, even among conventionally effective herbicides, reinforcing the need for site-specific management approaches and knowledge of water exchange dynamics prior to herbicide selection.

Chemical Control of Hydrilla (*Hydrilla verticillata*, subsp. *lithuanica*) in Tidally Influenced Sections of the Connecticut River

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Hydrilla was first identified in the Connecticut River in 2016 and has since spread to numerous coves, tributaries, and boat basins along a 113 km stretch of the river. In response, a research and demonstration project began in 2023 to initiate a management strategy and reduce the spread of hydrilla. Following rhodamine water tracer (RWT) dye studies to inform water exchange dynamics of the tidally influenced river, the first demonstration of operational scale aquatic herbicide treatments occurred at five sites in 2024. With the success of these initial treatments, additional dye studies and retreatments were added to the project for 2025. This presentation will focus on the results from these treatments and lessons learned from aquatic herbicide treatments influenced by the tidal cycles found in the Connecticut River, where water exchange dynamics potentially prevent treatments from achieving the necessary concentration- exposure time requirements to be effective using traditional boat-based aquatic herbicide application techniques. This complexity has required a novel approach to treatment planning and execution that emphasizes application timing and tidal adjustments to waterbody volume calculations.

Nuisance plant or nitrogen cycling powerhouse? *Azolla caroliniana* responses to mild winters in a polluted river-fed system

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Azolla caroliniana is a free-floating aquatic fern that enriches waters due to its symbiotic relationship with nitrogen-fixing bacteria. It is prolific with a doubling rate of 2-5 days, quickly forming dense mats that prevent light penetration and gas exchange on the surface. This nutrient enrichment can lead to algal blooms when *Azolla* decays. In winter, *Azolla* growth declines as it enters dormancy by sinking to bottom sediments. In spring through summer, growth increases with temperature as plant fragments resurface and resume asexual growth. This phenology is inconsistent with our observations. In Lake Springfield, southwest Missouri, *Azolla* was first observed in October 2020 and its abundance increased every year since, with growth peaking in fall and declining in early winter. We suspect that these patterns are due to variations in annual winter temperatures. Previous experiments in lab-prepared growth media showed it can tolerate temperatures near 0 °C but with low growth rates and survival. This allows *Azolla* to survive extreme temperature fluctuations and outcompete other plants. We aim to determine the impact of cold exposure on *Azolla* growth in lake water microcosms and subsequent changes in water chemistry. We hypothesized that *Azolla* exposed to ≤ 0 °C will have decreased biomass and survival, leading to nitrogen increases due to nutrient release from decaying *Azolla*. We grew *Azolla* in water from Lake Springfield, exposed it to -5 °C, 0 °C, 5 °C, and 20 °C for 14 days, then grew it at 20 °C for 21 days. We measured water nitrogen throughout the experiment and plant biomass at the end. Biomass comparisons showed that *Azolla* tolerated exposure to 5 °C ($p < 0.001$) with an aggressive resurgence but did not survive < 0 °C. *Azolla* growth and death impacted water chemistry variables. After exposure to 5 °C, *Azolla* thrived and pH increased. When photosynthesis was inhibited at 20 °C, nitrate increased as *Azolla* senesced. Our findings imply that milder winter temperatures can lead to an earlier and intense spring resurgence, causing increased nutrient cycling and release when *Azolla* decays. This work will provide insight on locally adapted *Azolla* and inform Lake Springfield's wetland management initiatives.

Blurry Species Boundaries in *Myriophyllum*: Genomic Insights into Identification Challenges

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In groups of aquatic plants where species look very similar, identification may rely on DNA barcoding. However, in some cases, genetic patterns can be complicated by shared ancestry and hybridization, which may limit how effective these tools are. This is a concern in a group of North American watermilfoils (*Myriophyllum*, subsection *Spondylastrum*), where several species overlap in geographic range, morphology, and can hybridize. Species level identification is especially important for one species, variable-leaf watermilfoil (*M. heterophyllum*), that has been introduced past its historic range and is a competitive invasive in those regions. We used a genome-wide approach to better understand relationships between six of these watermilfoil species and to evaluate how accurate current DNA barcoding methods reflect those relationships. Our results suggest that genetic differences among these species are sometimes subtle and do not always align cleanly with current species boundaries. In particular, variable-leaf watermilfoil shows notable genetic variation across its range, and some populations appear more distinct than expected. We also see geographic patterns in genetic variation in multiple species, which may reflect regional separation over time. These findings suggest that tracking distinct genetic lineages, rather than relying on species names alone, may provide a more practical way to monitor and manage these plants. More work in understanding and documenting these clones' current ranges will be imperative to this end.

Multi-Barrier Phosphorus Control: Integrating Lanthanum-Modified Bentonite, Coagulants, and Peroxides for Durable Cyanobacteria Suppression

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Lanthanum-modified bentonite (LMB) can permanently bind dissolved and sediment-released phosphorus, and when used alongside oxidative algacides such as Peracetic Acid (PAA) and peroxides, and coagulants like aluminum chloralhydrate (ACH), the combined treatment can enhance cyanobacteria suppression and reduce bioavailable phosphorus more effectively than any single product alone. Lanthanum-modified bentonite (LMB) is a phosphorus-inactivation agent in which lanthanum is exchanged onto a bentonite matrix, forming highly insoluble lanthanum-phosphate minerals, stripping orthophosphate from the water column and intercepting internal loading from sediments. This process targets the low-concentration dissolved phosphorus pool that sustains cyanobacterial blooms and can maintain reductions in bioavailable phosphorus for many years in eutrophic systems. Polymeric aluminum coagulants such as aluminum chloralhydrate (ACH) similarly bind and precipitate phosphorus, forming metal-phosphate flocs that settle to the benthic zone, thereby reducing water-column phosphorus and turbidity and directly improving light climate. Peroxides such as Peracetic Acid (PAA) and hydrogen peroxide selectively damage cyanobacteria because these taxa are more sensitive to reactive oxygen species than many eukaryotic algae, so appropriately dosed treatments can rapidly reduce cyanobacterial biomass and associated toxins while minimizing non-target impacts. When applied in a coordinated strategy, peroxides first selectively lyse cyanobacterial cells and release intracellular phosphorus while preserving beneficial phytoplankton communities. Independently, aluminum chloralhydrate captures and settles the particulate and dissolved phosphorus and consumes less alkalinity, which means less pH depression, fewer buffering chemicals, and more reliable performance in low alkalinity or variable pH lakes and ponds. Applied as a top layer to these treatments, Lanthanum-modified bentonite (LMB) on or near the sediment binds released phosphate and ongoing internal loads, creating a multi-barrier approach that permanently binds bioavailable phosphorus, limits bloom regrowth, and extends treatment longevity beyond that achievable with algacides or coagulants alone.

Precision Mapping and Volume Measurement for Pesticide Applications

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Mapping and volume monitoring of pesticides is a critical component to our work. As the caretakers of our aquatic environments, we are responsible for ensuring our work is as judicious and environmentally sound as we can provide. The utilization of the most recent and sound technology is a large component to meet the high standard we strive to achieve. Mapping and flow monitoring technology of this type provides near real time data, allowing applicators to monitor their work and make detailed adjustments to the application while in the field. All collected data can be documented within appropriate reports. With this monitoring, the applicator now has precise information of each treated zone both size and pesticide volume. The near real time also allows for confirmation all treatment areas have been covered before the applicator leaves the site. Geo-fencing within the mapping programs ensures that treatment areas are clear and concise. Utilization of this technology is a prudent step for our industry.

The Lake's Thumbprint: Algal Community Structure in Littoral Zones of Lake Springfield, A Reservoir in Southwest MO.

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Lake food webs are driven by algae. However, excessive algal growth can degrade water quality by decreasing dissolved oxygen and water clarity. In early spring, algae respond to changing temperatures. Mild winters lead to quick increases in water temperatures in spring and warmer surface waters in summer and fall. This causes premature algal blooms in the spring and intensified blooms in the summer. Lake Springfield, a reservoir located within the James River watershed in southwest Missouri, has a history of algal blooms due to excess nutrients and shallow waters. We aimed to determine how algal abundance, diversity, and richness vary with season and location in Lake Springfield. We hypothesized that algal abundance would increase in spring through fall and species diversity and richness would decrease. We also hypothesized that homogenization of algal communities would increase with increasing distance from the lake inflow. We assessed surface water samples collected every 1-3 months from the littoral zone at different locations in Lake Springfield. Sample locations occurred at different distances from the inflow. We analyzed samples for taxa abundance, richness, and diversity. Data from August 2025 to March 2026 indicated that algal community composition varied by season and sample location. Four of the six surveyed months had a taxa richness of seven while August and November had a taxa richness of six. The seven taxa groups included Chlorophyta, Cyanophyta, Euglenophyta, Bacillariophyta, Crysophyta, Cryptophyta, and Dinophyta. Chlorophyta, Cyanophyta, Euglenophyta, Bacillariophyta had higher average abundance than other taxa and increased in fall. Each month had varying levels of diversity, not following a distinctive pattern, but December had the highest diversity. Chlorophyta and Bacillariophyta abundance varied among sample locations downstream from inflow indicating heterogeneity in algal communities within the lake. The different sample locations acted like micro-habitats influenced by depth and subsequent mixing, which could play important roles in distribution and abundance of algae in Lake Springfield. Additional sampling and physiochemical measurements will increase our understanding of the impacts of seasonal variations on algal diversity in Lake Springfield and how algal abundance is influenced by the physical characteristics of reservoirs.

Application of Remote Sensing for HAB Management: 2024 APMS Symposium Highlights and Case Study

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Managing harmful algal blooms (HABs) remains a persistent challenge due to their spatial heterogeneity, temporal dynamics, and the diversity of taxa and environmental drivers influencing bloom development. While remote sensing technologies, including satellite imagery, aerial platforms, and in situ sensor networks—have advanced HAB detection and monitoring, their direct application to management decision-making remains limited. Building on outcomes from an expert meeting held at the 64th meeting of the Aquatic Plant Management Society (APMS), this presentation synthesizes emerging practices and presents a multi-platform case study demonstrating how remote sensing can be operationalized to support real-world HAB management. A review of recent literature and practitioner insights highlights that relatively few studies explicitly link sensor-derived data to management actions. However, where applied, remote sensing has proven valuable for (1) prioritizing areas for intervention, (2) guiding adaptive monitoring strategies, and (3) evaluating treatment effectiveness. Expanding on these findings, the U.S. Army Corps of Engineers (USACE), in partnership with stakeholders and state agencies, implemented a coordinated monitoring effort across an ~80 km² region along the western shoreline of Lake St. Clair to support development of a science-based adaptive management framework for benthic HABs (*Microseira wollei*). To address system complexity, a multi-platform approach integrated satellite imagery, fixed-wing aerial surveys, and high-resolution autonomous underwater vehicle (AUV) mapping. AUV surveys confirmed *M. wollei* presence within mixed assemblages of cyanobacteria and submerged aquatic vegetation from nearshore areas to approximately 2.2 km offshore, while aerial imagery resolved shallow-water benthic coverage (<1 m depth) up to ~900 m from shore. These data enabled spatially explicit mapping of percent cover and distribution across depth gradients to delineate management zones and identify treatment options. As remote sensing capabilities continue to evolve, their integration into HAB management frameworks offers a pathway toward more proactive, data-driven, and scalable solutions for protecting aquatic ecosystems and water resources.

Establishing Aquatic Herbicide Control Methods for European Frogbit (*Hydrocharis morsus-ranae* L.)

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Invasive floating aquatic plants have become increasingly problematic in waterbodies across the United States. Their presence negatively impacts biological processes, economic enterprises, and biodiversity. European Frogbit (*Hydrocharis morsus-ranae* L.) is a non-native floating aquatic plant that has established populations in the Great Lakes and surrounding areas, causing concern for managers. European frogbit forms dense mats over the water surface thereby shading out submersed macrophytes and disrupting recreational activities. Current management of this species is primarily done through physical removal via hand pulling. There is little to no research on chemical control options for use on European Frogbit in the United States. The current study is investigating the efficacy of nine submersed and twelve foliar aquatic herbicides for the control of European Frogbit. Preliminary submersed herbicide trials indicate that diquat provides 100% biomass reduction within one week. At three weeks after treatment (WAT), flumioxazin reduced biomass by 86%, fluridone reduced biomass by 75%, and penoxsulam reduced biomass by 83%. Average turion production decreased by 9-80% in submersed herbicide treatments when compared to non-treated reference plants. Initial foliar herbicide trials suggest that diquat, byspiribac sodium, carfentrazone-ethyl, flumioxazin, and penoxsulam were all effective in reducing total biomass by more than 90% at four WAT. Average turion production decreased in all foliar herbicide treatments by 53-97% compared to non-

treated reference plants. Future research will seek to verify these preliminary results and further refine use patterns for aquatic herbicides on this species.

Beyond Code and Robots: Updates on Water Chestnut (*Trapa natans*) Adaptive Management in Long Island

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Aquatic invasive species management demands adaptable, data-driven tools capable of guiding intervention decisions across variable ecological and logistical conditions. Building on a discrete-time population dynamics model for Water chestnut (WC, *Trapa natans*) management in Long Island water systems, this work pursued three objectives: refining predictive capacity, estimating threshold management strategies, and deploying field-ready autonomous prototypes. The model reliably predicted WC population dynamics across seasonal cycles, enabling estimation of threshold management strategies, i.e. the minimum intervention intensity required to drive population decline within defined time horizons. Grazing pressure on established plants was found to substantially reduce seed bank contribution to population recovery, shifting the threshold conditions under which mechanical or squad-based harvesting achieved long-term control. This interaction between grazing and seed bank dynamics fundamentally changed integrated management calculus and revealed new avenues for cost-effective, multi-pronged strategies. On the engineering front, three specialized autonomous prototypes were developed on a common platform: the Surveyor, designed for high-resolution spatial mapping of infestation extent; the Grazer, designed to reduce rosette density and attenuate seed bank replenishment; and the Harvester, optimized for biomass removal at management-relevant scales. Together, these prototypes operationalized the model's integrated management recommendations directly in the field. The Surveyor was further prepared for deployment to automate environmental DNA (eDNA) sampling across Long Island waterbodies, enabling landscape-scale early detection of multiple aquatic invasives. A simulated herbicide application system, using water as a surrogate, will be field-tested to evaluate spray range, coverage uniformity, and operational efficiency as a proof-of-concept for future autonomous chemical control. Finally, sustained long-term success requires not only suppression of the invader but restoration of ecological function. Native white water lily (*Nymphaea odorata*) sourced from the same water systems will be introduced to assess interspecific competition strength and evaluate its potential as a biological buffer against reinvasion, a key step toward community-level recovery of affected waterbodies. This living model-automated system represents a scalable framework for adaptive invasive species management, with direct applicability to resource-limited agencies.

Assessment of Integrated Pest Management Control Strategies for Cuban Bulrush (*Cyperus blepharoleptos*)

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The monocephalous (capitate) and polycephalous (antherlate) forms of the invasive emergent aquatic epiphyte Cuban bulrush (*Cyperus blepharoleptos*) have spread throughout the U.S. during the past decade. Herbicides are the primary control technology used to manage this plant, but mechanical control using shredding is a non-chemical option that has been used where established mats (tussocks) dominate the aquatic system. In addition, an integrated pest management (IPM) approach using shredding and herbicides requires further evaluation since both tools have limitations. Therefore, two mesocosm experiments were conducted in Baton Rouge, LA, during 2025 to evaluate the influence of water depth following shredding and shredding followed by foliar herbicide applications to remove remnant plants. In the first experiment, mono- and polycephalous forms were shredded and weighted to the bottom of containers with 15, 30, or 60 cm of water and remained for 6 weeks prior to harvest. In the second experiment, both forms were shredded and placed on floating frames, acclimated for 4 weeks, and treated with foliar applications of 2,4-D, diquat, flumioxazin, glyphosate, floryprauxifen-benzyl, or triclopyr. At 6 weeks after treatment (WAT),

plants were harvested. Both experiments included controls which consisted of individual plants placed on a floating frame without being subjected to herbicides or water depth. In the initial shredding trial, all mono- and polycephalous plants were controlled 100% regardless of water depth. However, in the repeated trial, water depth had less impact, but submerging mono- and polycephalous plants 15 to 60 cm below the water's surface resulted in 80 to 84% and 77 to 83% control, respectively. Experiment timing likely contributed to the increased level of control in the first trial. The water temperature was much warmer and algae blocked light, whereas the repeated trial was conducted under cooler conditions and clearer water. In the shredding followed by herbicide trial, all treatments provided 100% control of monocephalous plants, and all treatments except florypyrauxifen-benzyl (43% control) provided 92 to 100% control of the polycephalous plants. This data indicates that an IPM approach of shredding in conjunction with water depth or follow up herbicide applications can be effective at managing Cuban bulrush.

Fast and Furious: Measuring the Efficiency of an Upgraded

Harvester on *Nuphar advena*

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Mechanical harvesting is a vital tool for managing aquatic plants. Often, mechanical harvesting is disregarded for faster and more cost-effective methods like chemical control. However, there are times when mechanical harvesting is necessary either for restrictions on herbicide use, nutrient removal, or the immediate clearance of water ways. There is a current need for more efficient mechanical harvesters. The filter marsh located in Lakes Regional Park in Fort Myers, FL was harvested for *Nuphar advena* three times between November 2025 and May 2026 to determine if the overall harvesting efficiency of an Inland Lake Mini 5x4-100 Harvester was improved with upgrades (i.e., a more powerful engine and larger paddle wheels). Harvester efficiency was assessed by measuring ferry speed without a load, ferry speed with a load, harvesting time of a 1/8-acre plot, and the time needed to harvest a complete load. The results of this study could inform aquatic plant managers of more effective ways to allocate funds towards mechanical harvesting.

Assessing herbicide rainfastness for giant salvinia (*Salvinia molesta*) management

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Giant salvinia, *Salvinia molesta*, is listed as one of the world's worst invasive aquatic weeds and has invaded waterbodies across the U.S. forming dense mats on the water surface. Infestations lead to negative socio-economic and environmental impacts. Several control strategies exist to combat this invasive species using physical, chemical, and biological control. Chemical control is the most widely used control option due to the ease of application and rapid results. Nine herbicides are efficacious against on giant salvinia in the U.S.; however, complete control of giant salvinia eradication has yet to be achieved. One reason for poor control is inaccessibility, where areas with dense tree stands or shallow waters cannot be sprayed and act as nurseries repopulating the waterbody. Another possible limitation of herbicides is rainfastness or wash-off of herbicides within minutes of application, which may occur due to rainfall post application, wave action, or boat back splash during application or by recreational boaters. Rainfastness for giant salvinia has yet to be investigated; therefore, research was conducted to determine the rainfastness of metsulfuron (42 g active ingredient (a.i.) ha⁻¹), flumioxazin (420 g a.i. ha⁻¹), glyphosate (3,364 g acid equivalent (a.e.) ha⁻¹), and glyphosate + flumioxazin (3,364 g a.e. ha⁻¹ + 70 g a.i. ha⁻¹) without the use of surfactants. In a mesocosm study, herbicides were applied to giant salvinia and washed off at 5, 10, 15, 30, or 60 minutes post application, and a static no wash off treatment was also included. Plant biomass was harvested 7 weeks after treatment (WAT). Across all wash off times, biomass was reduced by 92, 97, 97, and 98% by metsulfuron, flumioxazin, glyphosate, and glyphosate + flumioxazin, respectively. There were no differences in herbicide efficacy among all wash off times for metsulfuron and flumioxazin treated plants. Glyphosate and glyphosate + flumioxazin static treatments resulted in 100% control, while differences in control were exhibited by other wash off times. Overall, these four herbicides exhibited a

high level of herbicide rainfastness without the use of surfactants.

Assessing direct and indirect herbicide and surfactant toxicity to salvinia weevils (*Cyrtobagous salvinia*)

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Giant salvinia, *Salvinia molesta*, is a free-floating aquatic fern that is invasive across the U.S. Infestations lead to thick mats which outcompete native vegetation, block irrigation canals, change water chemistry, and impact hunting, fishing, and recreational activities. Three control strategies exist including physical, chemical, and biological control. There are nine chemicals registered for use on giant salvinia and one biological control agent, the salvinia weevil, *Cyrtobagous salvinia*. Chemical control has its limitations, the most significant being inaccessibility where applicators cannot reach infestations within dense tree stands or shallow waters. Biological control is limited by the weevil's poor cold tolerance and population die back overwinter. To overcome these challenges an integrated pest management (IPM) approach should be implemented to combine control options to improve results. The first step in combining chemical and biological control is to assess herbicide and surfactant toxicity to weevils. This study aimed to assess toxicity of metsulfuron (42 g active ingredient (a.i.) ha⁻¹), flumioxazin (420 g a.i. ha⁻¹), glyphosate (3,364 g acid equivalent (a.e.) ha⁻¹), glyphosate + flumioxazin (3,364 g a.e. ha⁻¹ + 70 g a.i. ha⁻¹), diquat low and high (1,121 g a.i. ha⁻¹ and 2,243 g a.i. ha⁻¹), modified vegetable oil and surfactant blend (MVO SB) (0.25% v v⁻¹), methylated seed oil blend (MSOB) (0.25% v v⁻¹), and modified vegetable oil/organosilicone blend (MVO OSB) (0.25% v v⁻¹). Upon direct exposure under laboratory conditions diquat high and MSOB resulted in 36 and 41% mortality, respectively. All other direct treatments resulted in between 7 to 28% mortality. A mesocosm study investigated indirect exposure by applying chemicals to weevil infested giant salvinia. After 7 days there were no significant differences in mortality among all treatments, and mortality ranged from 11 to 26%. These studies indicate that metsulfuron, flumioxazin, glyphosate, glyphosate + flumioxazin, MSOB, and MVO OSB are compatible with the salvinia weevil causing minimal mortality. For a more conservative approach diquat and MVO OSB should be avoided in areas with established weevil populations.

Special Session – 20 Years of Aquatic Plant Management: What's Changed?

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The past 20 years have brought many changes within the field of aquatic plant management. An expert panel of individuals with 20+ years' experience will provide an overview of dynamics from the marketplace to management.

Determining the response of lyngbya (*Microseria wollei*) to consecutive annual algaecide applications

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Lyngbya (*Microseria wollei*) is a filamentous cyanobacteria that has become increasingly problematic throughout the Southeastern United States. A successful lyngbya treatment program has been established within Lake Gaston, NC/VA that utilizes chelated copper-based algaecides to manage this nuisance species throughout the system. This program, initiated in 2021, utilizes an annual protocol consisting of six-monthly treatments (April - September) targeting individual sites for multiple consecutive years. Since 2021, the overall targeted acreage has steadily increased with new sites being added annually. While it has been well documented that the algaecides used in this program produce favorable control responses in lyngbya, there has been variability in the magnitude of response between sites. It is hypothesized that drivers for this variation could be environmental factors, differences in morphological features of lyngbya mat formations, or changes in lyngbya response to current algaecide protocols as documented in some vascular weed species. To determine if the duration of program inclusion impacts the efficacy of chelated-copper based algaecides for lyngbya management, laboratory evaluations utilizing Captain XTR® and AMP® were performed on lyngbya collected from sites that varied by initiation year into the Lake Gaston treatment program. Preliminary results indicate the number of consecutive treatments to individual sites was not a significant factor in the response of lyngbya to treatments, possibly indicating that site specific factors are driving overall treatment efficacy. In addition, lyngbya collected from sites within the treatment program was significantly less healthy than samples collected from outside of the targeted treatment areas indicating positive response to current treatment protocols.

Phenology of *Hydrilla verticillata* subsp. *lithuanica* in the Connecticut River

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In 2016 a new subspecies of hydrilla (*Hydrilla verticillata* ssp. *lithuanica*) was first documented in the Connecticut River. Hydrilla is a highly problematic submersed, aquatic invasive species that limits navigation, out-competes native vegetation, and impacts flood control. Recent mesocosm research has indicated that this hydrilla subspecies may exhibit distinct life history traits compared to other hydrilla subspecies present in the United States. Understanding phenology is critical for optimizing management timing for after turions have sprouted but before the production of new turions. To address this, a field phenology study was conducted in 2023 to 2024 across three sites per year. Measurements included turion and tuber counts as well as above and below ground biomass using soil cores. Aboveground biomass peaked in August, while subterranean turion densities generally peaked in September at approximately 12.8 hours of daylength. Axillary turion production peaked in October at approximately 11.2 hours of daylength. This indicates that propagule production coincides with decreasing daylength and cooling temperatures. Maximum estimated propagule densities reached 6,400 axillary turions m⁻² and 1,300 subterranean turion m⁻², supporting prior mesocosm findings that this subspecies exhibits exceptionally high axillary turion production. These findings suggest that late spring to early summer represents a critical management window, when plants have emerged but before peak biomass and propagule production. Targeting hydrilla during this period may help reduce both standing biomass and replenishment of the turion banks, improving long-term control outcomes.

Management of Connecticut River Hydrilla (*Hydrilla verticillata* ssp. *lithuanica*) Turions with Imazamox and Florpyrauxifen-benzyl

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Hydrilla verticillata ssp. *lithuanica*, also known as Connecticut River hydrilla, behaves as an annual in the northeastern United States, dying back during winter and regrowing from turions in early spring as temperatures rise. Hydrilla turions often exhibit relatively low susceptibility to herbicide injury compared to mature plants. However, applying treatments in early spring, when turions have just sprouted, may reduce the risk of further spread and conserve management resources compared to delaying control efforts until plants reach larger sizes in summer. The objective of this study was to evaluate the efficacy of two herbicides, imazamox and florpyrauxifen-benzyl (FPB), on pre-sprouted *H. v.* ssp. *lithuanica* axillary turions. Treatments consisted of imazamox or FPB at three different rates, with exposure times of 6, 12, 24 hours, and a 7-day static exposure. Following treatment, turions were maintained in the growth chamber for 6 weeks, with visual injury ratings recorded weekly. At harvest, dry biomass and shoot length were measured. The results from this study are anticipated to help improve turion management.

Does Light Influence Herbicide Efficacy When Targeting Giant Salvinia (*Salvinia molesta*)?

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The invasive floating fern giant salvinia (*Salvinia molesta*) can be found in open water or under dense vegetation across Louisiana and the southern U.S. Historically, aquatic herbicides have been tested for activity against giant salvinia under full sunlight in mesocosm settings. It is unknown if operational plant management is hindered under lower light conditions under tree and other vegetation canopies where plant growth is slower. Also, most aquatic herbicides interfere with plant light dependent processes and this could influence efficacy. Therefore, a mesocosm trial was conducted and repeated to determine the impact of three light levels on the efficacy of the contact herbicides carfentrazone, diquat, and flumioxazin, and the systemic herbicides glyphosate, metsulfuron, and penoxsulam. The herbicides were applied to the foliage of giant salvinia cultured under 0, 30, or 60% shade at maximum application rates. Nontreated control plants were also grown under each shade regime. In general, plant injury was 5 to 10% less for plants grown under 30 and 60% shade, respectively, compared to 0% shade plants for the first week after treatment (WAT). By 3 WAT, minimal differences in plant injury were observed between 0 and 30% shade treatments from all herbicides except metsulfuron and penoxsulam treated plants. However, plants grown under the 60% shade regime exhibited less injury throughout the trial. Giant salvinia biomass was reduced by 87 to 100% of the control at 7 WAT by all herbicides when cultured under 0% shade. Diquat and glyphosate provided $\geq 97\%$ control across all shade treatments. Carfentrazone treatment was impacted by both the 30 and 60% shade treatments, while differences in control existed between the no shade and 60% shade treatments for flumioxazin. Shade decreased efficacy of the slow-acting penoxsulam and metsulfuron, especially for plants grown under 60% shade with only 20 and 23% biomass reductions, respectively. These herbicides provided $\geq 63\%$ control under full sunlight conditions at 7 WAT. These results suggest that light influences herbicides used for giant salvinia control and should be evaluated in operational settings to confirm these findings.

Evaluating nonaquatic labeled herbicides for efficacy on torpedograss (*Panicum repens*) and West Indian marsh grass (*Hymenachne amplexicaulis*)

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Torpedograss (*Panicum repens*) and West Indian marsh grass (*Hymenachne amplexicaulis*) are invasive grasses that have infested many aquatic sites across Florida. Controlling grasses in any system is difficult, but even more so in aquatic systems. There are only a few aquatic labeled herbicides that could provide selective grass control, but they often do not achieve desirable control of problematic grasses like torpedograss and West Indian marsh grass. As a result, applicators often rely on herbicides like glyphosate and imazapyr. These herbicides offer effective control but result in significant nontarget injury. Therefore, other herbicides that are currently labeled in agronomic and turfgrass systems need to be screened for efficacy on these problematic species. This experiment evaluated six nonaquatic herbicides for potential efficacy on torpedograss and West Indian marsh grass. Newly sprouted shoots from each species were planted in pots and were given roughly two months to grow and become established. Plants were then treated and visual control was assessed every two weeks for a ten-week period. Above ground and below ground biomass were collected at the conclusion of this experiment and combined into total biomass. The results indicate that >90% visual control was achieved at 10 weeks after treatment for three of the herbicides (trifloxysulfuron, nicosulfuron, and glufosinate) in torpedograss and five of the herbicides (nicosulfuron, imazethapyr, trifloxysulfuron, clethodim, and glufosinate) in West Indian marsh grass. Additionally, these respective herbicides for each species resulted in >75% total biomass reduction when compared to a nontreated check. While these herbicides are not currently labeled for aquatic use, these results show that there are potential herbicides that could provide more selective options for controlling these problematic grasses. Additional research is needed to evaluate the lowest effective rate and native plant response to these herbicides.

Utilizing Herbicide Impregnated Paper-Based Granules for Water Lettuce (*Pistia stratiotes*) Control

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Problematic floating plants, like water lettuce (*Pistia stratiotes*), can be detrimental in aquatic environments. Commonly found in Florida and along the Gulf Coast, these plants can form large floating mats that shade out submerged plants, hinder water-related recreational activities, and impede navigation. They can also be found mixed with native emergent and floating-leaved species such as bulrush, spatterdock, and alligator flag. In these situations, controlling floating plants with herbicides becomes increasingly difficult, especially when trying to reduce or prevent injury to native species. While native species usually recover from applications, stakeholders dislike the appearance of injured plants. Therefore, there is a need for research to reduce injury to native species while maintaining acceptable control of floating plants. The goal of this research is to evaluate herbicide-impregnated granules as a herbicide application method for targeting water lettuce while potentially reducing nontarget injury. This experiment evaluated two herbicides, flumioxazin and penoxsulam, impregnated into paper-based granules. Granular applications were applied at 112.1 kg ha⁻¹ (100 lbs ac⁻¹) and were impregnated with maximum foliar application rates of 12 fl oz ac⁻¹ and 5.6 fl oz ac⁻¹ of Clipper SC (flumioxazin) and Galleon SC (penoxsulam), respectively. Granular treatments were also split into rain and no-rain after-treatments to determine whether rainfall was needed to facilitate herbicide release. Granular treatments were also compared to standard foliar application at the previously mentioned rates. Four weeks after treatment, the data indicate that flumioxazin impregnated granules were statistically different from the nontreated control, achieving >80% visual control, and were statistically similar to the foliar application. Penoxsulam impregnated granules, however, were statistically similar to the nontreated control at four weeks after treatment. These data indicate that flumioxazin-impregnated granules could be useful for controlling water lettuce; however, additional research is needed to improve efficacy and to evaluate nontarget plant injury from this herbicide application method.

Assessing injury on *Eleocharis interstincta* after foliar applications of commonly used aquatic herbicides.

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Eleocharis interstincta [(Vahl) Roem. & Schult.] is an emergent, perennial sedge that is found along the margins of wetlands, marshes, and other aquatic habitats. *E. interstincta* is most prolific in peninsular Florida, but can be found in Texas, Alabama, and Oklahoma as well. Its seeds and rhizomes are eaten by waterfowl, and the submerged portions of the plant provide important cover for aquatic fauna. *E. interstincta* is an important habitat component for wetland birds, including the sandhill crane. As a beneficial native species, prioritizing minimal injury during herbicide applications is important for aquatic applicators. However, this can be very difficult since the target species are often intermixed. Utilizing the least injurious herbicides while maintaining efficacy is important, but we have found significant knowledge gaps in the literature of the effects of common aquatic herbicides on *E. interstincta*. Therefore, the objective of this experiment was to assess how *E. interstincta* will respond to applications of aquatic herbicides that are used to treat invasive species. This research is being conducted at the Center for Aquatic and Invasive Plants in Gainesville, Florida and is ongoing. We evaluated foliar applications of 2,4-D, diquat, imazamox, flumioxazin, floryprauxifen-benzyl, and penoxsulam as these herbicides are commonly used to treat invasive floating plants. This research will provide important information that will further sustainable aquatic plant management and restoration goals. Furthermore, understanding the off-target effects of herbicides on *E. interstincta* can help aquatic applicators minimize injury by utilizing herbicides that result in the lowest amount of injury or being mindful of their applications.

Screening aquatic labeled herbicides for efficacy on torpedograss (*Panicum repens*) and West Indian marsh grass (*Hymenachne amplexicaulis*)

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Torpedograss (*Panicum repens*) and West Indian marsh grass (*Hymenachne amplexicaulis*) are invasive, perennial grasses that have spread throughout aquatic habitats across Florida. They both form dense monotypic stands via vegetative structures and can displace many native plants. Currently, systemic herbicides like glyphosate and imazapyr are commonly used to control torpedograss and West Indian marsh grass in aquatic systems. However, both herbicides are non-selective, which is an issue when applied in natural environments, where there can be significant damage to non-target, native plants. The objective of this study was to assess ten labeled aquatic herbicides as selective treatment options for torpedograss and West Indian marsh grass in a greenhouse pot study. Each treatment was compared to a nontreated and pretreatment control. Visual ratings were conducted every two weeks, and aboveground and belowground biomass were collected at the end of the experiment. For torpedograss, at 10 weeks after treatment (WAT), glyphosate, imazapyr, and imazamox were the only herbicides that significantly differed from the non-treated control and had $\geq 95\%$ visual control. Additionally, torpedograss aboveground biomass was reduced by $>80\%$ and belowground biomass was reduced by $>90\%$ by glyphosate, imazapyr, and imazamox when compared to the non-treated control. For West Indian marsh grass, at 10WAT, glyphosate, imazapyr, imazamox, fluridone, and topramezone had $>90\%$ control when visually assessed and were significantly different when compared with the non-treated control. Aboveground biomass was reduced by $>70\%$ by glyphosate, imazapyr, fluridone, and topramezone. Belowground biomass was reduced by $>80\%$ by glyphosate, imazapyr, imazamox, fluridone, and topramezone. These results indicate that the industry standards of glyphosate and imazapyr continue to provide excellent control; however, there are promising alternative herbicides that warrant further research.

New kid in the pond: How does florpyrauxifen-benzyl treatment impact various strains of Eurasian and hybrid watermilfoil (*Myriophyllum spicatum*, *M. sibiricum*)?

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Florpyrauxifen-benzyl is a recently developed synthetic auxin herbicide that has become a popular choice for managing Eurasian watermilfoil (*Myriophyllum spicatum*), and its hybrids with native northern watermilfoil, (*M. sibiricum*) in the United States. Despite its rapid adoption and wide application, we currently know little about how different watermilfoil strains respond to florpyrauxifen-benzyl. In this study, we evaluated florpyrauxifen-benzyl response for six Eurasian and hybrid watermilfoil strains using controlled greenhouse dose-response assays, and we found significant variation among strains. One hybrid strain previously observed to have lower-than-expected field control exhibited the highest biomass at 2 and 4 ppb, and a second hybrid strain with documented low-level resistance to 2,4-D also maintained greater biomass at these concentrations compared to more susceptible strains. These results suggest that strain-level variation for florpyrauxifen-benzyl response may influence field management practices. We recommend further characterization of Eurasian and hybrid watermilfoil strains in the laboratory and field to further improve treatment decisions and efficacy in managed populations.

Scaling Submersed Aquatic Herbicide Research: 4D Chess vs. Checkers

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Small-scale mesocosm studies serve as the bedrock of submersed aquatic herbicide research, providing highly controlled environments to evaluate efficacy, non-target toxicity, and baseline concentration-exposure times (CET). Operating in these confined systems is similar to playing checkers: the rules are straightforward, the boundaries are static, and the environmental variables are largely predictable and easily manipulated. However, transitioning these controlled findings to operational-scale field treatments introduces a paradigm shift arguably parallel to playing 4D chess, where multiple, dynamic variables interact simultaneously. This presentation examines the stark contrast between small-scale trials and operational field studies, focusing heavily on the critical assumptions researchers make and the variables that frequently go unconsidered during the field planning phase. We will explore the hidden pitfalls of upscaling, including the reliance on mesocosm-derived CETs that fail to account for open-water complexities such as dynamic hydrology, nuanced bathymetry, thermal stratification, and heterogeneous plant densities. Furthermore, we will address the logistical and environmental assumptions that can derail a study before a herbicide is even applied, from unpredictable dilution and degradation pathways to weather-driven application delays. By contrasting the linear predictability of mesocosm "checkers" with the multi-dimensional chaos of field "4D chess," this presentation aims to highlight common blind spots in experimental design. Attendees will gain actionable insights into identifying hidden planning assumptions, mitigating real-world variables, and developing more robust, adaptable protocols to bridge the gap between the tank and the lake.

Hydrilla (*Hydrilla verticillata*, subsp. *lithuanica*) Control on Riverine Littoral Zones in Connecticut

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Achieving acceptable levels of submersed weed control in high water exchange sites is challenging. Areas such as shallow littoral zones along shorelines of rivers are common troublesome sites for hydrilla infestation and often experience a lack of control using traditional aquatic herbicide delivery techniques.

The primary driver of these conventional treatment failures is rapid water exchange, which severely limits the ability to meet the critical Concentration-Exposure Time (CET) requirements necessary for target plant mortality. Consequently, evaluating alternative management approaches to these types of sites has been a continuous research objective of the US Army Engineer Research and Development Center's (ERDC) Aquatic Plant Management Team for decades. Focusing on highly infested riverine littoral zones in the Connecticut River, this presentation introduces a novel drip application technique designed to overcome these hydrodynamic hurdles. By shifting away from traditional broadcast applications that are quickly diluted, this targeted method utilizes a drip system. This technique successfully maintains a concentrated, shallow band of herbicide that moves longitudinally down through the target area, effectively maximizing localized exposure while minimizing lateral dilution into the main channel. This presentation will explain the specific operational challenges of lotic hydrilla management, detail the recent field studies evaluating dye-traced hydrodynamics of this new drip application technique, and outline hypotheses for future research to optimize this strategy for broader riverine weed control.

Effect of ambient temperature after herbicide application on jointed spikerush (*Eleocharis interstincta*) injury

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Jointed spikerush (*Eleocharis interstincta*) is a perennial sedge found along the shallow edges of freshwater bodies in southern portions of the United States. Oftentimes, problematic invasive species can be intermixed into stands of *E. interstincta* and as a result herbicide applications to control the invasive plants can result in injury to the *E. interstincta*. Since *E. interstincta* is a desirable native species, reducing or preventing herbicide injury is beneficial. Recent applications in south Florida using flumioxazin and florpyrauxifen-benzyl, resulted in increased and unexpected injury to this plant. This resulted in questions on how ambient temperature after application of flumioxazin or florpyrauxifen-benzyl may influence off-target injury to this species. To investigate this, plants were treated with maximum labeled rates of flumioxazin and florpyrauxifen-benzyl at four different ambient temperatures. Growth chambers were set at 21.1-, 26.7-, 32.2- and 37.8-degrees Celsius to achieve the desired temperature gradient. The plants were visually assessed for injury at 1, 3, 7, 14, 21, and 28 days after treatment (DAT). At 28 DAT, the number of green shoots were counted. The resulting data indicates that higher ambient temperatures at the time of application resulted in increased injury and a reduced number of green shoots at 28 DAT. At 21.1 C, flumioxazin and florpyrauxifen-benzyl applications resulted in 34% and 41% visual injury, respectively. However, at 32.2 C and above, injury was higher at >56% for flumioxazin and >77% for florpyrauxifen-benzyl. Similar reductions in the number of green shoots were also observed for florpyrauxifen-benzyl where there was a >50% decrease in number of green shoots when compared at 21.1 C to the higher temperatures. These data indicate that ambient temperature at application could have a significant effect on nontarget injury. With this information, applicators can time their applications to help reduce injury and prevent potential loss of our desirable native species.

Best Practices for Sonar Data Collection & Waypoint Management

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¹ BioBase LLC., Nashville, TN

Accurate sonar data starts with proper installation and use. This session will walk through simple, effective steps for setting up sonar systems, including transducer mounting, external GPS placement, and survey speed considerations that directly influence data quality. We'll also highlight the differences between single beam and multibeam sonar, when each is most effective, and what to keep in mind when planning surveys. Beyond installation, I'll cover best practices for capturing and sharing waypoints, ensuring that key features like habitats, structures, or management areas are documented in a clear and consistent way.

Geographic and genetic patterns of *Cyperus blepharoleptos* morphology in the invaded range

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Studies on population genetics are important tools for understanding the history and management of an invasive species. *Cyperus blepharoleptos* Steud. (Cyperaceae; Cuban bulrush) is an emerging invader in the freshwater ecosystems of the southeastern USA. This species exhibits two discrete forms (capitate and anthelate), and very little is known about its genetic diversity. In this study, genetic material was collected from 24 *C. blepharoleptos* populations across the southeastern USA to determine genetic and geographic patterns of morphology in the invaded range. From this material, sequences from the chloroplast (cpDNA) *trnL* intron and *trnL-F* spacer identified three haplotypes: CbA, CbB, and CbC. Haplotypes CbA and CbB were dispersed throughout the region, but CbC was exclusive to central and southern Florida. Haplotype CbA was more likely to express the anthelate form, CbB was more likely to express the capitate form, and CbC was exclusively anthelate. These findings suggest a potential effect of haplotype on form, which warrants further study. Additionally, studied populations were used in conjunction with herbarium records to reconstruct the known distribution of *C. blepharoleptos* in the USA. The reconstruction showed a major, unexplained, geographic gap including much of Alabama, Georgia, and South Carolina. While these findings were unable to completely explain the genetic and geographic causes that determine form in *C. blepharoleptos*, there were patterns that emerged that warrant further investigation.

Preliminary results of field trials for reduction of invasive *Vallisneria* taxa in Florida

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Multiple *Vallisneria* (eelgrass) taxa have invaded Florida waterbodies and are a concern for aquatic resource managers in the state and elsewhere. *Vallisneria spiralis* has infested the Braden River which is used for recreation but is also an important irrigation and drinking water source for the Tampa metropolitan area. Similarly, the hybrid *Vallisneria x pseudorosulata* has invaded multiple water bodies in south Florida near West Palm Beach and is impacting recreational activities in Lakes Osborne and Wellington and is also impacting irrigation and flood control uses of associated drainage canals in the region. Small scale research identified endothall, carfentrazone-ethyl, and copper applied alone as potential control mechanisms for both eelgrass taxa; however, repeated treatments are likely needed for long-term reduction. The purpose of this work was to assess each herbicide as repeated treatments for control of eelgrass in each waterbody.

Endothall was applied (3.0 ppm) to sites in the Braden river. Endothall (5.0 ppm), carfentrazone-ethyl (200 ppb), and copper (1.0 ppm) were applied to field sites in South Florida. Onset of symptomology was rapid in each site (<3 days). Four weeks after initial treatment, *V. spiralis* aboveground biomass was reduced 92% in the Braden river; 6 weeks after final treatment *V. spiralis* could not be found in plots receiving multiple treatments. This project is ongoing but final results of this work will aid resource managers in Florida and other southeastern states that are managing eelgrass infested waterbodies.

Investigating Surface-Applied Submersed Treatments for Crested Floating Heart (*Nymphoides cristata*) Control

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Crested floating heart (*Nymphoides cristata*; CFH) is an invasive aquatic plant native to Asia that is well-established in the southeastern United States. Management of this species is critical to maintaining the ecology and utility of aquatic systems. However, the extensive root systems and prolific ramet production of CFH make long-term control challenging. Aerial applications of herbicides at in-water concentrations are commonly used for CFH control in areas that are inaccessible by boat; however, the efficacy of these applications compared to traditional subsurface herbicide injection treatments is unknown. Surface-applied (aerial) in-water treatments concentrate herbicide in the upper water column before dissipating, which could offer an advantage compared to subsurface injections. Therefore, dipotassium salt of endothall (3 mg ai L⁻¹) and florypyrauxifen-benzyl (FPB, 29 µg ai L⁻¹) were evaluated in mesocosm experiments for CFH control. Application techniques included surface applications at 187 L ha⁻¹ or 468 L ha⁻¹, and a subsurface injection. Each treatment was tested across exposure periods of 12, 24, 48, 96 h, and 12-week static. Destructive harvests were conducted 12 weeks after treatment, during which ramets and root crowns were counted, and above and belowground biomass were dried and weighed. Data were subjected to ANOVA and means were separated using Fisher's Protected LSD Test ($\alpha = 0.05$). In endothall treatments, only static exposure resulted in >95 % ramet, root crown, and biomass reduction. Shorter endothall exposure times did not result in sustained CFH suppression, regardless of application method. In contrast, FPB provided 98 to 100 % reduction of all metrics within 12 WAT regardless of application method or exposure time. These results demonstrate that surface-applied in-water treatments are a viable alternative to traditional submersed injections when using endothall or FPB for CFH control. Future research should investigate the minimum concentration-exposure time requirements to achieve long-term CFH control using these herbicides in order to maximize cost-effectiveness and selectivity. The mesocosm experiments conducted here should also be verified at the field level to verify findings in hydrodynamic environments.

Seasonal Influences on Water Hyacinth (*Pontederia crassipes*)

Response to Herbicides

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Water hyacinth (*Pontederia crassipes*) is a free-floating aquatic invasive plant established in the southeastern United States. Water hyacinth is managed through maintenance control, which is a year-round practice involving frequent treatments of nascent plant populations to maintain the species below problematic levels. Reports from field practitioners indicate time-of-year driven reductions in efficacy of some herbicides. Limited data exists on the efficacy of these herbicides for water hyacinth control during slow or poor growing conditions (i.e., fall through winter). Consequently, the objective of this study was to evaluate water hyacinth response to several commonly used herbicides under various seasonal conditions to aid in the development of guidelines for use. Outdoor mesocosm studies were conducted in Gainesville, FL in winter, spring, summer, and fall for two years, for a total of eight experimental runs. Herbicide treatments included: diquat, penoxsulam, glyphosate, 2,4-D, carfentrazone, and florypyrauxifen-benzyl (FPB) applied at rates typical for water hyacinth control. Each experimental run was harvested six weeks after treatment, and remaining viable biomass was dried and weighed. Diquat was the most consistent herbicide across all seasons, providing 75 to 100% reduction in biomass at both rates (32 and 64 fl oz acre⁻¹). Florypyrauxifen-benzyl was also consistent, providing 75 to 100% reduction in most seasons at both rates (2.7 and 5.4 fl oz acre⁻¹), with some reduced efficacy observed from the lower rate during the fall. Carfentrazone efficacy was variable, and most effective during the winter, performing better at 13.5 than 6.75 fl oz acre⁻¹. 2,4-D was most effective in fall and winter, and least effective in summer, with minimal

separation between rates (32 and 64 fl oz acre⁻¹). Glyphosate was generally more effective at 64 fl oz acre⁻¹ than 32 fl oz acre⁻¹, with lower efficacy in winter ($\leq 50\%$ biomass reduction). Penoxsulam was the least effective overall, providing $\leq 75\%$ biomass reduction in most seasons, regardless of rate or season (2.8 and 5.6 fl oz acre⁻¹). These results highlight the importance of synchronizing herbicide applications with seasonal growth dynamics, enabling managers to select the most effective product and rate at the time of greatest water hyacinth vulnerability.

From Strains to Strategies: Integrating Genetics and Herbicide Response in Aquatic Plant Management

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Aquatic plant managers experience variable outcomes from herbicide treatments on the same species in different waterbodies. While several factors contribute to the variation in management outcomes, a sizeable body of work with Eurasian watermilfoil demonstrates that variation in management outcomes can be driven by genetic differences among populations. This body of work has resulted in practical management tools that can provide managers with strain-specific herbicide response information freely available in the web application, MilfoilMapper. We are extending the framework developed around Eurasian watermilfoil to additional invasive aquatic plant species for which genetic resources and herbicide response data are more limited but rapidly developing. We will present surveys from several other invasive aquatic plant species, including curlyleaf pondweed, frogbit, eelgrass, and floating hearts. These surveys indicate that these species also exhibit genetic variation, which suggests similar opportunities for genetics-informed management. We will outline key research needs and challenges linking genetic variation to herbicide response across species, with the ultimate goal of developing support tools to inform invasive aquatic plant management strategies.

Arizona Department of Forestry and Fire Management: Managing Invasive Species, Restoring Habitats and Reducing Fire Risk

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¹Arizona Department of Forestry and Fire Management

This presentation details the Arizona Department of Forestry and Fire Management's (DFFM) efforts to manage invasive species, restore native habitats, and reduce wildfire risk across state forests. It highlights key programs like the Forest Health and Forestry initiatives, providing technical assistance and funding for wildfire protection and land stewardship. Through collaborative projects such as those with the Lower Gila River Collaborative and the Rio Reimagined initiative, the presentation examines case studies of invasive treatment successes and fire outcomes, such as the Hazen and Phon D fires. By sharing lessons learned on herbicide application, biomass removal, and post-fire recovery, the talk emphasizes the importance of strategic planning and cross-partnership collaboration in enhancing ecosystem resilience and developing future invasive management tools.

A Comparative Analysis of the Ecophysiology Between the Invasive Macroalgae Starry Stonewort (*Nitellopsis obtusa*) and the Native Macroalgae Chara (*Chara sp.*) to Predict Invasion Potential

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Starry stonewort (*Nitellopsis obtusa*) is an invasive macroalga from Eurasia. Currently starry stonewort's invasive range consists of the upper Midwest and Great Lakes region including the Mississippi River. Starry stonewort poses recreational and ecological problems by forming dense canopies that extend through the water column. Starry stonewort occupies a late season niche space with dense biomass occurring in late July and persisting well into fall. To date there is a lack of information on the ecophysiology of starry stonewort. Two populations of starry stonewort, Minnesota and New York, were analyzed to compare

regional differences in ecophysiology, along with chara (native species) serving as a control due to its widespread presence throughout the United States. Chlorophyll fluorescence was used on all three populations to determine photosynthetic efficiency at temperatures between 4-45°C. Dark-acclimated (Fv/Fm) measurements, or measurements that depict photosynthetic potential, showed that the three populations have a high potential to be efficient at temperatures from 4-35°C (HSD; $p < 0.05$). Light-acclimated (Φ PSII) measurements indicated similar patterns across the macroalgae populations, except at 30 and 35°C, where starry stonewort exhibited increased values compared to chara (HSD; $p < 0.05$). Gas exchange measurements were completed using the LI-6800-18 at 3 temperature optimums (4°C, 27°C, 37°C). Results indicated the net photosynthesis for the two starry stonewort populations was 0.0066 $\mu\text{mol g}^{-1} \text{s}^{-1}$, which was significantly higher (1.4 times higher) compared to chara at 27°C (HSD; $p < 0.05$). These data suggest that starry stonewort has the potential to expand its range into warmer climates and could outcompete chara in warmer areas.