Florida Invasive Species Council
2023 Annual Symposium

Building Resilience

From Land to Sea

March 21-24, 2023
DAYTONA BEACH SHORES, FL
# FISC 2023 CONFERENCE AGENDA

## TUESDAY MARCH 21ST

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>12:00 pm – 2:00 pm</td>
<td>Registration set up</td>
</tr>
<tr>
<td>3:00 pm – 5:00 pm</td>
<td>FISC Board meeting</td>
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## OVERVIEW: WEDNESDAY MARCH 22ND

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>8:00 am – 5:00 pm</td>
<td>Registration – Foyer</td>
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<tr>
<td>8:00 am – 5:00 pm</td>
<td>Sponsor Set-up/Poster Set-up – Bill France B &amp; C/Petty</td>
</tr>
<tr>
<td>9:00 am – 12:00 pm</td>
<td>Keynote and Plenary Session – Bill France A</td>
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<tr>
<td>12:00 pm – 1:30 pm</td>
<td>Lunch on your own</td>
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<tr>
<td>1:30 pm – 4:50 pm</td>
<td>Oral Presentations – Student Presentations, Bill France A</td>
</tr>
<tr>
<td>5:30 pm – 7:00 pm</td>
<td>Poster Session and Welcome Social – Bill France B &amp; C/Petty</td>
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## SESSION I – WELCOME, KEYNOTE, & ORAL PRESENTATIONS Bill France A – CEU

**Session ID:** 35300

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>MODERATOR</td>
<td>Deah Lieurance</td>
</tr>
<tr>
<td>9:00 am – 9:10 am</td>
<td>Welcome and announcements – Deah Lieurance, FISC Chair</td>
</tr>
<tr>
<td>9:10 am – 9:45 am</td>
<td>The way forward in restoring our beach dune plant communities for a resilient coastline <em>(Keynote Speaker)</em> – Eric Foht, Director of Natural Resources, Naples Botanical Garden</td>
</tr>
<tr>
<td>9:45 am – 10:20 am</td>
<td>Invasive Plant monitoring: Towards a quantitative but practical approach – Dexter Sowell, Florida Natural Areas Inventory</td>
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<tr>
<td>10:20 am – 10:55 am</td>
<td>Assessing the Success of Invasive Species Targeted Outreach – Paul Evans, Ft. Lauderdale Research and Education Center, University of Florida</td>
</tr>
<tr>
<td><strong>10:55 am – 11:15 am</strong></td>
<td><strong>NETWORKING BREAK IN SPONSOR ROOM (Bill France B&amp;C/Petty)</strong></td>
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<tr>
<td>11:15 am – 11:40 am</td>
<td>Herbicide options if glyphosate is off the table – Stephen Enloe, UF/IFAS Center for Aquatic and Invasive Species</td>
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<tr>
<td>Time</td>
<td>Session Content</td>
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<tr>
<td>11:40 am – 12:00 pm</td>
<td>The Southeast Regional Invasive Species and Climate Change Network (SE RISCC): Working together to reduce the joint effects of climate change and invasive species - Deah Lieurance, Agronomy Department, University of Florida</td>
</tr>
</tbody>
</table>

### SESSION II – STUDENT ORAL PRESENTATIONS – Bill France A – CEU SESSION ID: 35301

**MODERATOR** | TBD
---|---

**1:30 pm – 1:40 pm**  
Corporate sponsor update: Aquatic Vegetation Control, Sharon Gillenwalters

**1:40 pm – 2:05 pm**  
Plant community response to Old World climbing fern (*Lygodium microphyllum*) herbicide treatment in a pine flatwood – Minjin Choi, UF/IFAS Center for Aquatic and Invasive Species

**2:05 pm – 2:25 pm**  
Non-native Aquatic Plants in Urban Stormwater Structures: Implications for Host of Mosquito *Mansonia* Larvae – Imani Ford, Bethune-Cookman University

**2:25 pm – 2:50 pm**  
In-Water Activity of Glyphosate, 2,4-D, and Diquat on Waterhyacinth (*Eichhornia crassipes*) – Hannah Brown, UF/IFAS Center for Aquatic and Invasive Species

**2:50 pm – 3:15 pm**  
Seed Bank Persistence, Seed Output and Long-term Seed Viability of the Non-native Invasive Grass, *Hymenachne amplexicaulis* (West Indian marsh grass) – Akiem Gough, Agroecology Department, Archbold Biological Station

**3:15 pm – 3:35 pm**  
**NETWORKING BREAK IN SPONSOR ROOM (Bill France B&C/Petty)**

**3:35 pm – 4:00 pm**  
Evaluating Modified Basal Bark Band Heights to Enhance Triclopyr Efficacy – Conrad A. Oberweger, Agronomy Department, University of Florida

**4:00 pm – 4:25 pm**  
Developing Aerial Surveillance Methods for Identifying Cryptic Water Hyacinth (*Eichhornia crassipes* [Mart.] Solms) on Lake Lochloosa in Florida – Amber Riner, UF/IFAS Center for Aquatic and Invasive Species

**4:25 pm – 4:50 pm**  
Student-led Initiatives in Managing Invasive Plant Spread in the UCF Arboretum – Christian Horn, Biology Department, University of Central Florida

**5:30 pm – 7:00 pm**  
Poster Session and Welcome Social – Bill France B & C/Petty
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<tr>
<td>8:00 am – 5:00 pm</td>
<td>Registration – Foyer</td>
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<tr>
<td>8:00 am – 5:00 pm</td>
<td>Sponsor Exhibits, Poster Display – Bill France B&amp;C/Petty</td>
<td>Bill France B&amp;C/Petty</td>
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<tr>
<td>8:00 am – 11:00 am</td>
<td>Oral Presentations – Invasive Plant Management, Bill France A</td>
<td>Bill France A</td>
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<tr>
<td>11:00 am – 12:30 pm</td>
<td>Lunch on your own</td>
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<tr>
<td>12:30 pm – 2:05 pm</td>
<td>Oral Presentations – Bill France A</td>
<td>Bill France A</td>
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<tr>
<td>2:05 pm – 5:10 pm</td>
<td>CISMA Workshop – Bill France A</td>
<td>Bill France A</td>
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<tr>
<td>6:00 pm – 7:00 pm</td>
<td>Banquet – Ocean Terrace</td>
<td>Ocean Terrace</td>
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<tr>
<td>7:00 pm – 8:00 pm</td>
<td>Prize drawing &amp; Awards– Sponsor Room (Bill France B&amp;C/Petty)</td>
<td>Sponsor Room (Bill France B&amp;C/Petty)</td>
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**SESSION III – Invasive Plant Management – Bill France A – CEU SESSION ID: 35302**

**MODERATOR** | TBD
---|---
8:00 am – 8:05 pm | Corporate sponsor update: Environmental Quality Inc., Nicole Murray
8:05 am – 8:10 am | Corporate sponsor update: Natural Resource Planning Service, Eric Hoyer
8:10 am – 8:35 am | Spatio-temporal shifts in submersed aquatic vegetation (SAV) community structure from a selective, in-water treatment of Florpyrauxifen-benzyl in Lake Sampson, FL- James Leary, UF/IFAS Center for Aquatic and Invasive Plants
8:35 am – 9:00 am | Efficacy of cattle grazing and herbicide application in managing West Indian Marsh Grass (*Hymenachne amplexicaulis*) (Rudge) Nees) in Florida wetlands - Grégory Sonnier, Agroecology Department, Archbold Biological Station
9:00 am – 9:25 am | The reduced hack and squirt technique for woody invasive plant control: Status and future directions – Stephen Enloe, UF/IFAS Center for Aquatic and Invasive Plants
9:25 am – 9:45 am | NETWORKING BREAK IN SPONSOR ROOM (Bill France B&C/Petty)
9:45 am – 10:10 am | Rotation of herbicides for resistance management in controlling *Hydrilla verticillata*; case study Lake Elbert in Polk County – Kelli Gladding, UF/IFAS Center for Aquatic and Invasive Plants
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<tr>
<th>Time</th>
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<tr>
<td>10:10 am – 10:35 am</td>
<td>Translating Herbicide Use Pattern for Floating Plant Control with Spray Tracker Technology – Jonathan Glueckert, UF/IFAS Center for Aquatic and Invasive Plants</td>
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<tr>
<td>10:35 am – 11:00 pm</td>
<td>The very recent hydrilla invasion on Lake Apopka, Florida: A wickedly big problem with a need for immediate and long-term solutions – James Leary, UF/IFAS Center for Aquatic and Invasive Plants</td>
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<tr>
<td>11:00 am – 12:30 pm</td>
<td>Brown Bag Lunch</td>
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**SESSION IV – Stakeholder Engagement and the Control of Invasive Species – Bill France A – CEU SESSION ID: 35303**

**MODERATOR**

Deah Lieurance

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<th>Time</th>
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<tbody>
<tr>
<td>12:30 pm – 12:40 pm</td>
<td>Corporate sponsor update - TBD</td>
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<tr>
<td>12:40 pm – 12:50 pm</td>
<td>Corporate sponsor update - TBD</td>
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<tr>
<td>12:50 pm – 1:15 pm</td>
<td>The Regional Invasive Plant Status Assessment (RIPSA): a decision support tool to standardize plant listing across the Southeastern US – Deah Lieurance, Agronomy Department, University of Florida</td>
</tr>
<tr>
<td>1:15 pm – 1:40 pm</td>
<td>Update from the FISC Plant List Committee – Jessica Spencer, Army Corps of Engineers</td>
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<tr>
<td>1:40 pm – 2:05 pm</td>
<td>Lessons Learned in Training Georgia First Detectors to Combat the Spread of Invasive Species – Tristan Hansford, Center for Invasive Species and Ecosystem Health, University of Georgia</td>
</tr>
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</table>

**SESSION V – CISMA Workshop Updates and Facilitated Discussion 2:10 – 5:10 – Bill France A**

**BANQUET AND AWARDS – Ocean Terrace 6:00 pm – 8:00 pm**

**OVERVIEW: FRIDAY MARCH 24TH**

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<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>8:35 am – 12:00 pm</td>
<td>Oral Presentations – Bill France A</td>
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<tr>
<td>12:00 pm – 12:30 pm</td>
<td>FISC Business Meeting and Conference Concludes</td>
</tr>
</tbody>
</table>

**SESSION VI – Biocontrol – Bill France A – CEU SESSION ID: 35304**
MODERATOR  |  Carey R. Minteer
---|---
8:35 am – 8:45 pm | Corporate sponsor update: TBD
8:45 am – 9:10 am | Attraction of the Air Potato Leaf Beetle, *Lilioceris cheni*, (Coleoptera: Chrysomelidae) to leaf volatiles of the Air Potato, *Dioscorea bulbifera*, in a wind tunnel – Jessica L. Griesheimer, Entomology and Nematology Department, University of Florida
9:00 am – 9:30 am | Biological Control of *Acacia auriculiformis* in Florida – Carey R. Minteer, Indian River Research and Education Center, University of Florida
9:35 am – 10:00 am | Biological Control of Feathered Mosquito Fern (*Azolla pinnata*) – Seth Farris, USDA-ARS Invasion Plant Research Laboratory
10:00 am – 10:25 am | NETWORKING BREAK IN SPONSOR ROOM (Bill France B&C/Petty)
10:25 am – 10:50 am | Updates on the Release and Impact of the Brazilian Peppertree Biological Control Agent and Steps Forward – Dale A. Halbritter, USDA-ARS Invasion Plant Research Laboratory
10:50 am – 11:10 am | Chinese Tallow Biological Control and Pollinators – Alex Gaffke, USDA-ARS Center for Medical, Agricultural and Veterinary Entomology
11:10 am – 11:35 am | Waterlilies gone wild: the quest for biological control of *Nymphaea mexicana* and its hybrids in South Africa – Megan K. Reid, Centre for Biological Control, Department of Zoology and Entomology, Rhodes University and Fort Lauderdale Research and Education Center, University of Florida
11:35 am – 12:00 pm | FISC (formerly) FLEPPC BUSINESS MEETING
12:00 pm – 12:20 pm | CONFERENCE CLOSING REMARKS
Coastal Resiliency: The way forward in restoring our beach dune plant communities for a resilient coastline

Eric Foht, Director of Natural Resources
Naples Botanical Garden, Naples FL
efoht@naplesgarden.org

Florida’s coastal ecosystems serve as the front line in our defense against the impacts of hurricanes, storms, and sea-level rise. Both mangrove and beach dune systems play a significant role in protecting inland coastal resources, including natural areas and the urban interface. Mangroves often receive significant attention, protection, and research, while coastal dunes lag behind in protection and management for resiliency. Naples Botanical Garden has partnered with the City of Naples to pilot multi-species restoration projects of beach dune ecosystems within the city. The pilot projects re-introduce a diversity of native plant species to areas where invasive exotic plants have been removed. These diverse plantings include early colonizer and successional species with a goal of promoting greater resiliency in the face of increased disturbance from storms and hurricanes. This presentation will cover the response of dynamic coastal dune ecosystems to disturbance and outline the way forward in restoring beach dune plant communities for both resilient coastlines and against the spread of invasive exotic species.

Bio: Eric Foht is the Director of Natural Resources at Naples Botanical Garden and has been with the Garden since 2009. Eric’s role is the management of the Garden’s 90-acres of natural areas, the plant-based stormwater systems, and native plantings, and collaborates on offsite plantings and restoration projects. Eric actively participates in prescribed fires with partner organizations and recently completed the first prescribed fire at Naples Botanical Garden in February of this year.

Invasive Plant Monitoring: Towards a quantitative but practical approach

Dexter Sowell, Research Scientist
Florida Natural Areas Inventory, Tallahassee, FL
DSowell@FNAI.fsu.edu

Monitoring and treating invasive plants is a universally essential task for resource and land managers worldwide. In Florida, there is general uniformity in how invasive plants are managed due to the efforts of UF IFAS Extension outreach and FDACS pesticide applicator certifications, among others. Yet, there is considerable variation in how the presence and abundance of invasive plant species are surveyed and quantified, or how invasive plant treatment projects are evaluated—if at all. Land managers site lack of resources (time, staffing, funding) as a major obstacle in the implementation of a regular monitoring program. The Florida Natural Areas Inventory (FNAI) is working with land managers statewide to work towards a standardized, adaptive, and quantitative monitoring framework. FNAI adheres
to the North American Invasive Species Management Association 2018 minimum standards and collects additional attributes to better evaluate invasive plant species presence, coverage, and control in management projects. For post-treatment monitoring of invasive plants, FNAI estimates, at each target species occurrence: 1) the species managed, 2) gross acreage infested, and the estimated cover of the invasive plant 3) before and 4) after treatment. With these attributes, we can calculate the percent control for: 1) an entire project, and 2) each target species. For invasive plant surveys, this methodology also allows for calculation of net acres of infestation for proposed invasive plant treatment projects. We suggest that resource and land managers should collectively develop a standard methodology of their own to conduct invasive plant surveys that quantify invasive species abundance, and confidently quantify success of invasive plant treatments. We will outline various monitoring projects and techniques which could be implemented by any resource or land manager in Florida, yielding a more quantitative invasive plant monitoring program.

Bio: Dexter Sowell is the Invasive Plant Coordinator with the Florida Natural Areas Inventory. He conducts invasive plant surveys and inspections of invasive plant treatments on conservation lands. He serves on two CISMA Steering committees and the FISC Plant List committee. He has experience with Florida’s flora, fire-dependent ecosystems, invasive plant species management, and prescribed burning. Dexter has worked for the Florida Forest Service, Tall Timbers Research Station, and an environmental consulting firm. Dexter has a BS in Biological Sciences from Florida State University, a MS in Biology from Georgia Southern University, and a PhD in Biology from the University of Virginia.

Assessing the Success of Invasive Species Targeted Outreach

Paul Evans (presenting)\(^1\), Justin Dalaba\(^2\), Melissa Miller\(^1\), and Frank Mazzotti\(^1\)

\(^1\) UF IFAS-Fort Lauderdale Research & Education Center, Fort Lauderdale, FL

\(^2\) Cornell University, NYISRI, Brentwood, New York

The modern age of Invasive Species management requires in-depth and often tedious data collection to ensure adequate understanding of species distribution and introduction. This process has led many researchers and managers to turn to the public to increase information availability. However, the success of this approach often relies on the variability of the individual. The last four years the University of Florida has surveyed and began quantifying the success of such practices in hopes of bettering the impact of targeted outreach. Over 30 organizations attended and were surveyed at educational trainings on large nonnative lizards and constrictors. The success of these training led to an increase in individual’s willingness to report invasive species, greater awareness on invasive species in the region, as well as increased ‘confidence’ to identify correctly. This confidence was tested through identification surveys at outreach events. Although confidence increased considerably, the correct identification for nonnative species was less than 50% for various large lizards and constrictor species. Burmese Python (\textit{Python bivittatus}) were typically identified with greater accuracy, possibly linked to decades of media coverage and sensationalism. If modern invasive management practices continue this form of reporting than a reliance on the individual is inevitable. To better identification rates more time and effort is required to truly solidify this approach of data collection.

Bio: Paul Evans is the Science Writer and Outreach Coordinator with the University of Florida’s Croc Docs research team. The Croc Docs are a team of biologists working to improve the understanding of herpetofauna in South Florida, the Caribbean, and endangered mammals in Central America. He received his MSc. in Ecology and Conservation from the University of Aberdeen, and his bachelors from the University of South Florida. Paul aims to bridge knowledge gaps existing in the conservation field through wildlife education, scientific research, and public engagement. His research goals are in citizen scientist work, morphometric analysis, and geospatial processes. He has aided in improving public perception of lesser studied species and public awareness of invasive species with organizations in Alaska, Scotland, and is excited to continue his work in South Florida.
What does invasive plant management look like in a post-glyphosate world?

Stephen F. Enloe, Professor
UF/IFAS Center for Aquatic and Invasive Plants
sfenloe@ufl.edu

Glyphosate is the most widely used herbicide in the United States and the world. For decades, Academic Researchers, Extension Specialists and Industry Scientists alike have touted the herbicide as extremely safe, based upon numerous studies indicating an excellent toxicological profile. In 2015, this safety was brought into question when the International Agency for Research on Cancer (IARC) reclassified glyphosate as a probable carcinogen. Following the IARC decision, in 2017, the California Office of Environmental Health Hazard Assessment placed glyphosate on its Proposition 65 list of carcinogens. Subsequently, in 2018 and 2019, juries awarded over 2.3 billion dollars in the separate trials to plaintiffs who alleged glyphosate was the cause of their cancer. As a result of these actions, some cities and counties in Florida have enacted bans on glyphosate use on public lands. These collective actions have resulted in a tremendous need for management alternatives and innovative approaches to educating land managers on the controversy surrounding glyphosate. This presentation will focus on glyphosate management alternatives and how UF/IFAS is leading the effort to clarify what has transpired and present the science of glyphosate to a broad range of clientele.

Bio: Dr. Enloe is a professor and extension specialist at the IFAS Center for Aquatic and Invasive Plants at the University of Florida. He has been involved with invasive plant research and extension for the past two decades and has worked throughout the western and southeastern United States on developing innovative management strategies for many of the worst invasive tree, shrub, vine, and herbaceous species in the US. Dr. Enloe earned his Ph.D at UC Davis in Plant Biology, a Master’s degree in weed science from Colorado State University, and an undergraduate degree in Agronomy from N.C. State.

An introduction to the Southeast Regional Invasive Species and Climate Change Network (SE RISCC)

Deah Lieurance (presenting) 1, Wesley Daniel2, Brent Scheffers3

1Agronomy Department, University of Florida, Gainesville FL
2Wetland and Aquatic Research Center, US Geological Survey, Gainesville FL
3Wildlife Ecology and Conservation, University of Florida, Gainesville, FL

The Southeastern US harbors thousands of invasive plants and animals. Climate change is expected to further facilitate the introduction and spread of invasive species, which represents one of the biggest anticipated challenges to the conservation of natural resources and biodiversity in the world. Additionally, climate change is predicted to alter the impact from existing invasive species and the effectiveness of current control strategies. To plan and respond to the compounding effects of invasive species and climate change, researchers, managers, policy makers, and the general public must coordinate efforts to make climate smart management decisions and identify research gaps to improve invasive species management in the present and future. For these reasons
we created the Southeast Regional Invasive Species and Climate Change Network (SE RISCC) to connect land management practitioners and researchers. The mission of the SE RISCC management network is to reduce the joint effects of climate change and invasive species by synthesizing relevant science, sharing the needs and knowledge of managers, building stronger scientist-manager communities, and conducting priority research. Here we will present the network and the results of two surveys designed to assess the research and management needs of the Southeast.

Bio: Deah Lieurance is an Extension Scientist in the Agronomy Department at the University of Florida’s Institute of Food and Agricultural Sciences. She has been the coordinator of the UF/IFAS Assessment of Non-Native Plants in Florida’s Natural Areas since 2013. She received her Ph.D. from Wright State University, Dayton Ohio in 2012 and prior to that spent 3 years in Ft. Lauderdale working on the development of biocontrol agents at the United States Department of Agriculture (USDA) Invasive Plant Research Laboratory. She is the 2021 recipient of North American Invasive Species Management Association’s Rita Beard Visionary Leadership Award. Additionally, she currently serves on the NAISMA’s board and the chair of the Board Development Committee. She was the chair of the Florida Invasive Species Council (FISC) from 2019-2023 and was just selected Vice President of the Invasion Ecology Section of the Ecological Society of America.

SESSION II – STUDENT ORAL PRESENTATIONS – CEU SESSION ID: 35301

Plant community response to Old World climbing fern (Lygodium microphyllum) herbicide treatment in a pine flatwood

Minjin Choi¹, Jonathan Glueckert¹ and Stephen Enloe¹

¹UF/IFAS Center for Aquatic and Invasive Plants, Gainesville, FL m.choi1@ufl.edu

Old world climbing fern (OWCF) is an aggressive fern that has invaded many natural areas in south and central Florida. It forms dense cover that outcompetes many native plants and alters the fire ecology of multiple ecosystems. OWCF is a priority for many land managers and glyphosate is the most widely used herbicide for control. Unfortunately, glyphosate is nonselective and can damage native plants. Triclopyr has shown promise for OWCF control. However, there is limited information on optimal triclopyr concentrations in relation to both efficacy and selectivity. To address this, we compared triclopyr at 2.6, 3.4, and 5.2 g L⁻¹ to glyphosate (14.4 g L⁻¹) and quantified changes in cover for OWCF and native plants. Five by five-meter plots were treated with a CO₂ pressurized single nozzle backpack sprayer at 50 gallons acre⁻¹. Data were collected at 0, 60, 180 and 360 days after treatment (DAT). At 360 DAT, triclopyr at 2.6 g L⁻¹ failed to control OWCF compared to the untreated control. Triclopyr at 3.4 and 5.2 g L⁻¹ reduced OWCF cover to 23 and 31%, respectively. However, glyphosate reduced cover to 3%, which was significantly lower than triclopyr at 5.2 g L⁻¹. Native cover at 360 DAT was significantly higher in the triclopyr 3.4 g L⁻¹ treatment than the glyphosate treatment. These results indicate triclopyr performance on OWCF was lower with a tradeoff for higher selectivity among native plants. The impact of multiyear treatment with triclopyr should be examined to determine if nontarget benefits are maintained over time.

BIO: Minjin Choi is a Ph.D. student in the UF/IFAS Center for Aquatic and Invasive Plants. Her research interests are the biology and ecology of Old World Climbing Fern (Lygodium microphyllum) to understand how the problematic fern affect multiple ecosystems and surrounding native plants. Also, she would like to figure out how to control this invader efficiently and selectively.

Non-native Aquatic Plants in Urban Stormwater Structures: Implications for Host of Mosquito Mansonoria Larvae

Imani Ford¹, Hyun Jung Cho¹, Anna Ponce¹, Miranda Tressler², and Savannah Stura²

¹Bethune-Cookman University, FL Imani.J.Ford@students.cookman.edu
²Volusia County Mosquito Control District, New Smyrna Beach, FL
Plant selection is an important factor in reproduction by female mosquito *Mansonia titillans*. Anatomical structures of aquatic plants are plausibly the factors for selection of the location for laying eggs of this species and facilitating development of the larvae: large aerenchyma for larvae to obtain oxygen from; and soft root tissue for larvae to perforate. Previous studies suggest that *Mansonia* control should be achieved through understanding widest possible range of host plant species. Our research goal is to assess the role of urban stormwater systems and golf courses as potential habitats of *Mansonia* production by studying phenology and anatomical structures of floating and emergent plants growing. *Mansonia*'s oviposition varies seasonally and has been correlated with the abundance/growth season of the aquatic plants. Retention ponds, ditches, and canals within the coastal cities of Volusia County (e.g. Daytona Beach, Ormond Beach, and New Smyrna Beach) have been surveyed for documenting growth and phenology of aquatic plants that are known to potentially host *Mansonia* eggs and larvae. Some specimens of the plants will be taken for laboratory observation. Anatomical sections and prints of epidermis of the leaves will be used to examine anatomy of aquatic plants including invasive species, like Water lettuce (*Pistia stratiotes*) Water hyacinth (*Eichhornia crassipes*), Water spangles (*Salvinia minima*), and native species like Sponge plants (*Limnobium* spp.) during development of mosquito’s eggs and larvae. The microscopic picture will be analyzed and documented. Presence of egg masses and larvae will also be documented. This research outputs will be incorporated into mosquito control management and assess the golf course turf management on urban watershed and mosquito breeding habitats.

**BIO:** Imani Ford received a Bachelor’s degree at University of South Florida in Physical Sciences. She is currently enrolled in the MS program of Integrated Environmental Science at B-CU. This presented research will serve as the preliminary study for her MS thesis research.

**In-Water Activity of Glyphosate, 2,4-D, and Diquat on waterhyacinth (Eichhornia crassipes)**

**Hannah Brown**, Benjamin Sperry, Candice Prince, and Jason Ferrell

1UF/IFAS Center for Aquatic and Invasive Plants, Gainesville, FL  
2US Army Engineer Research and Development Center, Gainesville, FL

Waterhyacinth is an aggressive floating macrophyte that has traditionally been managed using foliar applications of 2,4-D and diquat. Recent research suggests that 20-25% of herbicide is lost to the water column. Here, we evaluated the relative efficacy of subsurface applications of 2,4-D, diquat, and glyphosate to determine if spray loss from foliar applications provides additional efficacy through absorption from roots and submersed leaves. Plants were established in mesocosms and treated with diquat at rates of 100, 200, 400, 800, 1600, or 3200 ppb. Both 2,4-D and glyphosate were applied at rates of 125, 250, 500, 1000, 2000, 4000, or 8000 ppb. Total plant biomass was harvested after 28 days of static exposure. Results suggest that subsurface diquat applications are effective at waterhyacinth control, with total plant death observed at 3200 ppb and biomass reductions of 92% at 1600 ppb. Neither 2,4-D or glyphosate were effective at reducing waterhyacinth biomass regardless of application rate. Results suggest that spray loss from glyphosate and 2,4-D applications represents wasted product and cost, while spray loss from diquat may provide additional efficacy on waterhyacinth.

**BIO:** Hannah Brown is a master’s student in the Agronomy Department at the University of Florida, where she also obtained her bachelor’s degree in chemistry and biology in 2022. Her research focuses on the management of water hyacinth and water lettuce.

**Seed bank persistence, seed output, and long-term seed viability of the non-native invasive grass, Hymenachne amplexicaulis**

**Akiem Gough**, Grégory Sonnier, and Elizabeth Boughton

1
**Agroecology Department, Archbold Biological Station, Venus, FL**  
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*Hymenachne amplexicaulis* (West Indian marsh grass) is a Category I invasive species affecting wetlands of Florida. Through its displacement of native species, its rapid spread may halt the progress of wetland restoration efforts. This study aimed to fill gaps in knowledge about the seed output, seed viability, longevity and seed bank persistence of *H. amplexicaulis* in Florida. Interestingly, the species is also highly palatable to cattle. Thus, we also aimed to compare seed output between grazed and fenced wetlands. To do this, we sampled 7 wetlands invaded by *H. amplexicaulis* for more than a decade at Buck Island Ranch and estimated number of inflorescences per m², number of seeds per inflorescence, and seed viability over 120 days using the Tetrazolium test. We also collected soil samples for a germination experiment under a shade house. Our results showed that mean seed output was high (with on average 2892 seeds/inflorescence and 98 inflorescences/m²), and seed viability was high during seed shedding and remained high (>50%) after 4 months. However, we found that *H. amplexicaulis* seed bank appeared to be more transient than persistent, accounting for < 3% of total germination. This is likely due to a high percentage of seeds germinating quickly after being produced, leaving less seeds with the opportunity to incorporate into the soil. Our results also show evidence that seed output per inflorescence, and inflorescence count were both lower in grazed wetlands (on average 1708 seeds/inflorescence and 56 inflorescences) than fenced wetlands (on average 3780 seeds/inflorescence and 144 inflorescences), suggesting that cattle grazing reduced seed output and potentially could be used as a control strategy.

**BIO:** Akiem Gough is a 2021 graduate of Florida Southern College and currently a Research Assistant in the Agro-Ecology program at Archbold Biological Station. His role encompasses various tasks, involving data collection and monitoring of vegetation, water quality, greenhouse gas emissions, and plant invasion at Buck Island Ranch, to help maintain grazing lands of Central Florida, within the Northern Everglades. Before his current position, he worked as an intern in the same program, assisting primarily on the “Efficacy of exotic grass control by cattle grazing for wetland” project, funded by NRCS. During this internship, he designed and conducted the research project on which this presentation is based. His research interests are focused on plant ecology, principally pertaining to non-native species and to wetland, grassland, and scrub habitats.

**Evaluating Modified Basal Bark Band Heights to Enhance Triclopyr Efficacy**

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Basal bark treatment involves applying an oil soluble herbicide in an oil carrier to the lower 0-45 cm of bark around the circumference of a tree. Recently, triclopyr acid (Trycera) was labeled for aquatic use, permitting wetland applications. However, reports of non-target injury have followed and direct application to the trunks base is not feasible in standing water. Elevated band height applications may offset these challenges, but no research had examined this. To evaluate Trycera efficacy and required concentrations, a field study with two experimental runs was conducted during Spring 2022. The first run took place in Melbourne, FL and the second run occurred in Wimauma, FL. Both trials involved a CRBD of 28 (7.62x7.62-m) plots of Brazilian peppertree (*Schinus terebinthifolia*). Treatments included Trycera concentrations at 5%, 10%, and 20% and band heights of 0-45-cm and 61-107-cm. Preliminary analysis indicated the time required for raised band height applications increased while herbicide output decreased when compared to lower band heights. Analysis of defoliation at 180 DAT for the first run, indicated effective control and no significant differences between band heights for 20% and 10% Trycera, while treatments with 5% Trycera were significantly lower in effectiveness at both band heights. No reductions in peppertree defoliation with Trycera at 5% were observed in the second run. Epicormic shoot data of the first run indicated that Trycera at 20% provided long-term control of peppertree at both band heights, while elevated treatments with 10% and 5% Trycera had significantly more new growth present on peppertrees. New epicormic shoots were only observed on peppertrees subject to elevated treatments with Trycera at 5% in the second run. Efficacy data collection is ongoing. If successful, these findings may provide an
effective management strategy for wetlands that requires less herbicide and better prevention of potential non-target injury.

Bio: Conrad Oberweger was born and raised in Orlando, Florida. He completed his Bachelor of Arts in environmental science from the University of Florida in 2021 and is currently continuing his education as a graduate student in the University of Florida's Agronomy program, where he plans on graduating in May of 2023. He is also a Graduate Research Assistant at the UF/IFAS Center for Aquatic and Invasive Plants under Dr. Stephen Enloe, where he provides support for the development and dissemination of sustainable and effective strategies for the control of invasive plants. He has developed a passion and appreciation for protecting natural areas and hopes to continue contributing to the field of invasive plant management for the foreseeable future by continuing to explore new and existing strategies for enhancing the resilience of natural areas in a long-term sustainable manner.

Developing Aerial Surveillance Methods for Identifying Cryptic Water Hyacinth (Eichhornia crassipes [Mart.] Solms) on Lake Lochloosa in Florida

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Abstract: Water Hyacinth (Eichhornia crassipes [Mart.] Solms) is an invasive, free-floating plant that has been managed in Florida for over a century. It is currently under statewide maintenance control to prevent small incipients from becoming large infestations. This requires an intense use of resources dedicated to monitoring and treatment efforts over large aquatic systems. This plant can migrate over long distances, colonize new areas and blend into native pad communities, making it difficult for an applicator to locate from a boat. The advent of small unmanned aerial systems (UAS) advances the opportunity for integrating aerial surveillance into the maintenance control of hyacinth. Affordable UAS outfitted with optical sensors and automated flight planning can cover large areas with high resolution imagery that is able to discriminate hyacinth from other species. We are testing this utility on Lake Lochloosa (2400 ha) with line point intercept missions capturing images from a nadir position at 1 cm resolution along transects that follow the littoral shoreline. We are learning that these missions are highly efficient, e.g., covering over 20 km and capturing over 900 images in less than 2 hours on the water. Each image can be manually scored with a presence/absence classification by an experienced analyst in less than 60 seconds and displayed in GIS for interpretation. To make this process even more efficient, we are integrating convolutional neural networks to automate the detection of hyacinth. In this presentation, we will discuss mission planning, image geo-referencing, model training and accuracy assessment. These technologies are accessible and user-friendly to practitioners with basic technical skills used in invasive plant management. The adoption of these technologies will greatly enhance intelligence that goes into management decisions for optimizing effort and resources.

BIO: Amber Riner is a first year Agronomy Master’s Student pursuing certificates in Weed Science and AI Based Smart Ag Systems at the University of Florida Center for Aquatic and Invasive Plants. Her research interest is in applying remote sensing and GIS technologies to solve problems in aquatic plant management.

Student-led Initiatives in Managing Invasive Plant Spread in the UCF Arboretum

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Invasive plant species pose a great risk to native biodiversity due to their propensity to spread quickly and create monocultures. The prevention of these alien monocultures is beneficial to the species comprising
these already threatened ecosystems as well as to the community’s enjoyment of the bio-diverse and interesting natural landscapes. At the UCF Arboretum, we have cultivated community and student involvement in this conflict with invasive species by maximizing the efficiency of invasive plant removal during weekly volunteer shifts and creating identification materials. The Urban Horticulture team began this process from the bottom-up by first cataloging which invasive species are present in the UCF Arboretum using field guides and iNaturalist. Then, using ArcGIS Field Maps, these plant populations were tracked with various fields of data including square footage, identification certainty, and reproductive stage. Finally, this field collected data was displayed in ArcGIS to show invasion intensity and location. This presentation will highlight the process, misconceptions, and improvements of invasive plant management and research in community-led initiatives. With proper tools and guidance, invasive plant management can be extended to students and those in the community who are willing to learn.

BIO: Christian Horn is a graduating student majoring in Biology from UCF studying plant sciences. He will also graduate with a minor in Environmental Studies and a certificate in GIS. His research focuses on invasive plants and GIS mapping in the UCF Arboretum Park and Natural Lands. First creating public maps for visitor use in GIS, he has since moved onto studying the invasive plant species present in the natural areas of UCF. Working as a co-coordinator for the Urban Horticulture team, he designed gardens with responsibly cultivated horticultural plants and revitalized invasive species management in the park area. Invasive plant identification, education, and management are all areas of focus for the team of 8 interns he co-leads. He is also well versed in insect identification and pinning for curation.

SESSION III – Invasive Plant Management – CEU SESSION ID: 35302

Spatio-temporal shifts in submersed aquatic vegetation (SAV) community structure from a selective, in-water treatment of Florpyrauxifen-benzyl in Lake Sampson, FL

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Submersed aquatic vegetation (SAV) communities are major ecological components of Florida’s shallow lake systems. Hydrilla (Hydrilla verticillata) is a non-native SAV dominating many of these lakes and is often observed to be growing in large monospecific cultures exclusive to other native community members. This invasive species is the top priority for aquatic plant management in Florida with objectives to conserve native SAV through selective suppression. Lake Sampson is approximately 770 hectares and located in rural Bradford County, Florida. It is mesotrophic with high color; half of the lake is littoral and has a long history of hydrilla management. A 2020 survey recorded over 400 ha of hydrilla infestation and strong representations of native eelgrass (Vallisneria americana) and Illinois pondweed (Potamogeton illinoensis). An in-water treatment of florpyrauxifen-benzyl was administered in early spring to 360 ha of the littoral area in the 1.2-2.4 m depth range. The target concentration was 29 µg l-1 covering 47% of the total surface area and 32% of the whole lake volume. The treatment equilibrated throughout the lake by 8 DAT and had measurable levels of the acid degrade at 32 DAT. Species and abundances were recorded with point intercept, hydroacoustic, and airborne imagery surveys to assess changes in community structure with high spatial and temporal resolution. Hydrilla was suppressed in 87% of the occupied area at 20 WAT. Coincident to that, eelgrass expanded 1 ha to 141 ha total, while pondweed expanded 70 ha to 175 ha total. These migrations were observed in spaces that were co-occupied with hydrilla and further showed a slight shift into deeper water. Here, we present on some of the basic attributes in community ecology consisting of native and nonnative patch networks influenced by environmental filtering and competitive exclusion. Selective hydrilla management is enhancing local composition of native SAV communities.

BIO: James Leary is Assistant Professor at the Center of Aquatic and Invasive Plants, with the Institute of Food and Agricultural Sciences, at The University of Florida. He has over 20 year of experience in tropical invasive plant management. His mission is
Efficacy of cattle grazing and herbicide application in managing West Indian Marsh Grass (*Hymenachne amplexicaulis* (Rudge) Nees) in Florida wetlands.

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West Indian Marsh Grass (*Hymenachne amplexicaulis* (Rudge) Nees, hereafter, WIMG) is a non-native clonal grass capable of rapidly forming monospecific stands in seasonal wetlands and floodplains, when left unmanaged. Control of WIMG usually involves herbicide application, however WIMG is highly palatable to cattle, and cattle could be used as an alternative management of WIMG. In this study, we investigated the cost-effectiveness of using cattle grazing vs. herbicide application in controlling WIMG. To do this, we selected 10 seasonal wetlands embedded in three different working cattle ranches and setup 4 plots in each wetland with 4 treatments: i) no grazing, no herbicide, ii) no grazing + Herbicide, iii) grazing, no herbicide and iv) grazing + herbicide. We monitored vegetation response to treatments by determining species richness, cover and biomass of WIMG.

At the start of the experiment, WIMG had on average 50.4% cover, but biomass was kept low by grazing and species richness was on average 10.3. After a year without grazing and no herbicide application, we observed an increase in both WIMG cover (by 37%), and biomass (by 82%), while species richness decreased by 37%. Both grazing and herbicide treatments reduced WIMG cover and biomass. However, herbicide was the most effective treatment reducing WIMG cover by 83% compared to 48% in grazed plots. We did not detect significant benefit of applying grazing to herbicide plots. Herbicide application is expensive, time-consuming, and difficult to implement at large scale in wetlands using machinery without substantial soil disturbance. Our study could have important implications for managing wetland restoration easements where grazing was removed.

BIO: Grégory Sonnier, Ph.D., is an Assistant Research Biologist with experience in plant community ecology and functional ecology. His current work focuses on how pasture management affects wetland plant communities embedded in agroecosystems and the services they provide. Much of this work has taken place on wetland restoration easements located on Archbold Biological Station property.

**The reduced hack and squirt technique for woody invasive plant control: Status and future directions.**

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The reduced hack and squirt technique (aka incision point application) was developed by Dr. James Leary in Hawaii over a decade ago. Since then, it has been tested and refined in Florida for several woody invasive plants. The technique entails making a limited number of hacks to a tree or shrub and delivering microliters of herbicide directly to the phloem and cambium. This technique has been exceptionally effective with aminocyclopyrachlor and can reduce herbicide use by over 95%. This presentation will focus on the development of reduced hack and squirt in Florida and will cover target efficacy, non-target injury, and the necessary tools and training required for success.

BIO: Dr. Enloe is a professor and extension specialist at the IFAS Center for Aquatic and Invasive Plants at the University of Florida. He has been involved with invasive plant research and extension for the past two decades and has worked throughout the western and southeastern United States on developing innovative management strategies for many of the worst invasive tree, shrub,
vine, and herbaceous species in the US. Dr. Enloe earned his Ph.D at UC Davis in Plant Biology, a Master’s degree in weed science from Colorado State University, and an undergraduate degree in Agronomy from N.C. State.

**Rotation of herbicides for resistance management in controlling Hydrilla verticillata; case study Lake Elbert in Polk County.**

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Herbicide resistance is the ability of a weed population to survive an herbicide application that previously was known to control the population. During the early 2000’s, Hydrilla verticillata populations began to demonstrate resistance to the a.i. fluridone and in 2011 resistant strains to a.i. endothall were identified. With the development of herbicide resistance in aquatic plants, new active ingredients were registered for use in aquatics. In order to preserve the herbicides currently on the market, rotation of herbicides to control aquatic weeds is highly recommended. A case study for Lake Elbert in Polk County will be presented regarding herbicide rotations to manage Hydrilla and results regarding a recent treatment (2022) using a.i. topramezone.

BIO: Kelli Gladding is a graduate from Rollins College with her bachelor’s degree in Environmental Science. Currently, Kelli works with the University of Florida, IFAS, Center for Aquatic Invasive Plants (CAIP) as research biologist for over 2 years. She spent 5.5 years as a representative with SePRO Corporation providing technical support to aquatic plant applicators and managers throughout the State of Florida. Kelli also served as the Co-Chair for the East Central Florida Cooperative Invasive Species Management Area for 7 years and served on the Board of Directors for the Florida Aquatic Plant Management Society, 2015-2017 and the 2019 FAPMS President. From 2004-2014, she worked for the Florida Fish and Wildlife Conservation Commission, Invasive Plant Management Section as a Regional Biologist focused on managing aquatic invasive plants in the St. Johns River region.

**Translating Herbicide Use Pattern for Floating Plant Control with Spray Tracker Technology**

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² Invasive Plant Management Subsection, Florida Fish and Wildlife Conservation Commission

Maintenance control of floating plants is a critical component of aquatic plant management (APM) programs on public lakes. The intent is to keep populations at low levels with frequent interventions using highly experienced, professional applicators trained to find small patches and precisely dispense small amounts of herbicide to targets while minimizing non-target injury. Maintenance control is a dynamic strategy that requires intense effort and is difficult to monitor. GPS fleet vehicle tracking technology was developed over two decades ago for commercial applications to monitor and evaluate transportation activities leading to many improvements in operational efficiency and cost reduction. GPS fleet tracking has recently been introduced to aquatic plant management on Florida public lakes with the advent of Spray Tracker technology providing real-time monitoring from a live web portal. The Spray Tracker device has an added feature of a spray valve actuator for signaling spray on/off to further display where and when herbicides have been applied. This operational data is downloadable in multiple forms including a comma separated value (.csv) format with georeferenced coordinates, time stamps and the added binary spray designation. Here, we build on this data by adding an attribute for how much herbicide was applied (i.e., active ingredient per unit area) when the sprayer was “on” by integrating sprayer calibration data (e.g., range and nozzle flow rate) and herbicide batch recipes. This gives a more spatially relevant account of how much (or little) herbicide is used in floating plant management. The adoption of this information technology is evidence to APM embracing the principles of precision pest management maximizing productivity, optimizing resources and minimizing footprint.

BIO: Jonathan Glueckert is a biological scientist at the University of Florida Center for Aquatic & Invasive Plants. He recently graduated from the University of Florida with a master’s degree in Agronomy, specializing in natural areas and aquatics weed
science and unmanned aerial systems. His current research involves upland and aquatic invasive plant management and the integration of geospatial and unmanned aerial technology into these fields.

The very recent hydrilla invasion on Lake Apopka, Florida: A wickedly big problem with a need for immediate and long-term solutions

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Lake Apopka is the 4th largest lake in Florida at 12,500 ha and serves as the head waters for the Ocklawaha River tributary. In the early 20th century, Apopka was a world-class bass fishing destination dominated by native submerged aquatic vegetation (SAV), especially southern naiad (Najas guadalupensis), eelgrass (Vallisneria americana) and Illinois pondweed (Potamogeton illinoensis). Decades of anthropogenic eutrophication switched Apopka, in the 1940s, from a SAV fishery habitat to an algal-dominant “green” lake. In the 1990s, nutrient reduction programs resulted in exponential declines in phosphorous and chlorophyll-a, over the next 30 years, concomitantly increasing water clarity and very suddenly promoting the expansion of surface hydrilla to >4000 ha in 2021. This forced an immediate, large-scale intervention in 2022, with in-water herbicide treatments covering 2500 ha using the active ingredients, endothall (406 ha), fluorpyrauxifen-benzyl (414 ha) and fluridone (1734 ha). Here, we will report on some of the early outcomes less than a year after treatment. In particular, the novel use of fluridone as a sectional treatment will be highlighted. Overall, hydrilla was effectively suppressed in the treated areas, while continuing to expand in untreated areas. Nutrient reductions will continue to create an environment conducive for SAV to thrive. Importantly, restoration plantings of naiad, eelgrass and pondweed are starting to thrive near shore but pales to the rates of hydrilla expansion. The long-term goal is to promote the original native SAV communities, but the long-term strategy to get past the hydrilla gauntlet is still in the adaptive phase of development.

BIO: James Leary is Assistant Professor at the Center of Aquatic and Invasive Plants, with the Institute of Food and Agricultural Sciences, at The University of Florida. He has over 20 year of experience in tropical invasive plant management. His mission is to contribute to the enhancement of aquatic plant management in Florida by extending technologies promoting environmental and economic sustainability and broader knowledge promoting social acceptance of natural resource protection.

SESSION IV – Stakeholder Engagement and the Control of Invasive Species – CEU SESSION ID: 35303

The Regional Invasive Plant Status Assessment (RIPSA): a decision support tool to standardize plant listing across the Southeastern US.

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State and regional invasive plant councils (IPC) were established across the United States to provide scientific, educational, and technical information. IPCs also generate invasive plant lists that are often used
to prioritize invasive plant management, local regulation of invasive plants, and development of early detection-rapid response watchlists. Most 78% of the 50 states possess at least one non-regulatory invasive plant list and there are approximately 30 entities (invasive plant councils, exotic plant councils, advisory councils, and invasive plant task forces) across the US with publicly available plant lists. Overall, there is little continuity across councils in how they add species to their lists. This has resulted in an inability to “crosswalk” the lists beyond state borders. In 2017, the National Association of Invasive Plant Councils (NAIPC) addressed this lack of consistency by publishing a checklist for the development of invasive plant lists to ensure that they include the highest standards for objectivity, scientific rigor, and ecological expertise and transparent consistent methodology to assure comparability across state lists. Here we present a simple screening tool that incorporates information from literature and occurrence records with expert knowledge from the field. Questions fall into four categories, distribution, spread potential, negative impacts, and management difficulty. Species are scored and then assigned rankings for major invader (category 1), minor invader (category 2), caution, and non-invader. In this presentation, we will illustrate how a species is assessed using examples from the FISC plant list. We are currently working with IPCs in Alabama, Georgia, Kentucky, North and South Carolina, Tennessee, and Florida to standardize the way we list species in the region. Harmonizing the way nonnative species are assessed can facilitate data sharing and enhance interpretation of results for stakeholders and the general public.

Bio: Deah Lieurance is an Extension Scientist in the Agronomy Department at the University of Florida’s Institute of Food and Agricultural Sciences. She has been the coordinator of the UF/IFAS Assessment of Non-Native Plants in Florida’s Natural Areas since 2013. She received her Ph.D. from Wright State University, Dayton Ohio in 2012 and prior to that spent 3 years in Ft. Lauderdale working on the development of biocontrol agents at the United States Department of Agriculture (USDA) Invasive Plant Research Laboratory. She is the 2021 recipient of North American Invasive Species Management Association’s Rita Beard Visionary Leadership Award. Additionally, she currently serves on the NAISMA’s board and the chair of the Board Development Committee. She was the chair of the Florida Invasive Species Council (FISC) from 2019-2023 and was just selected Vice President of the Invasion Ecology Section of the Ecological Society of America.

An update from the Florida Invasive Species Council Plant List Committee

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The FISC Plant List Committee is comprised of ecologists, invasive species practitioners, and botanists. This committee oversees the addition and removal of Category I and II invasive species for Florida. Previously, the list is revised every two years, but as a result of the pandemic, the 2021 list was not formally printed and released. That does not mean we were not busy. During the pandemic, we reviewed many species (including the unpublished watch list), made a few additions, and added a more interactive and accessible plant list to the website. The new website format allows any changes to made in real time, so stakeholders do not have to wait for new information to come with a new list. The plant list is a critical element in the mission of the Florida Invasive Species Council to reduce the impacts of invasive plants in Florida through the exchange of scientific, educational, and technical information.

BIO: Jessica Spencer earned a Bachelor’s Degree in Chemistry and Human & Natural Ecology from Emory University. She has also taken several graduate level courses at the University of Nevada, Las Vegas, and University of Florida and earned a Graduate Certificate in Weed Science from University of Florida. She has worked for the Corps of Engineers in the Jacksonville District since 2008. She worked with Regulatory for one year and has since been working for the Invasive Species Management Branch. She is currently the lead on the Corps’ Invasive Management on Dredge Material Management Areas and has been leading an Early Detection, Rapid Response effort to eradicate salt cedar (Tamarix canariensis) along the St. Johns River. She has also participated in biological control efforts, facilitated restoration projects, developed management plans for invasive species and coordinated interagency efforts to control invasive species.

Prior to working for the Corps, Jessica worked at Lake Mead National Recreation Area for five years, doing invasive plant surveys, rare plant surveys and other land management activities. She worked to organize and implement a "Weed Sentry" invasive species mapping and control program for all of the federal land management
agencies (US Fish and Wildlife, US Forest Service, Bureau of Land Management and National Park Service) in the Las Vegas area. She also implemented a project to create a buffer zone to prevent the spread of invasive fountain grass along the shores of Lake Mojave. She has also worked for the US Geological Survey and Sequoia National Park doing vegetation surveys and research.

She currently holds a Pesticide Applicator License from the Florida Department of Agriculture and Consumer Services. She is an active member of the Florida Native Plant Society, Florida Invasive Species Council and co-chair of the First Coast Invasive Working Group.

Lessons Learned in Training Georgia First Detectors to Combat the Spread of Invasive Species

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The Georgia First Detector Program has proven to be a valuable tool for training both land management professionals and engaged members of the public in finding, identifying, managing, and reporting invasive species. In addition to hosting specific First Detector Training Workshops, we have tapped into pre-existing natural resource and environmental networks in and around the state by attending relevant events and trainings. Through these events, we equip attendees with the tools and knowledge they need to detect new and existing invasive species outbreaks, as well as to report and manage them where possible. Though challenging, this work is not insurmountable! This presentation will outline recurring challenges facing training the general public about invasive species and how we have addressed them.

BIO: Triston Hansford is the First Detector Coordinator and Invasive Species and Ecology Specialist for the UGA Center for Invasive Species and Ecosystem Health, and has been in this position for 3 years. He has experience in wildlife education, prescribed fire, invasive species management, and habitat management for Georgia’s coastal plain native flora and fauna. He received his Bachelor of Science in Natural Resource Management: Wildlife from Abraham Baldwin Agricultural College in 2021.

SESSION VI – Biocontrol – CEU SESSION ID: 28883

Attraction of the Air Potato Leaf Beetle, Lilioceris cheni, (Coleoptera: Chrysomelidae) to leaf volatiles of the Air Potato, Dioscorea bulbifera, in a wind tunnel

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Air potato, Dioscorea bulbifera L., is an invasive vine native to Asia and Africa that was introduced to the southeastern United States in 1905. In 2011, the host specific air potato leaf beetle Lilioceris cheni (Coleoptera: Chrysomelidae), was introduced as a biological control agent for D. bulbifera. It has proven to be a highly effective agent, however, recalcitrant populations of D. bulbifera are commonly observed in urban and forestry settings. The beetle is known to aggregate in the field, and studies of this behavior could result in better management strategies to control these problem patches of D. bulbifera. Experiments were conducted to determine what was causing L. cheni aggregations in the field. Wind tunnel experiments determined that L. cheni predominately orientates to host plant via odors and not visual cues, and L. cheni is especially attracted to conspecific damaged plants. Chemical analysis of these damaged plants indicated that L. cheni induces a specific blend of volatile to be released by the plants. This induced response is likely
the source of the attraction of *L. cheni* and could be further leveraged into the creation of lures to monitor for populations of the agent and create targeted aggregations on problem weed patches.

**BIO:** Jessica Griesheimer is a second-year masters student at the University of Florida at the North Florida Research and Education Center in Quincy, FL, under Dr. Xavier Martini and Dr. Carey Minteer. She studies the chemical ecology and biological control of air potato, *Dioscorea bulbifera*, by its biological control agent the air potato beetle, *Lilioceris cheni*.

**Biological Control of *Acacia auriculiformis* in Florida**

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Earleaf acacia (*Acacia auriculiformis* A.Cunn. ex Benth) is a fast-growing tree species native to Australia. Earleaf acacia was introduced into the United States as an ornamental plant in the early 1900s. Over the last 10-15 years this invasive has been spreading very rapidly through Central and South Florida, especially in areas once inhabited by another invasive tree, *Melaleuca quinquenervia*. Foreign range exploration to search for natural enemies began were conducted from 2015-2019. Eighty-nine species were found to occur on and complete development on earleaf acacia. The species deemed most promising for use as biological control agents were prioritized for testing. Greenhouse and laboratory experiments and host range testing to increase our understanding of two of the prioritized biological control candidates of earleaf acacia: *Calomela intemerata* (Coleoptera: Chrysomelidae), *Trichilogaster* sp. nov. (Hemiptera: Pteromalidae) are currently underway in containment laboratories in Florida. Determining the fundamental host range of the leaf-feeding beetle *C. intemerata* is well underway. To date, we have observed no significant feeding or development on non-target species, except *Acacia cultriformis*, an Australian natives and one of the closest relatives of *A. auriculiformis*. *Trichilogaster* wasps gall leaf bases and developing vegetative and reproductive buds, diverting plant resources away from branch and flower development. To date, the only test plant that this *Trichilogaster* species has been able to gall is *Acacia mangium*. To date, no feeding has occurred on any native North American test plants.

**Assessing the establishment of two biological control agents of Old World Climbing Fern (*Lygodium microphyllum*)**

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Old World Climbing fern (*Lygodium microphyllum*) is an invasive climbing that causes extensive damage by disturbing natural fire regimes, collapsing Everglades tree island canopies, and outcompeting native vegetation. Two biological control agents have been tested for safety and permitted for release. Monitoring the establishment of these agents is imperative for understanding the effects of both *L. microphyllum* and the biological agents in Florida’s ecosystems. To evaluate the persistence of both the brown Lygodium moth (*Neomusotina conspurcatalis*), and the Lygodium mite (*Floracarus perrepae*),
monthly monitoring was conducted at 5 different sites for 4 years. Pheromone traps along transects, and 15-minute visual timed surveys were used to monitor the presence of the brown Lygodium moth, *N. conspurcatalis*. Random samples collected along two transects per site were examined for damage caused by *F. perrepae*. Mid-project we began measuring percent cover of *L. microphyllum* using 1-m² quadrats. We found that populations fluctuate interannually. During specific times of the year, each biological control agent specie will independently experience population spikes. These population spikes do not correspond to *L. microphyllum* coverage or any single environmental factor but may be a combination of environmental factors including temperature and day length. Quarterly monitoring will continue indefinitely.

BIO: Andrea Carmona Cortes is a biological science technician at the USDA ARS Invasive Plant Research Laboratory. She works on the mass rearing and release of biological control agents for *Lygodium microphyllum*, as well as IPM studies related to the weed.

**Biological Control of Feathered Mosquito Fern (*Azolla pinnata*)**

**Seth Farris**¹, Matthew Purcell², Bradley Brown², and Melissa Smith¹

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*Azolla pinnata*, or feathered mosquitofern, is a small, free-floating fern native to Africa, Asia, and Australia. It reproduces sexually or asexually, allowing the plant to spread rapidly and form dense mats on the surface of the water. This fern was discovered in Florida in 2007, where it was likely introduced by someone emptying an aquarium into a waterway. Due to the rapid nature in which it reproduces, *A. pinnata* is considered an emerging invasive species, subject to early detection and rapid response in Florida, and has been added to the Federal Noxious Weeds list. Potential biological control agents for *A. pinnata* have been identified and are currently being studied in Australia. *Bagous clarenciensis* has been prioritized as a biological control agent because it prefers to utilize *A. pinnata* as a host and has been shown to successfully reproduce on the plant. Recent results from a multi-generation study show that *A. pinnata* is likely the preferred host for *B. clarenciensis* over *A. rubra*. Research is ongoing to assess the effectiveness of *B. clarenciensis* as well as other potential biocontrol agents (e.g., a defoliating moth and a scale insect) for controlling *A. pinnata* in Florida.

BIO: Seth Farris is a biological science technician with the U.S. Department of Agriculture (USDA) Agricultural Research Service (ARS) at the Invasive Plant Research Laboratory (IPRL) in Davie, Florida. Seth received a Bachelor of Science degree in Biology at the University of Central Missouri and a Master of Science degree in Interdisciplinary Ecology at the University of Florida. He has been a biologist in Florida for over 10 years, studying a variety of native and nonnative flora and fauna throughout the state. Seth began working on Water Hyacinth biological control projects for the USDA ARS in 2021 and is now also involved with biological control research for water lettuce (*Pistia stratiotes*) and feathered mosquito fern (*Azolla pinnata*).

**Updates on the Release and Impacts of the Brazilian Peppertree Biological Control Agent and Steps Forward**

**Dale A. Halbritter**¹, Greg S. Wheeler¹, Min B. Rayamajhi¹, Carey Minteer², Eric Rohrig³, and Manoj Pandey³

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The biological control agent targeting Brazilian peppertree, *Pseudophilothrips ichini* Hood (Thysanoptera: Phlaeothripidae), is continuing to be mass reared and released at field sites across Florida. Since May 2019, over 3 million thrips agents have been released through the collaborative efforts of multiple agencies. Here we provide an update on the distribution and persistence of the thrips, damage inflicted to Brazilian peppertree, and some new avenues of research to better understand the variations in agent performance in the field. There is strong evidence for local persistence at several field sites across the region and one instance of dispersal and colonization of a new site over 1 km from the nearest release site. Damage to Brazilian peppertree canopies among sites has varied from undetectable to 100% of the canopy with at least some degree of detectable damage. Recent surveys have found sites with severe damage and canopy thinning. Biotic and abiotic factors, such as predation pressure, canopy diversity, phytopathogens, and soil properties are being considered to offer explanations for thrips efficacy. This information can be used to select optimal sites for biological control and sites that would be better suited for other methods of control, such as mechanical and chemical.

**Chinese Tallow Biological Control and Pollinators**

*Alexander Gaffke*¹, Greg Wheeler², Diajiang Li³, Rodrigo Diaz⁴

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⁴ Louisiana State University, Department of Biological Science, Baton Rouge, LA

Chinese tallow, *Triadica sebifera*, is a tree native to southeast Asian that was introduced to North America in the late 1800’s. Since its introduction, it has escaped cultivation and has spread throughout the southeastern United States, degrading natural habitats. Numerous attempts to control this invasive tree through conventional means has failed. This resulted in the initiation of a classical biological control program. Petitions for release have been approved for two, host specific, biological control agents. During the petition process, beekeepers expressed broad resistance towards the biological control program, resulting in significant delays to the permitting of the agent. Therefore, the importance of Chinese tallow for honey production will be discussed with an emphasis on empirical studies from the scientific literature. Multiple studies can be found to support and contradict the importance of Chinese tallow to beekeepers. This presentation will compare and contrast the implications of Chinese tallow biological control and honey production.

**Waterlilies gone wild: the quest for biological control of *Nymphaea mexicana* and its hybrids in South Africa**

*Megan K. Reid*¹, Julie A. Coetzee³, Martin P. Hill¹

¹Waterlily Biological Control Project, Florida Department of Agriculture and Consumer Services, University of Florida, Gainesville, FL  
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³University of Florida, IFAS, IFAS-IFC Program, Lake Alfred, FL  
⁴University of Florida, IFAS, IFAS-IFC Program, Sebring, FL
For biological control of invasive alien species to be successful, it is necessary to have an understanding of the genetic makeup of the target species, so that host specific natural enemies can be collected from genetically similar populations in the native range. For some invasive plants, this is complicated by the presence of hybrids, as is the case for *Nymphaea mexicana* Zuccarian (Nymphaeaceae) in South Africa. This plant is native in the southern states of USA but invasive in South Africa, where there also appears to be hybrid populations. To better understand the genetic structure of these hybrids, molecular techniques were utilised to determine the putative parents so that surveys for potential biological control agents can be streamlined. In addition, the host specificity of two insects was investigated to compare their potential to manage *N. mexicana* and the hybrids. One of these insects was the South African *Bagous longulus* Gyllenhal (Coleoptera: Curculionidae) that has expanded its host range to include *N. mexicana*, and the other was the Floridian *Megamelus toddi* Beamer (Hemiptera: Delphacidae) that occurs naturally on *N. mexicana* in the U.S.

Collecting information about the host specificity of these species allows us to improve efforts to develop biological control for *N. mexicana* by relating host specificity to plant genetic structure.

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**BIO:** Megan Reid recently completed her PhD at Rhodes University in Makhanda/Grahamstown, South Africa, where she has focused on developing biological control for *Nymphaea mexicana*. She has started as a postdoctoral researcher at the University of Florida Fort Lauderdale Research and Education Centre in Dr. Gettys’ research laboratory in collaboration with Dr. Melissa Smith at the USDA, where she will conduct research to promote the integrated management of water hyacinth.

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**POSTER SESSION – STUDENT**

**Using two chemotypes of invasive Melaleuca to compare herbivory in opposite coasts of South Florida**

**Blake Blaskowski**, Biology Department, University of South Florida, Tampa, FL  bblaskowski@usf.edu

*Melaleuca quinquenervia* is an invasive species native to Australia that impacts South Florida, including the Florida Everglades (1). To further reduce the impacts of *Melaleuca*, we propose conducting more research into biological control agents’ distribution and effects of climate differences (2). Herbivory from three agents, *Oxyops vitiosa*, *Boreioglycaspis melaleucae*, and *Lophodiplosis trifida*, target different niches within *Melaleuca* and subsequently reduce its biomass, growth rate, and reproductive rate (3). The addition of biocontrol agents to other management tactics has drastically contracted *Melaleuca*’s footprint, but persistent populations are still present throughout much of the range. To address these recalcitrant populations, we pose following question: How do *Melaleuca* respond to ecological and herbivore differences? We hypothesize that *Melaleuca* will have more success in cooler and drier areas of the park because of its adaptability to climate change in the past decades (5). Trees will likely be most affected by *O. vitiosa* due to its ability to reduce reproduction and growth (2) compared to the other introduced
herbivores. We also intend to grow and monitor seedlings from two different chemotypes within these areas/refuges on each coast. Seedling measurements will include age/size of tree, herbivores present during surveys, and how much herbivory has occurred among other findings as the experiment progresses. The results will address, and possibly confirm, the hypothesis regarding Melaleuca success in different ecological conditions and with different responses to biocontrol agents.

BIO: Blake Blaskowski received her Bachelor's in Biology from the University of Florida in 2021. During her time there, she worked in a plant pathology lab that specialized in genetics and studied abroad at Cardiff University in Wales. After her degree, she worked for the U.S. Geological Survey as a student researcher studying invasive marine species. Now she is seeking her master's at the University of South Florida in Biology, specializing in Ecology and Evolution, and her thesis focuses on the invasive tree, Melaleuca quinquenervia, and its herbivores.

References

Investigating Abiotic Factors Influencing Pseudophilothrips ichini (Hood) (THYSANOPTERA: PHLAEOOTHRIPIDAE) Establishment in the Field

Emily J. Le Falchier, Carey R. Minteer, PhD

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Schinus terebinthifolia Raddi (commonly called Brazilian pepper or peppertree) is a Category 1 invasive shrub that grows rapidly in dense, monotypic stands and is a prolific producer of berries. It is one of Florida’s worst upland invasive plant species, and as such, has been the target of biological control programs for many years. After years of studies on its safety and biology, the classical biological control agent, Pseudophilothrips ichini (a thrips) was approved for release in Florida in 2019. Since then, over 3 million thrips have been released in selected areas around the state. However, establishment and persistence of the thrips have not been observed at all previous release sites despite niche model predictions finding most of peninsular Florida to be climatically suitable. In this study, I am investigating which abiotic factors that have the greatest influence on P. ichini thrips establishment and persistence through site-level microclimate monitoring. To do this, I selected sixteen individual Brazilian peppertrees in two different locations and two different habitats. Each tree received a total of 7,000 thrips, released over a four-month period (July-October). Site visits are being conducted every two weeks to survey for adult thrips, immatures, and to collect data on other abiotic factors like soil moisture. Information on the preferred habitat or abiotic conditions of the thrips can be used to inform researchers and land managers where release efforts should be concentrated.
BIO: Emily is a Master’s student in the Entomology and Nematology department at the University of Florida’s Indian River Research and Education Center. Her research focuses on improving control of Brazilian peppertree through studies of the biological control agents’ habitat preferences.

Determining the host range of *Trichilogaster* sp. nov (Hymenoptera: Pteromalidae), a potential biological control agent of earleaf acacia (*Acacia auriculiformis*) in Florida

Sara Salgado¹ and Carey Minteer¹

¹Entomology and Nematology Department, University of Florida, Indian River Research and Education Center, Fort Pierce, FL 34945, sara.salgadoast@ufl.edu

*Acacia auriculiformis* (earleaf acacia) is a fast-growing, an evergreen tree in the Fabaceae family. It is native to Australia and was introduced to the United States as an ornamental plant in the early 1900s. Since then, earleaf acacia has been spreading rapidly throughout Florida, altering native plant communities and ecosystem functions. In 2021, the bud-galling was, *Trichilogaster* sp. nov. (Hymenoptera: Pteromalidae) was imported into containment laboratories in Florida from Australia to assess its potential for biological control of earleaf acacia. Host specificity tests are underway at the UF/IFAS Hayslip Biological Control and Containment Laboratory in Fort Pierce, Florida. No choice oviposition and gall formation tests were conducted on 16 plant species from the list of plant species for host range testing approved by the Technical Advisory Group on the Biological Control of Weeds. So far, no gall formation was observed on any species other than *A. auriculiformis*. More testing is on the way to determine if this insect will be safe to release in Florida to control earleaf acacia. However, current results are promising.

BIO: Sara Salgado is a Ph.D. student in the Entomology and Nematology Department at the University of Florida based in the Indian River Research and Education Center. Her research is on classical biological control for invasive plant species, focusing in earleaf acacia (*Acacia auriculiformis*) in Florida. She graduated from Rhodes University in 2021 with a MSc in Entomology.

POSTER SESSION – GENERAL

Assessing the ability of the biological control mite (*Floracarus perrepae*) to attack and limit the growth of earlier life stages of Old World Climbing Fern (*Lygodium microphyllum*)

Jessene Aquino-Thomas¹, Ellen Lake², Andrea Carmona Cortes¹, Anthony M. Garcia¹, Melissa Smith¹

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Old World Climbing Fern (*Lygodium microphyllum*) is native to the tropics and subtropics of Australia, Asia, Oceania, and Africa and is considered an invasive plant in the North America. *Floracarus perrepae* is an eriophyid mite that forms leaf roll galls on leaflets and apical meristems of *L. microphyllum*, which can cause leaf necrosis and reduced climbing ability. Additionally, the mite diminishes the plant growth rate, alters plant architecture, and lessens some of the other damaging consequences of *L. microphyllum* on ecosystems. To develop more effective Integrative Pest Management (IPM) for *L. microphyllum*, it is
critical to assess the vulnerability of *L. microphyllum* to *F. perrepae* during early life stages. The hypotheses tested in the experiment are A) what life stages of *L. microphyllum* are susceptible to attack by *F. perrepae*, B) because of damage from *F. perrepae*, does sporeling mortality increase, C) can *F. perrepae* damage alter above ground and/or below ground biomass. Sporelings were grouped at the beginning of the experiment by life stages; gametophyte, sporophyte, true leaf, rachis node, and “fits in four-inch pot”. Preliminary results suggest that *F. perrepae* damages *L. microphyllum* as early as the first true leaf stage, but it does not attack the gametophyte or the sporophyte stages. Additionally, at the end of the experiment, the initial gametophytes, sporophytes, and rachis node groups were significantly more likely to be dead than their control counterparts (P < .001, P < .001, P < .001) and biomass above ground and below ground was significantly different for gametophyte (P < .001, P < .001), sporophyte (P < .001, P < .001), rachis node (P < .001, P < .001), and four-inch pot groups (P = .030, P = .030). Based on this, we would recommend that these biological control agents be incorporated in IPM at all stages of invasion.

BIO: Jessene Aquino-Thomas is a Post-doctoral Research Ecologist at the USDA-ARS Invasive Plant Research Laboratory. She earned an Anthropology/Sociology B.A. from Florida International University, a Biology B.S., a Biology M.S., and her Ph.D. in Integrative Biology from Florida Atlantic University. In her current position, she manages the mass rearing and release of biological control agents to target the invasive weed *Lygodium microphyllum* and researches the population dynamics and the ecological processes of these agents and their target weed across different spatial scales.

**Assessing the establishment of two biological control agents of Old World Climbing Fern (*Lygodium microphyllum*)**

**Andrea Carmona Cortes**, Jessene Aquino-Thomas, Aaron David, Ellen Lake, Melissa Smith
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2 Archbold Biological Station, 123 Main Drive, Venus, FL
3 Mt. Cuba Center, 3120 Barley Mill Road, Hockessin, DE

Old World Climbing fern (*Lygodium microphyllum*) is an invasive climbing that causes extensive damage by disturbing natural fire regimes, collapsing Everglades tree island canopies, and outcompeting native vegetation. Two biological control agents have been tested for safety and permitted for release. Monitoring the establishment of these agents is imperative for understanding the effects of both *L. microphyllum* and the biological agents in Florida’s ecosystems. To evaluate the persistence of both the brown Lygodium moth (*Neomusotima conspurcatalis*), and the Lygodium mite (*Floracarus perrepae*), monthly monitoring was conducted at 5 different sites for 4 years. Pheromone traps along transects, and 15-minute visual timed surveys were used to monitor the presence of the brown Lygodium moth, *N. conspurcatalis*. Random samples collected along two transects per site were examined for damage caused by *F. perrepae*. Mid-project we began measuring percent cover of *L. microphyllum* using 1-m² quadrats. We found that populations fluctuate interannually. During specific times of the year, each biological control agent specie will independently experience population spikes. These population spikes do not correspond to *L. microphyllum* coverage or any single environmental factor but may be a combination of environmental factors including temperature and day length. Quarterly monitoring will continue indefinitely.

BIO: Andrea Carmona Cortes is a biological science technician at the USDA ARS Invasive Plant Research Laboratory. She works on the mass rearing and release of biological control agents for *Lygodium microphyllum*, as well as IPM studies related to the weed.

An Update on Biological Control Releases for Old World Climbing Fern, (*Lygodium microphyllum*)

**Logan Crees**, Jessene Aquino-Thomas, Melissa Smith
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Current biological control for Old World climbing fern (*Lygodium microphyllum*) consists of two approved agents, a defoliating crambid moth, *Neomusotima conspurcatalis* and an eriophyid mite, *Floracarus perrepae*. In the last nine years, nearly 900 releases have been made throughout the invaded range totaling to more than 3,800,000 moths and 30,500,000 mites. This effort has been part of the larger Comprehensive Everglades Restoration Plan to reduce populations of Old World climbing fern and restore impacted Everglades communities. To improve agent impact, we instituted changes to rearing protocols that resulted in a sharp increase in the number of mites released. Concomitantly, we anticipate the cessation of releases for the defoliating moth in the coming years to allow for more resources to support novel agents (e.g., the Lygodium sawfly and two new moth species are in the pipeline). From these releases, we have documented successful establishment of agents throughout several locations within the Greater Everglades Ecosystem. Despite these efforts, failure of these agents to establish in other locations have raised questions of the genetic origin of Florida Old World climbing fern populations. Moving forward, releases will be targeted at new sites, and the discovery of predatory mites feeding upon the Lygodium galling mite may require more study as to how they will affect the establishment and effectiveness of the Lygodium galling mite.

**BIO:** Logan Crees is a biological science technician responsible for rearing and releasing the biological control agents for Old World climbing fern for the USDA-ARS Invasive Plant Research Laboratory.

**East Central Florida (ECF) Invasive Plants for Early Detection and Rapid Response (EDRR): A Reference Guide for EDRR Target Species in the ECF Cooperative Invasive Species Management Area (CISMA)**

**Bonnie Wells¹, Kristine Campbell², and Carl Greene²**

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A new identification and management guide, *Plants for Early Detection and Rapid Response in the ECF CISMA: Brevard, Volusia, Flagler, and Putnam Counties*, was created and distributed among the vegetation management industry in Florida. The comprehensive guide includes photographs, identification characteristics, and management recommendations for all the current ECF CISMA EDRR target plant species and the ones listed on the “To be watched” list for the region. The content was created by ECF CISMA leadership, designed by the University of Florida/IFAS Communications graphic design team, and grant funded by the Florida Invasive Species Management Council. Content includes high-quality photographs, identification characteristics such as leaf arrangement, growth form, flower, and fruit, as well as University of Florida management recommendations, when available, for each species. The reference guide benefits Florida CISMAs by facilitating early detection and rapid response in managing important invasive species that threaten the lands and waters of ECF. This comprehensive, up-to-date photographic reference guide meets the shared goal across CISMAs to implement monitoring, prevention, efficient management, education, and awareness of invasive species. This publication is a first of its kind for the ECF CISMA. This shared resource helps vegetation management personnel accurately and efficiently identify and manage critical invasive species in the region, thereby limiting the threat of these species on public and private lands and waters in Florida and beyond.

**BIO:** Dr. Bonnie Wells is the Commercial Horticulture Agent for the University of Florida IFAS Extension in Brevard County, specializing in turfgrass, ornamental production, and sustainable landscape maintenance. She is a Doctor of Plant Medicine (UF ’13) with more than 15 years of experience in commercial plant production, with expertise in plant pathology, integrated pest management (IPM), and pesticide safety and stewardship. Dr. Wells also has a degree in Biochemistry from the University of Southern Mississippi, is an International Society of Arboriculture Certified Arborist®, Florida-Friendly Landscaping® Certified Professional, and is currently a co-chair for the ECF CISMA.