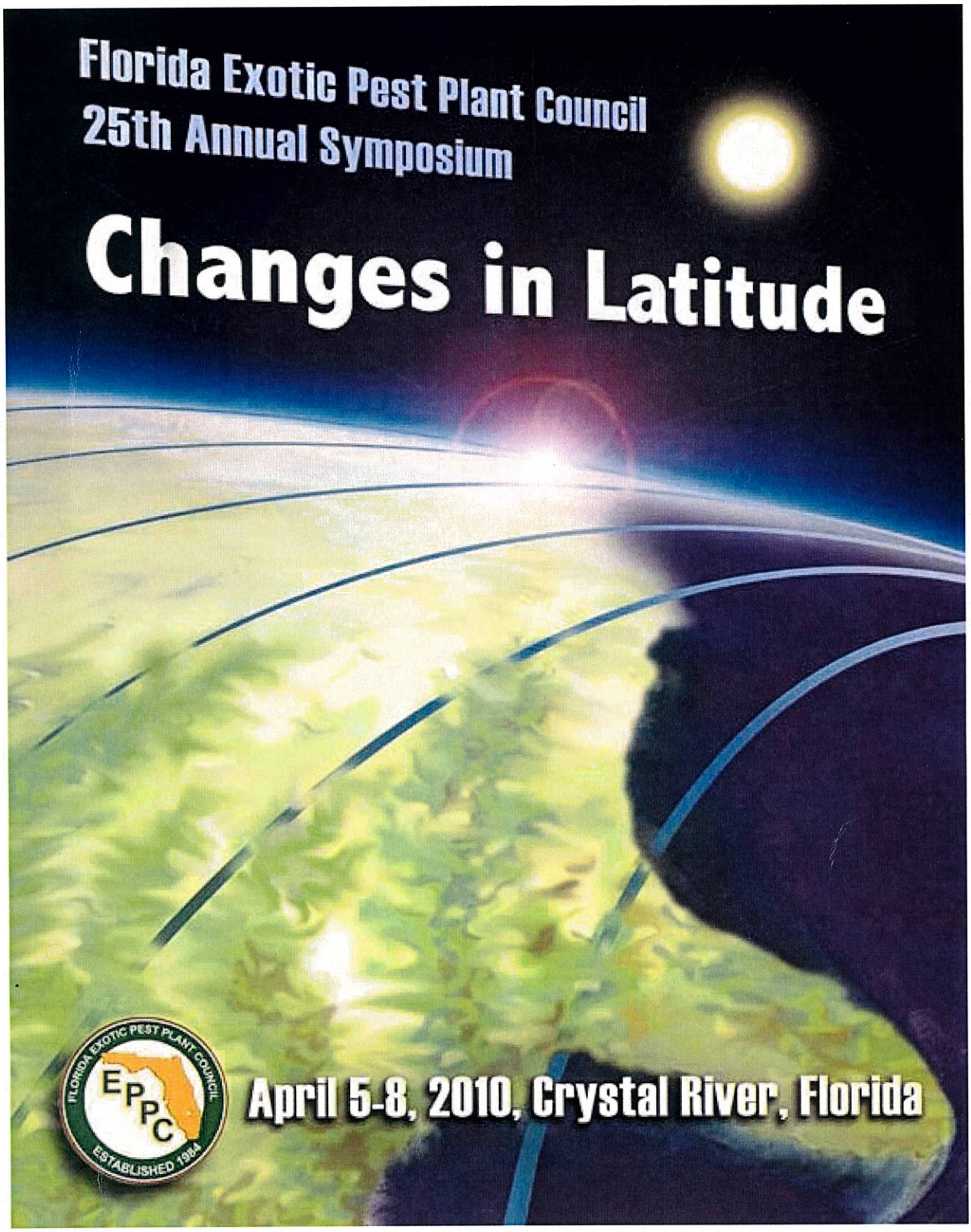

Florida Exotic Pest Plant Council
25th Annual Symposium
Changes in Latitude
FLORIDA EXOTIC PEST PLANT COUNCIL
EPPC
ESTABLISHED 1984
April 5-8, 2010, Crystal River, Florida

Symposium Schedule

Monday, April 5th

Florida EPPC Board of Directors & Task Force Meetings
1:00 PM – 4:00 PM, Sabal Ballroom

Symposium Early Registration
3:00 – 6:00 PM, Pine Room

Tuesday, April 6th

Symposium Registration
7:30 AM – 3:00 PM, Pine Room

Vendor Expo
8:00 AM – 5:00 PM, 6:00 – 8:00 PM, Magnolia Ballroom
Many companies in the invasive plant management industry will demonstrate their products and services.

Chair's Welcome Address
8:20 – 8:40 AM, Sabal Ballroom
Florida EPPC Chair, Jim Burney

Keynote Address
9:00 – 9:40 AM, Sabal Ballroom

A Warmer and Weedier Future? Challenges and New Opportunities in a Changing World
Jeffrey Dukes, Ph.D., Purdue University, West Lafayette, IN

This year's keynote speaker is Dr. Jeffrey Dukes, an assistant professor in the Department of Forestry and Natural Resources at Purdue University and Director of the Boston-Area Climate Experiment (BACE). His keynote address will explore how the impacts of invasive species are expected to change in a warmer, more CO_2-rich world and what measures can be taken to prepare for these scenarios.

Session I: Climatic Influence on Invasive Species
9:40 – 10:20 AM, Sabal Ballroom
Session Moderator: LeRoy Rodgers, South Florida Water Management District

9:40 – 10:00 AM **Climatic Drivers for Changes in Flowering Times of FLEPPC Category I and II Species**
Betsy Von Holle, Yun Wei, David Nickerson

10:00 – 10:20 AM **Endangered Species Have Significantly Lower Risk for Invasiveness than General Horticultural Plant Introductions** Hong Liu and Chad Husby

10:20 – 10:40 AM **Refreshment Break provided by Dow AgroSciences**

Symposium Schedule

Tuesday, April 6th

continued

Session II: Invaded Landscapes: Updates on Mapping and Invasive Assessment Programs

10:40 - 12:00 AM, Sabal Ballroom
Session Moderator: Jennifer Possley, Fairchild Tropical Botanic Gardens

10:40 - 11:00 AM **Lake Okeechobee Interagency Aquatic Plant Management Team – Several Decades… and Counting** Mike Bodle

11:00 - 11:20 AM **The IFAS Assessment of Non-Native Plants in Florida's Natural Areas** Aimee Cooper and Ken Langeland

11:20 - 11:40 AM **The FNAI Invasive Plant Mapping System and the Florida Invasive Plants Geodatabase** Frank Price

11:40 - 12:00 PM **Refining the New Zealand Aquatic Weed Risk Assessment for Florida** Doria Gordon, Crysta Gantz, Christopher Jerde and W. Lindsay Chadderton

Lunch 12:00 PM – 1:00 PM

Session III: Invasive Plant Management Strategies

1:00 – 2:20 PM, Sabal Ballroom
Session Moderator: Jon Lane, US Army Corps of Engineers

1:00 - 1:20 PM **Environmental Impact of Non-Herbicidal Invasive Weed Control** Jimmie Cobb and Bill Kline

1:20 - 1:40 PM **Implementation Program for *Megamelus scutellaris* in Florida** Philip Tipping

1:40 - 2:00 PM **Herbicide Spot Spraying in Remote Areas** Jim Burch and Hillary Cooley

2:00 - 2:20 PM **Biological Control of Brazilian Pepper; Results from Foreign Exploration and Host Testing** Greg Wheeler, Fernando McKay and Marcelo Vitorino

2:20 - 2:40 PM **Refreshment Break provided by DuPont**

Workshops 2:40 – 5:00 PM

EDDMaps: Invasive Species Mapping Made Easy! *Sabal Ballroom A*
Led by Chuck Bargeron, Karan Rawlins, University of Georgia and Kristina Serbesoff-King, The Nature Conservancy
EDDMapS is a tool for reporting and mapping invasive species. Workshop attendees will learn the "ins and outs" of this growing web-based invasive mapping tool. Attendees will learn how to enter data, discuss the importance of early detection lists, and learn ways to recruit local verifiers and monitoring volunteers in your area. Limit 40 participants.

Symposium Schedule

Tuesday, April 6th continued

Invasive Plant Field Identification *Pine Room*
Led by Drs. Colette Jacono and Kenneth Langeland, University of Florida/IFAS
Join us for a two-hour, hands-on workshop to learn and share the features and tips for successful field recognition of invasive plants in Florida. We will study an assortment of aquatic, wetland, and upland species. New additions to the FLEPPC Category I and II lists as well as other lesser-known species to be watched for will be highlighted. Limit 40 participants.

Natural Areas Weed Management Preparation Class *Sabal Ballroom C*
Led by Ken Gioeli, University of Florida/IFAS
Individuals planning to take the Natural Areas Weed Management Certified Pesticide Applicator examination should attend this three-hour training session. Participants will receive an overview of pest plants and their recommended chemical controls, a review of chemical control methodologies, herbicide characteristics and their behavior in the environment, and methods for herbicide dilution and rate calculations. Limit 30 participants.

Poster Session
6:00 – 9:00 PM, Magnolia Ballroom

Evening Social Event
6:00 – 9:00 PM, Magnolia Ballroom *sponsored by* **Aquatic Plant Management, Inc. and Dow AgroSciences**

Wednesday, April 7th

Vendor Expo
8:00 AM – 12:00 PM, Magnolia Ballroom

Track 1 Note: There are two concurrent sessions on Wednesday morning.

Session IV: The Power of Partnerships
8:20 – 10:00 AM, Sabal Ballroom A
Session Moderator: Jon Lane, The Army Corps of Engineers

8:20 – 8:40 AM **The Florida Invasive Species Partnership (FISP): Invasive Species Know No Boundaries—Do We?** Erin Myers, US Fish and Wildlife Service and Kristina Serbesoff-King, The Nature Conservancy

8:40 – 10:00 AM **Meet Your Local CISMA (Cooperative Invasive Species Management Area)** Updates and panel discussion on CISMA's throughout Florida.

10:00 – 10:20 AM **Refreshment Break provided by Southeastern Chemtreat, Inc.**

Symposium Schedule

Wednesday, April 7th continued

Session V: Invasive Grasses

10:20 – 11:20 AM, Sabal Ballroom A
Session Moderator: Ken Langeland, University of Florida

10:20 – 10:40 AM ***Phragmites australis* in Florida: Native or Exotic?** William Overholt, Megan Hanagan, Rodrigo Diaz and Dean Williams

10:40 – 11:00 AM **Ecology and Management of Natalgrass (*Melinis repens*)** Courtney Stokes, Greg MacDonald, Carrie Reinhardt Adams and Ken Langeland

11:00 – 11:20 AM **The Economic Impact of Cogongrass on Private, Non-Industrial Forest Owners in Florida** Nandkumar Divate, Michael Thomas, Moses Kairo, Oghenekome Onokpise and David Harding

11:20 – 11:40 AM **Break for Field Trips**

Track 2

Session VI: Assorted Topics on Invasive Species

8:20 – 10:00 AM, Sabal Ballroom C
Session Moderator: James Cuda, University of Florida

8:20 – 8:40 AM **Biological Control of Chinese Tallow: Results from Foreign Exploration and Host Testing** Greg Wheeler, Sedonia Steininger, Susan Wineriter Wright and Ding Jianging

8:40 – 9:00 AM **Biology and Fundamental Host Range of *Episimus unguiculus* (Lepidoptera: Tortricidae), a New Candidate for Biological Control of Brazilian Peppertree, *Schinus terebinthifolius* (Anacardiaceae) in Florida** James Cuda, Julio Medal, Jose Pedrosa-Macedo, Veronica Manrique and William Overholt

9:00 – 9:20 AM **Predicting Plant Invasions into North American Forests: Hypothesis Driven Testing of East Asian Temperate Bamboos** Melissa Smith and Richard Mack

9:20 – 9:40 AM **Current Invasive Plant Management Activities in the Jacksonville District of the USACE** Jon Lane

9:40 – 10:00 AM **Effect of Substrate Leveling on the Abundance of Brazilian Pepper (*Schinus terebinthifolius*) at Restored Mosquito Impoundments in Mosquito Lagoon, FL** Melinda Donnelly, Linda Walters, Ron Brockmeyer, William Greening and Jonas Stewart

10:00 – 10:20 AM **Refreshment Break provided by Crop Production Services**

Session VII: Vendor Introductions

10:20 – 11:20 AM, Sabal Ballroom C
Session Moderator: Bill Kline, Dow AgroSciences

11:20 – 11:40 AM **Break for Field Trips**

Field Trips 12:00 – 6:00 PM

Wednesday, April 7th

continued

Rainbow Springs State Park – *Led by Anne Barkdoll*
Rainbow Springs is Florida's fourth largest spring and, from the 1930s through the 1970s, was the site of a popular, privately-owned attraction. The field trip will visit two areas: the historic garden and the Griffits' sandhill which was converted to a sand pine plantation. The tour will begin at the head spring and historic gardens which have been rejuvenated by removing invasive exotics and incorporating new native plantings and non- invasive ornamentals into the garden. However there is still a serious problem with a multiplicity of exotics. Some of the original invasive plantings as well as new arrivals like skunk vine need constant treatment. The garden will require ongoing invasive exotic plant control. The goal is to control the worst exotics. The group will then continue to the Griffits property to see the beginnings of a long term restoration project. The Griffits sandhill, where staff has been treating cogon grass, was converted to a sand pine plantation before the park acquired it. It is possible that the cogon grass was introduced to the site during logging. When the park acquired the property in 2004 the cogon grass covered more than 100 acres of the plantation. The plantation has many gopher tortoises, very little native groundcover and will need long term restoration. The first phase is cogon grass control. This will be followed later with sand pine removal, groundcover seeding and longleaf pine planting. Participants will see a comparison of two situations: exotics in a natural area that will someday be restored and exotics in a garden area that will need perpetual invasive exotic plant control. Water and bathrooms are available at both ends of the tour. Bring sunscreen, insect repellant, hat, appropriate shoes, and money for the gift shop.

Crystal River Preserve State Park– *Led by Keith Morin*
Crystal River Archaeological State Park has Native American burial mounds, temple/platform mounds, a plaza area, and a substantial midden. The six-mound complex is one of the longest continuously occupied pre-Columbian historical sites in Florida. Crystal River Preserve is in transition between temperate and sub-tropical zones with plant communities that occur in each. It has over 15,000 acres of estuarine tidal marsh and over 600 hammock and marsh islands in addition to coastal uplands. This preserve serves the important functions of protection of estuarine water quality, wildlife habitat, storm surge protection, and outdoor recreation. It has a history of commercial forestry, cattle operations and use as a lease hunt club. The flatwoods, marsh and hammock areas to the north are slowly recovering with the elimination of heavy ground disturbance, reintroduction of fire as a landscape process and maintenance control of Brazilian pepper and cogon grass in some areas. Long term goals include the elimination of bahia grass from pasture areas, centipede grass from trails and openings, and reestablishment of longleaf pine as a dominant overstory in mesic to dry flatwoods sections. The group will then take a brief boat ride on the Crystal and Salt Rivers to see the preserve from the water and understand management challenges associated with exotic control on separated islands in a vast estuarine marsh matrix. The Pre-history of the area including the use of the coast by native Americans will also be presented. A visit to the Ozello area in the southern end of the Preserve will make the greatest exotic challenge, proliferation of Brazilian pepper on state and private lands, obvious. The history of exotic control efforts on the preserve, as well as current control program and limitations, will be outlined in this section of the trip. Stops will include sites at various stages of treatment. Water and bathrooms are available at both ends of the tour. Bring sunscreen, insect repellant, hat, appropriate shoes, and money for the gift shop.

Symposium Schedule

Wednesday, April 7th

continued

Cross Florida Greenway Spoil Islands – *Led by Adele Mills*

The Marjorie Harris Carr Cross Florida Greenway (Greenway) is 110 miles long, spanning from Yankeetown on Florida's west coast to just south of Palatka on the St. Johns River near Florida's east coast. Generally 300 yards wide to about one mile wide, the Greenway traverses four counties, Citrus, Levy, Marion, Putnam. Most of the Greenway lands were originally acquired for constructing a commercial shipping channel across the state. The shipping canal, which later became the barge canal, was deauthorized by Congress in 1990 and all lands and structures were transferred to the State of Florida to be managed as a public recreation and conservation area. The Greenway is managed by the Florida Department of Environmental Protection/Office of Greenways and Trails. The Withlacoochee Bay Trail located just south of Inglis on the western end of the Greenway extends 5 miles west from the Felburn Park Trailhead to the Gulf of Mexico along the southern side of the former barge canal. This 12' multiuse paved trail runs adjacent to the barge canal for the first 2.5 miles then switches its path to the southside of the "berm" that was created by the canal's excavation. The westernmost 2.5 miles of the trail runs through tidal marsh and hydric hammock natural communities. Continuing west into the Gulf of Mexico is a series of 9 spoil islands that are remnants from the dredging of the canal. Exotic plants in this area of the Greenway include Chinese brake fern, cogon grass, Australian pine, Brazilian pepper and skunkvine. Skunkvine is the 8th most common invasive plant species observed on the Greenway. The largest infestation occurs along the ruderal barge canal banks near Inglis Lock where it covered several acres of trees and shrubs prior to eradication treatments. Australian pine, Chinese brake fern and Brazilian pepper have been documented on the spoil islands. Discussions will include the history of OGT's invasive plant management program and how exotic species, listed species and natural community inventories are used to guide management actions. OGT's invasive plant eradication efforts in this area of the Greenway focus on protecting listed bird habitat and excellent natural communities. The spoil islands are home to a black-crowned night-heron rookery. American oystercatchers are known to use several of the islands as well as least terns and Wilson's plovers. Control of skunkvine on Inglis Island helps maintain an excellent ranked mesic hammock natural community. Water and bathrooms will be available before and after the boat tour. Please bring sunscreen, hat, appropriate shoes and personal life jacket if preferred, otherwise life jackets will be provided. Boat trip is weather dependent. Field trip will include site visits to Inglis Island and Withlacoochee Bay Trail if weather is not conducive for boat trip.

Withlacoochee State Forest Demonstration Project – *Led by LeRoy Rodgers*

The Withlacoochee State Forest is Florida's third largest state forest, spanning over 157,000 acres in many distinct management tracts. The Division of Forestry provides for multiple-use of the forest resources which includes timber management, wildlife management, ecological restoration, and outdoor recreation. Invasive plant management is a major component of DOF's management plan, with cogongrass and natalgrass being two priority invasive species for control. Field trip leaders will present results of control demonstration plots using commonly used as well as some proposed herbicides for these species. Participants will learn which methods, herbicides and rates are most successful for controlling cogongrass and natalgrass. Documentation of results will be provided for the cogongrass field trial plots. Other field trip highlights include a brief presentation on management challenges at the forest and a birding stop at a red-cockaded woodpecker nesting cluster.

Symposium Schedule

Wednesday, April 7th continued

Symposium Banquet, 7:00-10:00PM, Pool Deck
The band "Big Wiggler" will be performing, sponsored by **Habitat Restoration Resources, Inc.**

Thursday, April 8th

Session VIII: Collaboration: The Key to Success

8:20 – 10:00 AM, Sabal Ballroom
Session Moderator: Karen Brown, University of Florida

8:20 – 8:40 AM **Nurture Nature** Carla Ulakovic

8:40 – 9:00 AM **Seeking the NEXT Generation of Plant Managers** Amy Richard and Karen Brown

9:00 – 9:20 AM **The Central Florida Lygodium Strategy: Sentinels for Early Detection and Rapid Response** Rosalind Rowe

9:20 – 9:40 AM **Managing Exotics is Easy: Getting the Job Done without Any Staff or Budget** Sherry Williams

9:40 – 10:00 AM **Potential Alternatives to Ornamental Invasives in Florida** Sandra Wilson, Gary Knox, Zhanao Deng and Rosanna Freyre

10:00 – 10:20 AM **Refreshment Break provided by ProSource One**

FLEPPC Business Meeting 10:20 – 11:00 AM, Sabal Ballroom
Note: General membership is encouraged to attend! Come vote for the 2010/1011 Board of Directors.

Session IX: Control Strategies

11:00 AM - 12:20 PM, Sabal Ballroom
Session Moderator: Dennis Giardina, Florida Fish & Wildlife Conservation Commission

11:00 – 11:20 AM **Invasional Conflict: Spread of *Eugenia uniflora* (Myrtaceae) in South Florida May be Mitigated by the Introduction of a Novel Herbivore, *Myllocerus undatus* (Coleoptera: Curculionidae)** Kerry Bohl and Peter Stiling

11:20 – 11:40 AM **Demographic Study of Brazilian Pepper (*Schinus terebinthifolius*): PVA to the Rescue** John Geiger, Paul Pratt and Greg Wheeler

11:40 – 12:00 PM **Control of Para Grass in Florida Wetlands** Shushila Chaudhari, Brent Sellers, Greg MacDonald and Steve Rockwood

12:00 – 12:20 PM **Potential for Use of Native Phytopathogens as Biocontrol Agents for Old World Climbing Fern (*Lygodium microphyllum*)** Krish Jayachandran, Kateel Shetty, LeRoy Rodgers, Shili Miao and Robert Johnson

Symposium Schedule

Thursday, April 8th

continued

Symposium Adjourns, 12:20 PM

Natural Areas Weed Management Examination - 1:30 PM – 3:00 PM, Sabal Ballroom

Door Prizes

Door prizes will be given away at
the beginning of each session

Special thanks to our symposium sponsors!

Aquatic Plant Management, Inc.

Dow AgroSciences
Intelligent Solutions. Dedicated Service.

Southeastern ChemTreat

Habitat Restoration Resources Inc

Crop Production Services

DuPont
The miracles of science™

PROSOURCE ONE
Growing Smarter.

Symposium Information

Get involved with FLEPPC

We need your help! FLEPPC cannot fulfill its mission without the direct involvement of its members. Several committees are now in need of assistance. Contact a symposium organizer to find out about volunteer opportunities. Please volunteer today!

FLEPPC symposium organizers

Chuck Bargeron—Web Master
Mike Bodle—Local Arrangements
Karen Brown—Editor
Hillary Burgess—Secretary
Jim Burney—Chair
Jim Burney—Past Chair
Bob Farley—Cover Art
Ben Gugliotti—CEU Coordination
Bill Kline—Vendor Liaison
Jon Lane—Program Chair
Dianne Owen—Registration
Tony Pernas—Merchandise
LeRoy Rodgers—Workshop Coordinator
Jessica Spencer—Shadow Program Chair
Donna Watkins—Field Trip Coordination

Hotel Information

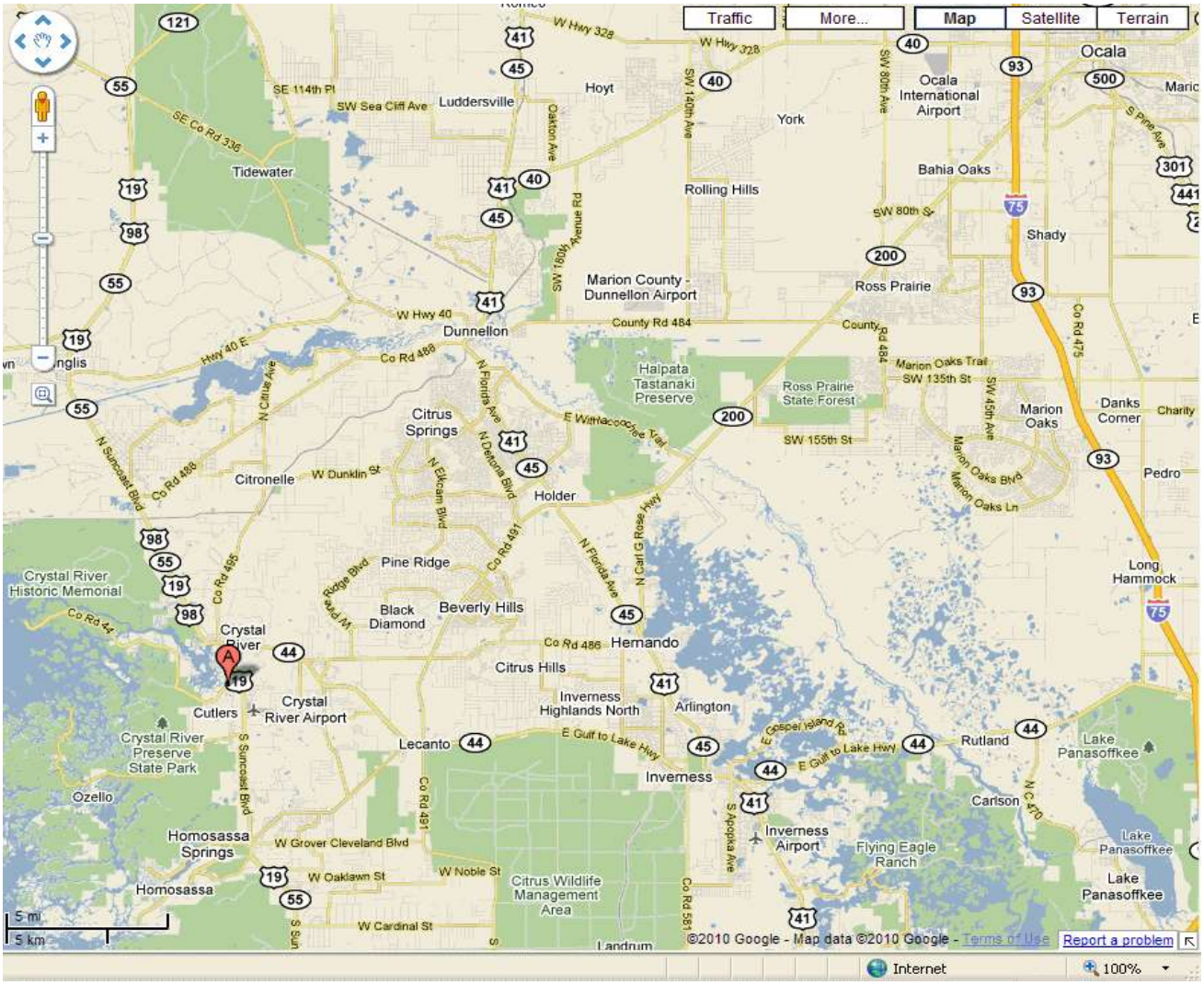
The Plantation Golf Resort & Spa
9301 W Fort Island Trail
Crystal River, FL 34429 USA
Phone: 1-352-795-4211
Toll-free: 1-800-632-6262

Points of Interest

Plantation Inn Dive Shop
Plantation Inn Golf Resort and Spa
Crystal River Archaeological State Park
End of N Museum Point Road
Crystal River Preserve State Park
3266 North Sailboat Avenue
Homosassa Springs State Wildlife Park
4150 S. Suncoast Blvd., Homosassa, FL

Symposium Information

Map to Plantation Inn Resort



Driving Directions

<u>From Jacksonville:</u> (Approx. 125 miles)
-I-10 West to US 301 Exit
-South to SR 24
-SR 24 West to Gainesville, to US 121
-SW on SR 121 to US 19
-South on US 19 to SR 44 Intersection in Crystal River
-Continue 19 S to 2nd traffic light, West Fort IslandTrail
-Turn right, go 0.8 miles, located on the right

<u>From Tampa:</u> (Approx. 90 miles)
-Suncoast Parkway N to Brooksville Exit (US 98)
-West on US 98/50 to US 19
-North on US 19 to Crystal River
-Turn Left on Fort Island Trail
-Located 0.8 miles on the right

<u>From Orlando:</u> (Approx. 95 miles)
-Florida Turnpike North to I-75
-I-75 North to Exit 329 Wildwood
-West on SR 44 to Crystal River
-South on US 19 to 2nd traffic light, West Fort Island Trail
-Turn right, go 0.8 miles, located on the right

Oral Presentations

EDDMaps: Invasive Species Mapping Made Easy!

Bargeron[1], Chuck, Karan Rawlins[1], and Kristina Serbesoff-King[2]
[1]The University of Georgia - Center for Invasive Species and Ecosystem Health, Tifton, GA, [2]The Nature Conservancy, Boynton Beach, FL

EDDMaps is a tool for reporting and mapping invasive species. Workshop attendees will learn the "ins and outs" of this growing web-based invasive mapping tool. Attendees will learn how to enter data, discuss the importance of early detection lists, and learn ways to recruit local verifiers and monitoring volunteers in your area.

Lake Okeechobee Interagency Aquatic Plant Management Team – Several Decades…and Counting.

Bodle[1], Mike
[1]South Florida Water Management District, West Palm Beach, FL

Invasive plant management on Lake Okeechobee has presented quite a range of biological and socio-economic situations over the years. While that doesn't make the lake unique, its size and popularity as a "destination" resource have encouraged the development of a unique series of interagency policies. These policies are encoded in a formal interagency agreement. This agreement guides the activities of the lake's resource managers and mandates that the lake's public stakeholders are informed during the process. Over the years, the team's members have dealt with situations ranging from droughts to floods along with previously unknown invasive plants and animals as well as rare and endangered native species. Several of these situations will be presented within the context of the range of public acceptance and/or outcry that they have engendered.

Invasional conflict: Spread of *Eugenia uniflora* (Myrtaceae) in South Florida may be mitigated by the introduction of a novel herbivore, *Myllocerus undatus* (Coleoptera: Curculionidae).

Bohl[1], Kerry R. and Peter Stiling[1]
[1]University of South Florida, Tampa, FL

Although many factors have been proposed that potentially contribute to invasion success in plants, it remains unclear why some species successfully establish and become dominant while others do not. A compelling explanation for the success of invasive plants worldwide is the enemy release hypothesis (ERH). The ERH maintains that plant populations are kept in check by co-evolved natural enemies in their native range but are released from this regulation in the new range. Although there is evidence that introduced plant species often experience a decrease in damage by herbivores in the novel range, it is uncertain if this decrease affects plant fitness. The purpose of this study was 1) to determine if the invasive plant *Eugenia uniflora* (Myrtaceae) experiences release from enemies and 2) if enemy release increases growth and survival for this species relative to co-occurring native congeners *E. axillaris* and *E. foetida*. In addition to a census of herbivore damage, an insect herbivore exclusion experiment was conducted in the field to assess the effects of herbivores on *Eugenia* populations by measuring differences in insect herbivore damage, leaf number, height, and survival for all three species. The results contradict the ERH, showing that *E. uniflora* has a greater proportion of damaged leaves and experiences a greater reduction in damage when herbivores are excluded from the system relative to the two native congeners. A trend

indicating that exclusion of enemies positively affects growth and survival for all three species suggests that *E. uniflora* has not experienced enemy release in its new range. This may be explained by the fact that *E. uniflora* exhibits, with few exceptions, mostly damage characteristic of a notching weevil, *Myllocerus undatus*, a recent import from Sri Lanka. *E. uniflora* originates in Brazil, so these species share no coevolutionary history. The results of this study indicate that *M. undatus* may have a negative effect on *E. uniflora*, potentially benefitting the native species by reducing competitive effects. In contrast to invasional meltdown, this is a potential example of another type of interaction, which we have termed "invasional conflict". This interaction will undoubtedly become much more prevalent as more species are introduced, become established, and interact with one another, forming new biotic associations.

Herbicide Spot-Spraying in Remote Areas.

Burch[1], Jim and Hillary Cooley[2]
[1]Big Cypress National Preserve, Ochoppee, FL, [2]Everglades National Park, Homestead, FL

In early 2009 we experimented in Big Cypress National Preserve with herbicide application equipment that is designed for use with a helicopter. This equipment is a jettisonable herbicide tank with suspended spray head that is mounted beneath the aircraft; spraying is powered by the helicopter and controlled by the pilot. The single spray nozzle limits the dispersal area of herbicide, and is most effective when treating single trees or small populations; isolated, remote melaleuca trees were the primary targets for this operation. This treatment occurred over eight days and covered over 100 sq. km in an area with limited access; about 6,000 trees were treated and several larger populations were identified for later treatment with other methods.

Everglades National Park also conducted a spot spray project for individual melaleuca trees in designated wilderness during September of 2009. The Everglades National Park spot treatment occurred over two days and covered approximately 40.5 sq. km (10,000 acres); about 200 melaleuca trees were treated and other melaleuca trees were identified for later spot spray treatment.

Control of Para Grass in Florida Wetlands.

Chaudhari[1], Sushila, Brent A. Sellers[1], Greg MacDonald[2], and Steve Rockwood[3]
[1]University of Florida, Ona, FL, [2]University of Florida, Gainesville, FL, [3]Florida Fish and Wildlife Conservation Commission, Fellsmere, FL

Para grass (*Brachiaria mutica*) is an exotic invasive, perennial grass that is native to tropical Africa and South America. It is believed that para grass was knowingly introduced as a fodder to the United States in the 1870s. In 1910, the Florida Agriculture Experiment Station recommended it as forage. Later introductions of forage grasses are superior to para grass as a forage, but it has persisted in Florida and has become a major problem in wetland ecosystems. The overall objective of this study is to develop a best management strategy via an integrated approach using both cultural and herbicide inputs to reduce the potential for para grass invasion. Three experiments were conducted to meet this objective. The first experiment was to analyze the total non-structural carbohydrates (TNC) in root, crown and stolon tissues. Para grass plants were harvested at monthly intervals and were separated into roots, crowns, stolons. Crown and stolon TNC concentration increased linearly from April through July. The second experiment was to evaluate the effect of flooding and burning on para grass re-growth and sprouting from stolons under greenhouse conditions. Para grass re-growth was significantly less when plants were subjected to flooding after burning. New plants from stolons were present only when not inundated by water. Field experiments consisted of evaluating the effect glyphosate and imazapyr at various rates on para grass control. Control of para grass was visually assessed at 4 and 8 weeks after treatment. The experimental area was burned and flooded following the initial control evaluations. After burning, one 3 X 3 m quad was randomly placed in each plot. Each plot was monitored every month for establishment of native species and para grass control. Para grass control was at least 90% in all plots 4 and 8 weeks after treatment. Immediate flooding of the experimental area after burning appears to have some effect on para grass as nearly

no re-growth has been observed in untreated plots. These experiments will be repeated in 2010. However, our preliminary results indicate that herbicide treatment, followed by burning and flooding provides excellent control of para grass.

Environmental Impact of Non-Herbicidal Invasive Weed Control.

Cobb[1], Jimmie and Bill Kline[2]
[1]Dow Agrosciences, Auburn, AL, [2]Dow Agrosciences, Duluth, GA

Although herbicidal control of invasive species has been proven to be effective and environmentally sound, many invasive species control program feature non-herbicidal control methods. These methods are used because they are claimed to be better for the environment. These include polyethylene sheeting, boiling water, mechanical and manual control, flame weed burners, vinegar, and other organic methods. These non-herbicidal methods are examined for their environmental impact, including total pounds of chemicals used, toxicity of all chemicals used, fuel use, and long term environmental fate of the non herbicidal chemicals utilized. In addition, the long term safety record of the different methods are compared in terms of worker injuries.

The IFAS Assessment of Non-Native Plants in Florida's Natural Areas.

Cooper[1], Aimee and Ken Langeland[1]
[1]University of Florida, Gainesville, FL

The IFAS Assessment of Non-Native Plants in Florida's Natural Areas (hereafter referred to as the IFAS Assessment) is a system that was created to address the growing awareness of the threat posed (especially to threatened and endangered species) by non-native plant species to Florida's natural areas. The purpose of the IFAS Assessment was to develop and provide a definitive system to the faculty and staff within the University of Florida's Institute of Food and Agricultural Sciences (IFAS) that characterizes a common basis for descriptions of, and recommendations for, the use and management of non-native plant species in Florida. It is important to note that the IFAS Assessment is not regulatory and that this process should not to be confused with the formal and complex risk-benefit analysis that is used to determine state regulations prohibiting the use of a species. The IFAS Assessment is composed of three components: the Status Assessment, the Predictive Tool, and the Infraspecific Taxon Protocol (ITP). The Status Assessment is intended to evaluate only plants that currently occur within the state of Florida and that have persisted for at least 10 years for herbaceous plants and 20 years for woody plants. It is intended to prevent the likelihood of further invasion of natural areas by non-native plants. A Weed Risk Assessment system, referred here as the Predictive Tool, and the Infraspecific Taxon Protocol were added to the IFAS Assessment in 2008. The Predictive Tool is intended to examine the invasive potential of non-native plant species to natural areas of Florida. It is applied to plants that are either recent arrivals to Florida (less than 10 years for herbaceous plants and less than 20 years for woody plants) or are known to be pests elsewhere with similar habitats and climates to Florida, or if there is a proposed or new use for a species that would result in higher propagule pressure in Florida. The Infraspecific Taxon Protocol was designed to evaluate infraspecific taxa found in Florida, regardless of whether it is documented in any flora outside cultivation or is only grown in cultivation. Infraspecific taxa consist of cultivars, varieties, and sub-species, which may have different outcomes from the "resident species" (a.k.a. "full species", "wildtype species" "parent species", "type species", or "named species"). To date, over 700 species have been evaluated with at least one of the IFAS Assessment components.

Biology and Fundamental Host Range of *Episimus unguiculus* (Lepidoptera: Tortricidae), a New Candidate for Biological Control of Brazilian Peppertree, *Schinus terebinthifolius* (Anacardiaceae) in Florida.

Cuda[1], James P., Julio Medal[1], Jose Pedrosa-Macedo[2], Veronica Manrique[3] and William A. Overholt[3]
[1]University of Florida, Gainesville, FL, [2]Universidade Federal do Parana, Curitiba, Parana, Brazil, [3]University of Florida/IFAS Biological Control Research & Containment Lab, Fort Pierce, FL

Schinus terebinthifolius Raddi (Anacardiaceae) is an introduced ornamental tree from South America that has become one of the most invasive weeds in central and south Florida. Exploratory surveys in the plant's native range identified several potential biological control agents. One of these is the leaflet rolling moth *Episimus unguiculus* Clarke (Lepidoptera: Tortricidae), previously known as *Episimus utilis* Zimmerman. This precedented biological control agent was established in Hawaii in the 1950s. Larvae tie the leaflets together, creating characteristic rolls in which they feed and are capable of completely defoliating small plants. A series of no- and multiple choice tests as well as multiple generation tests were conducted with 90 plant species in 48 families and 31 orders. Under the confined laboratory conditions imposed during the no-choice tests, *E. unguiculus* accepted the economically important *Pistacia* spp. and several other non-target plants for oviposition and development. The acceptance of *Pistacia* spp. by *E. unguiculus* was not unexpected because the terpenoid chemistry of Brazilian peppertree is more similar to the genus *Pistacia* than to other species of the genus *Schinus*. However, in the multiple-choice tests *E. unguiculus* exhibited a clear preference for Brazilian peppertree over the other plants attacked in the no-choice tests. Overall, the results of field observations in South America and host range studies completed in Hawaii and Florida showed that *E. unguiculus* is a narrow specialist capable of sustained reproduction only on Brazilian peppertree, its natural host plant.

The Economic Impact of Cogongrass on Private, Non-Industrial Forest Owners in Florida.

Divate[1], Nandkumar, Michael H. Thomas[1], Moses T.K. Kairo[1], Oghenekome Onokpise[1], and David B. Harding[2]
[1]Florida A&M University, Tallahassee, FL, [2]Florida Fish and Wildlife Conservation Commission, Tallahassee, FL

Cogongrass (*Imperata cylindrica* (L.) Beauv.) has become a major problem for many landowners, land managers, foresters, and governmental agencies since its introduction into the southeast. Cogongrass' tendency to form dense, persistent and expanding stands allows it to displace other vegetation. Its abundant biomass prevents recruitment of other plants and changes the properties of the litter and upper soil layers.

Cogongrass is spreading and invading new areas all over the country, and is now considered by many as one of the biggest weed threats presently facing forestland owners. Because this weed can burn hotter than native species, it can increase the damage to timber during wildfires. There is also concern that successfully established cogongrass can suppress growth of seedlings of native and beneficial plants in the forest including important tree species.

This research is entailed to document the direct economic impact of cogongrass on lost forest inventory resulting from increased fire damage, reduced forest regeneration and productivity, and other collateral impacts related to the forest and its dependant activities. These impacts will be measured as both lost timber inventory (actual and potential), reduced forest-dependent activities and any costs related to the control and/or removal of cogongrass and apply these estimates of direct economic impact to an input/output economic model and extrapolate the indirect and induced effects of these losses to the economy at large.

Effect of substrate leveling on the abundance of Brazilian pepper (*Schinus terebinthifolius*) at restored mosquito impoundments in Mosquito Lagoon, FL.

Donnelly[1], Melinda, [1]Linda Walters, Ron Brock[2], William Greening[3], and Jonas Stewart[3]
[1]University of Central Florida, Orlando, FL, [2]St. Johns River Water Management District, Palatka, FL, [3]Volusia County Mosquito Control, Daytona Beach, FL

Brazilian pepper (*Schinus terebinthifolius*) is a Category 1, non-native species and has invaded most habitats throughout Florida. Invasion of coastal wetlands by Brazilian pepper is thought to be limited by soil salinity and inundation. However, environmental changes to wetlands, such as impounding and filling, can alter invasion barriers. Many coastal wetlands in Mosquito Lagoon, FL were

impounded for mosquito control in the 1960s by building dikes with substrates over one meter above high tide. Dikes had less tidal inundation, causing drier and less saline soil conditions and Brazilian pepper accounted for over 20% of vegetation. Dike removal began in the 1990s by mechanically leveling substrate to marsh elevations and existing Brazilian pepper trees were buried in adjacent borrow ditches during this process. The purpose of our study was to: 1) evaluate abundance of Brazilian pepper at restored mosquito impoundments, and 2) test effects of soil inundation and salinity on Brazilian pepper germination, growth, and survival. We conducted seasonal surveys at five restored impoundments, five non-restored shorelines adjacent to impoundments, and five reference marshes from October 2008 to October 2009. For each Brazilian pepper tree located, height, stem dbh, and presence of fruits or seeds were recorded, as well as soil moisture, soil salinity, and relative change in elevation from shoreline. Manipulative experiments simultaneously tested effects of soil salinities (0, 15, and 30 ppt) and three soil inundations (with most extreme having substrate submerged under 2 cm water) on Brazilian pepper seed germination and growth and survival of seedlings. Significantly lower abundances of Brazilian pepper were found at restored sites compared to non-restored shorelines and mosquito impoundments prior to restoration. Brazilian pepper was growing at only one restored impoundment in October 2009 and the 13 trees were located in an area with significantly higher elevation, soil salinity, and lower soil moisture compared to other locations. During growth trials, 9-month seedlings continuously submerged under 2 cm of 30 ppt saltwater, survived for 1 month with minimal leaf loss, suggesting Brazilian pepper can tolerate complete saltwater submersion. In comparison, high water levels and high salinity significantly decreased germination of Brazilian pepper seeds, suggesting different life stages may be more tolerant to coastal wetland conditions. Understanding rates of Brazilian pepper recruitment at restored sites and the role of abiotic factors in preventing invasion will assist resource managers by predicting areas this non-native may invade and estimating optimal substrate elevations to for future restoration projects.

Demographic Study of Brazilian Pepper (*Schinus terebinthifolius*): PVA to the Rescue.

Gieger[1], John, Paul Pratt[1] and Greg Wheeler[1]
[1]USDA/ARS Invasive Plant Research Laboratory, Ft. Lauderdale, FL

Brazilian pepper (Schinus terebinthifolius Raddi., Anacardiaceae) is a small to large tree indigenous to Brazil, Argentina, Paraguay, and Uruguay. It was brought to Florida in the late nineteenth century with separate introductions to Punta Gorda on the west coast and Miami on the east coast. Presently, the plant is estimated to cover more than 4000 km^2 of public land in Florida. It is classified as a category I weed by the Florida Exotic Pest Plant Council and is considered one of the greatest threats to biodiversity in southern Florida ecosystems. Most land management groups regard Brazilian pepper as a high-priority management target because of its already widespread occurrence and increasing range distribution. To investigate the population dynamics of BP across its range in Florida, we have initiated a multisite/multiyear demographic study. We are monitoring tagged individuals at 6 sites several times a year to record survival, fecundity, and growth. These data will be used to build a mathematical model to predict population growth rates (λ, lambda) using a population viability analysis or PVA. PVA can offer compelling evidence in identifying effective management targets for the control of invasive plant populations. Different plant life stages (e.g. seeds, juveniles, adults) or population processes (e.g. seedling recruitment) may affect population growth rates (λ) in varying ways. The use of PVA allows for the effective choice of management actions with the greatest effect on slowing population growth rates. Ultimately, the use of PVA will guide efforts for biological control of Brazilian pepper in Florida by finding the weak links in the population dynamics of this invasive species that can be best controlled by biocontrol agents.

Refining the New Zealand Aquatic Weed Risk Assessment for Florida.

Gordon[1], Doria R., Crysta A. Gantz[2], Christopher L. Jerde[3], and W. Lindsay Chadderton[4]
[1]The Nature Conservancy, Gainesville, FL, [2]University of Florida, Gainesville, FL, [3]University of Notre Dame, Notre Dame, IN, [4]The Nature Conservancy, Notre Dame, IN

Our earlier work to refine a screening system for aquatic plants developed by New Zealand's Biosecurity Program resulted in the correct identification of 78% of the invaders and 52% of the non-invaders. Roughly 20% of each group was incorrectly predicted to be non-invasive or invasive, respectively. Close to 30% of the species, primarily in the non-invader category, required further evaluation. To increase the accuracy, particularly for non-invaders, we have further refined the tool. We subjected data from known invaders and non-invaders across all aquatic growth forms to jackknife analysis to determine threshold scores that discriminate invaders from non-invaders with greater accuracy. This analysis resulted in changes to the questions that address the biological, historical, and environmental tolerance for each species. The refinements have increased the prediction accuracy of both invaders and non-invaders to over 75% and reduced the proportion requiring further evaluation. These results should facilitate prevention activities within Florida and indicate whether the U.S. Department of Agriculture (APHIS-PPQ) should consider incorporating this tool within the revisions to the plant quarantine regulations (Q-37).

Potential for Use of native phytopathogens as biocontrol agents for Old World Climbing Fern (*Lygodium microphyllum*).

Jayachandran[1], Krish, Kateel G. Shetty[1], LeRoy Rodgers[2], Shili Miao[2], and Robert Johnson[3]
[1]Florida International University, Miami, FL, [2]South Florida Water Management District, West Palm Beach, FL, [3]South Florida Water Management District, Miami, FL

The fragile natural ecosystems in Florida are being threatened by exotic invasive plant species. In addition to the environmental cost there is a huge economic cost associated with the expanding threat of exotic invasive plant species. Originally imported from Asia over thirty years ago, Old World Climbing Fern (*Lygodium microphyllum*) has become one of the most invasive and destructive weeds in southern Florida. The situation calls for the development of new capabilities to counter this growing threat. One of the options is to discover and develop native plant pathogens of *Lygodium* as biocontrol agents that can be integrated with the existing control methods. Using native pathogens for biocontrol does not involve the introduction of any new organism and may also prove to be valuable for integrating with other control methods. We have initiated studies to discover and develop potential native microbial biocontrol agents of *Lygodium*. Periodic field survey for occurrence of disease were made, putative fungal pathogens were isolated and tested for pathogenicity using detached leaf assay and seedling inoculation. Based on our survey of *Lygodium* infested South Florida natural areas, we have found that native microbial pathogens of *Lygodium* do occur with capability to cause significant damage. Fungal isolates from *Lygodium* plant samples were screened for pathogenicity using detached leaf assay and seedling inoculation. Out of the 61 isolates that were tested, 23 fungal isolates were found to be pathogenic to *Lygodium* with varying degrees of disease severity symptoms. With further research and testing there is potential for development of selected native fungal pathogens of *Lygodium* as a biocontrol agents to be incorporated as valuable tool in the overall invasive species management plan.

Current Invasive Plant Management Activities in the Jacksonville District of the USACE.

Lane[1], Jon
[1]US Army Corps of Engineers, Jacksonville, FL

The presentation will provide an overview of the Invasive Plant Management Activities currently being conducted within the Jacksonville District of the USACE. These activities include upland control of herbaceous and woody stemmed plants in Everglades restoration areas including 8.5 sq mile and Picayune Strand. The presentation will also highlight aquatic plant management activities in the St. Johns River and Lake Okeechobee.

Endangered Species Have Significantly Lower Risk for Invasiveness than General Horticultural Plant Introductions.

Liu[1], Hong and Chad Husby[2]
[1]Florida International University /Fairchild Tropical Botanic Garden and Department of Earth and Environment, Miami, FL, [2]Montgomery Botanical Center, Coral Gables, FL

Ex-situ plant collection is a valuable tool in plant conservation and often done in botanical gardens located in geographic regions different from that of the wild plants. However, this practice is being challenged on the basis that non-accidental plant introductions are a major source of plant naturalization and invasion, which threaten local biodiversity and ecosystem functions. In addition, the current and projected global warming has prompted some conservation biologists proposing the use the human-assisted migration to mitigate species extinction, especially rare and endangered species. However, there is opposition of the idea due to the potential risk of species becoming invasive after introduced into a new range. Here we compare the invasive risk of species introduced for ex-situ conservation (hereafter refer to as conservation species) to those of horticultural introduction (hereafter refer to as horticultural species) at the Fairchild Tropical Botanic Garden and Montgomery Botanic Center. These species have been growing in the gardens for many years and much data is available in their records to answer questions in the Australian Weed Risk Assessment (WRA) adapted for Florida. Our research showed that the average WRA score for conservation species was significantly lower than that for the horticultural species. The lower the score, the lower the risk of a species becoming invasive in Florida. In fact, none of the 22 conservation species evaluated was in the "reject for introduction" category while some of the horticultural species were. Scores aside, none of the conservation species have naturalized, despite having been in cultivation for as long as 72 years. We conclude that introduction of endangered species to mitigate extinction probability entails a much lower risk of the species becoming invasive than general horticultural species introduction. We also recommend the use of WRA as one of the tools to evaluate the pros and cons of human-assisted migration of endangered species.

The Florida Invasive Species Partnership (FISP): Invasive Species Know No Boundaries – Do We?

Myers [1], Erin and Kristina Serbesoff-King [2]
[1]U.S. Fish and Wildlife Service, [2]The Nature Conservancy, Boynton Beach, FL

The mission of the Florida Invasive Species Partnership is to improve the efficiency and effectiveness of preventing and controlling invasive non-native species through partnering to increase communication, coordination and use of shared resources in order to protect wildlife habitat, working agricultural and forest lands, natural communities and biodiversity in Florida.

FISP partners continued to find new and innovative ways to promote the FloridaInvasives.org website, which houses a searchable database of private land incentive programs (the "Incentive Program Matrix"), and to foster and support Florida's Cooperative Invasive Species Management Areas (CISMAs). FISP continues to hold monthly conference call/online meeting for Florida CISMAs and our members have spoken at multiple conferences, land manager and CISMA meetings. In 2009, recognizing the need for a more formal partnership, FISP members wrote a Resolution for agencies and organizations to sign in support of our mission, goals and objectives. Response to this Resolution was positive, with US Fish and Wildlife Service (multiple regions), Florida Department of Transportation and UF Institute of Food and Agricultural Science (IFAS) being the first signatories. In addition, The Nature Conservancy (TNC) secured funding to support TNC and Department of Defense (DoD) engagement in 2 existing CISMAs and to start 2 new CISMAs. Through this DoD funding, TNC and the 4 CISMAs wrote a CISMA strategic plan template to be used by all CISMAs in Florida. First Coast Invasive Species Working Group and CISMA of Lake County quickly took the template and revised it to define the objectives of their local organizations. Many other CISMAs have committed to follow suit. Lastly, the University of Georgia Center for Invasive Species and Ecosystem Health (Center) and TNC were able to hold workshops with each CISMA to focus on early detection reporting and training using the online database EDDMapS (Early Detection and Distribution Mapping System).

***Phragmites australis* in Florida: Native or Exotic?**

Overholt[1], William A., Megan Hanagan[2], Rodrigo Diaz[1] and Dean Williams[2]
[1]University of Florida, Fort Pierce, FL, [2]Texas Christian University, Fort Worth, TX

Over the past 150 years, *Phragmites autralis* has become much more widespread and abundant in North America, and is considered to be invasive in some parts of its range. The spread of *Phragmites* has been attributed in part to the cryptic invasion of a genetic lineage originating in Eurasia. *Phragmites* in North America can presently be divided into three genetic groupings: native lineages, a Gulf Coast lineage, and a non-native lineage. The non-native type is an aggressive invader that has outcompeted and replaced virtually all native types along the east coast of the United States, and is now moving into the upper Midwest and western states where native types still exist. The origin of the Gulf coast type is uncertain, but it has been present in the Gulf coast since at least the 1800s, and is also common in South America. Hybridization between native and non-native varieties was originally thought to be non-existent, but recent studies have suggested that hybridization does take place and could represent an additional threat to the genetic integrity of North American varieties. *Phragmites* populations in Florida have not been extensively genotyped, and so it is unknown whether the invasive Eurasian type occurs here. We are collecting *Phragmites* samples from throughout the state and using molecular markers to determine whether the non-native Eurasian type occurs in Florida, and if so, its geographic distribution.

The FNAI Invasive Plant Mapping System and the Florida Invasive Plants Geodatabase.

Price[1], Frank
[1]Florida Natural Areas Inventory (FNAI), Tallahassee, FL

The mission of the Florida Natural Areas Inventory (FNAI) is to gather, interpret, and disseminate information critical to the conservation of Florida's biological diversity. In support of this mission FNAI has developed a system to standardize the mapping of invasive plant infestations in Florida. With the assistance of land managing agencies around the state, FNAI staff have used this system to compile a baseline invasive plant data set for each of the state's 1,700+ public conservation lands. This data is stored in the Florida Invasive Plants Geodatabase. This presentation will review the FNAI mapping system, discuss its use as a statewide standard, present summaries of contents of the Florida Invasive Plants Geodatabase, and discuss FNAI's future plans for both the mapping system and geodatabase.

Seeking the NEXT Generation of Plant Managers.

Richard[1], Amy and Karen Brown[1]
[1]University of Florida / IFAS Center for Aquatic and Invasive Plants, Gainesville, FL

For more than 30 years, the UF/IFAS Center for Aquatic and Invasive Plants (CAIP) has been providing information and educational support to thousands of individuals and organizations within Florida's invasive plant management arena and beyond. A comprehensive website was produced along with plant identification guides, photo murals, educational displays, videos, and a myriad of other publications. Many aquatic plant management professionals and citizens are quick to say how much the Center has helped them gain information they needed. And that's a good thing.

The challenge: How do we reach the demographic with the largest stake in invasive plant management -- the NEXT generation of citizens, homeowners, aquatic and upland managers, USDA inspectors, legislators, researchers, policy makers, etc.?

The Florida Invasive Plant Education Initiative, in its fourth year, represents a major effort to do just that. The Initiative was created to provide educators with the information and resources they need to teach about the harmful impacts some non-native, invasive plants are having on our natural areas and neighborhoods. Along the way, we are striving to inspire learners of all ages to spend more time observing plants (including native plants) and learning about their importance to our state's ecological well-being.

Methods included working with teachers to learn their ideas and gain assistance in developing materials that would engage their students. Four core modules were developed as a result. Each

module includes PowerPoint™-Video Presentations and a host of related lessons and hands-on activities – all of which are linked to the Florida Sunshine State Standards. A summer teacher training workshop (i.e., PLANT CAMP) and a new game show have become integral components of the program.

The ultimate goal is for today's youth to draw on this knowledge as they mature into responsible and committed environmental stewards for Florida, the "land of flowers."

The Central Florida Lygodium Strategy: Sentinels for Early Detection and Rapid Response.
Rowe[1], Rosalind
[1]The Nature Conservancy, Babson Park, FL

The Central Florida Lygodium Strategy (CFLS) is a partnership including The Nature Conservancy (TNC) and other land management conservation groups, federal, state and local governmental agencies, and private landowners. The CFLS was formed initially to create a "lygodium-free" zone across central Florida. This coordination of public and private land owners and managers offers a landscape-level approach through shared work and funding, striving for rapid detection and early response. Through the CFLS private lands initiative, TNC staff and contractors now have surveyed over 35,000 acres and worked over 2200 acres on 29 private properties, buffering at least 25 conservation areas. During 2009, CFLS focused on working with public land managers and private landowners in Polk, Lake, Volusia, Seminole and Orange Counties, to locate and control the northernmost infestations of Old World climbing fern (OWCF), drawing a "northern line." Direct assistance, in the form of sentinel sites committed to long-term monitoring for OWCF to maintain the northern line of migration, is coming from Florida Division of Forestry, Florida State Parks, several Water Management Districts, Audubon, County lands managers and others.

Direct funds for CFLS have been awarded through a USDA Cooperative Forest Health Program grant administered by the Florida Division of Forestry, the US Fish and Wildlife Service Partners for Fish and Wildlife Program and Private Stewardship Grant, and the Southwest Florida Water Management District. Equally important are the match funds and in-kind services that have been generated through the Florida Department of Protection Bureau of Invasive Plant Management, and the South Florida Water Management District.

With its partners, CFLS continues the work of defining the northern boundary of the migration of Old World climbing fern (OWCF) in central Florida, and of treating infestations as they are found. Successes have included 95%-or-better control on several properties, new discoveries in the accomplishments of partnership, and a definitive picture of the northern extent of this plant, coupled with an educational campaign north of suspected infestation areas. Challenges have included plants resisting treatments in certain soils and finding that the confirmation of our northern line requires better data. CFLS is preparing for new aerial surveys, further on-the-ground data from public land managers and Florida Natural Areas Inventory (FNAI) surveys, and is helping to implement sentinel sites that will provide long-term, regular monitoring and reporting of presence or absence of the fern.

Meet your local CISMA (Cooperative Invasive Species Management Area).
Serbesoff-King[1], Kristina, Lauren Brothers[2], Linda Duever[3], Dennis Giardina[4], Trish Gramajo[5], Alison Higgins[6], Justin Jones[7], Cheryl Millet[8], Brian Nelson[9], Tony Pernas[4], Mike Renda[10], Rosalind Rowe[9], Josh Spies[11], Mike Weston[12], Sherry Williams[13]

[1]The Nature Conservancy, Boynton Beach, FL, [2]CISMA of Lake County, [3]Marion County ISMC, [4]Everglades CISMA, [5]First Coast ISWG, [6]Keys CISMA, [7]NW Florida CISMA, [8]Heartland CISMA, [9]Green Swamp CISMA, [10]Treasure Coast CISMA, [11]Apalachicola IWG, [12]SW Florida CISMA, [13]Central Florida CISMA

As of October 2009, combined efforts and shared challenges have resulted in 15 Cooperative Invasive Species Management Areas (CISMA) in Florida. From Escambia County to the Florida Keys, these CISMAs are working across boundaries to control and prevent the threat of invasive species, from expanding invasive species management efforts across the landscape to building

community awareness. These coordinated efforts serve to protect our valuable conservation areas, public lands and private lands from the continuing colonization of invasive species. Some have been around for over 11 years; others will be celebrating their 1 year anniversary in 2010. However, they all have realized successes and overcome challenges.

In this panel discussion, members of many of the CISMAs in Florida will come together to present the results of their partnerships and share experiences. There will be a facilitated discussion following and audience participated is encourage. Confirmed CISMAs include the Keys Invasive Species Task Force, Treasure Coast CISMA, Northwest Florida CISMA, First Coast Invasive Species Working Group (ISWG), Central Florida ISWG, Heartland CISMA, Apalachicola ISWG and the Everglades CISMA.

A Cooperative Invasive Species Management Area is a partnership of federal, state, and local government agencies, tribes, individuals, and various interested groups that manage invasive species in defined area.

Predicting Plant Invasions into North American Forests: Hypothesis Driven Testing of East Asian Temperate Bamboos.

Smith[1], Melissa C. and Richard N. Mack[1]
[1]Washington State University, Pullman, WA

Temperate Asian bamboos are important constituents in the understory of Asian coniferous forests. As understory dominants, they limit the recruitment of other species, including canopy dominants, by blocking light and other resources from the forest floor. Temperate East Asia and the North America are similar climatically, floristically and physiognomically, making importation of temperate Asian bamboos North America a potential entry point for an invasion. Invasive species cause billions of dollars in economic and ecologic damage to communities. Post-entry control is costly, often ineffective and could be prohibitive in topographically diverse regions. Predicting species invasions before they occur is preferred. As part of a two-part approach to prediction, we are developing experimental protocols to predict likelihood of invasion of eight species of temperate Asian bamboos. In these protocols, we ask two essential questions: 1) what effects do limiting factors within a target region (i.e., light, water, biotic interactions) have on bamboo growth and 2) if bamboos naturalize, what are the consequences to communities? Experiments varying light and irrigation levels reveal that one, both, or neither factor limits species. We also found that bamboos fruits, although rare, present a novel and abundant food source for *Peromyscus maniculatus* that supports both weight gain and reproduction for this carrier of Hanta virus. We conclude that bamboo species not limited by light, water or biotic factors have the potential to naturalize as well as affect higher trophic levels in native communities.

Ecology and Management of Natalgrass (*Melinis repens*).

Stokes[1], Courtney A., Greg MacDonald[1], Carrie Reinhardt Adams[1] and Kenneth A. Langeland[1]
[1]University of Florida, Gainesville, FL

Natalgrass (*Melinis repens*) is an exotic invasive grass introduced to Florida as a forage in the late 1800s. Natalgrass is no longer utilized as a forage, but has persisted and become an increasing problem in the state, particularly in areas of active restoration. To address the need for a more comprehensive natalgrass management plan, several studies have been conducted.

Natalgrass colonization appears to be seed-vectored; therefore, a better understanding of seed germination characteristics will be useful to land managers. Natalgrass seed were collected from an infestation in central Florida and studies on temperature, light, pH, osmotic potential and germination over time were conducted. Natalgrass was found to germinate between 20 and 35 degrees C, and seeds do not appear to require light for germination. Germination was optimum at pH 7 and appears to be greatly affected by water stress. Further studies indicate seed germination increases over time, indicating possible afterripening.

Ecological studies to determine the longevity of natalgrass seed were also initiated. Exclusion frames were placed over large seed deposits on the ground, and the number of germinated seedlings was counted monthly. Seedling densities decreased from a mean of 520 per square meter after one month to 0 per square meter after three months. This indicates that seeds present on the ground germinate quickly, and a single preemergence herbicide application might be useful in suppressing growth and subsequent infestation. Seeds were also buried in mesh packets running the length of 30 cm PVC pipes, which were placed in the ground with one end at ground level. These seeds will be exhumed every three months and placed in a greenhouse. The number of seedlings will be counted after two weeks. The results of this study will help determine the effects of burial on natalgrass seed.

Studies were also initiated to determine the potential of several herbicides for natalgrass management. Glyphosate and hexazinone provide excellent postemergence control of natalgrass but cause severe damage to native plant species. Imazapic does not provide the same level of postemergence control of natalgrass, but provides greater selectivity due to minimal native plant injury. Preemergence studies to determine optimum treatments for seedling natalgrass control are currently being evaluated.

Implementation Program for *Megamelus scutellaris* in Florida.

Tipping[1], Philip W.
[1]USDA-ARS Invasive Plant Research Laboratory, Ft. Lauderdale, FL

Megamelus scutellaris is a planthopper from Argentina and the first new biological control agent targeting waterhyacinth in more than 30 years. It is expected to get a permit for general release in Florida in January 2010. This presentation will provide a primer of *M. scutellaris* biology, detail the current level of waterhyacinth suppression by existing agents, and describe the process for deploying and evaluating the impact of *M. scutellaris*.

Nurture Nature.

Ulakovic[1], Carla
[1]East County Water Control District, Lehigh Acres, FL

East (Lee) County Water Control District (ECWCD) preserves and protects water reserves through drainage, and water management in Lehigh Acres and a portion of western Hendry County. Our project, Nurture Nature, takes a multi-tiered approached to educate the local community—specifically home/business owners and youth aged K-8. Nurture Nature will: provide a base education in how the water cycle works; discuss ECWCD practices and how these practices tie into the Tidal Caloosahatchee River Watershed; identify daily activities which pollute and place stress on this system; outline the impact invasive plants have on the watershed while highlighting the benefits native plants (as filters and for xeriscaping) have on ecosystem; campaign for a reduction in pollutants (pet waste, fertilizer, oils, etc); and will provide best-practice education to help protect our encourage residents to become stewards for the District and the Watershed. This is particularly important due to proposed EPA changes to water quality which call for a refining of designated uses and classifications of water bodies. Nurture Nature will distribute a branded message to engage residents, ignite a passion, encourage action and get the community outdoors through interactive (presentations, otter mascot, etc.) and passive (brochures, activity sheets, etc.) components. The introduction of our mascot, Able Otter, Nurture Nature will more effectively be able to reach adults and youth. To gauge levels of awareness and behavior changes, ECWCD will conduct surveys prior to and throughout the campaign.

Climatic Drivers for Changes in Flowering Times of FLEPPC Category I and II Species.

Von Holle[1], Betsy, Yun Wei[1], and David Nickerson[1]
[1]University of Central Florida, Orlando, FL

It is unknown how global climate change will effect species distributions and developmental events in subtropical ecosystems. Likewise, there is scant information on how native and nonnative species differ in their response to climate change. We tested the hypothesis that global climate change has altered the reproductive phenologies of populations of FLEPPC Category I and II plant species and their closely related native species. To investigate this, we focused on the change in flowering time of 29 high impact invasive plant species and 40 closely related native species in Florida over historical time, using herbarium specimens. We will discuss the changes in flowering time of these FLEPPC Category I and II plant species and their closely related species as well as the climatic drivers for these changes.

Biological Control of Brazilian Pepper; Results from Foreign Exploration and Host Testing.

Wheeler[1], Greg, Fernando McKay[2], Marcelo Vitorino[3],
[1]USDA-ARS Invasive Plant Research Laboratory, Ft. Lauderdale, FL, [2]USDA/ARS/SABCL, Buenos Aires, Buenos Aires, Argentina, [3]Universidade Regional Blumenau, Blumenau, Santa Catarina, Brazil

Brazilian pepper is among the worst environmental weeds in Florida and other areas of the southeastern US. This species occupies diverse habitats causing many environmental problems including decreased biodiversity of the infested areas. Although chemical controls are known and used to control this invasive species, biological control presents an attractive alternative when practiced safely. The native range of this species primarily includes eastern Brazil and northern Argentina. The USDA/ARS Invasive Plant lab, colleagues at the South American biological control lab, and the Brazilian university colleagues have been conducting foreign surveys searching for insects that will be safe and effective at controlling Brazilian pepper in the US. Surveys have revealed many new herbivores and testing is underway on a thrips, a leaf miner and a caterpillar. Progress will be presented describing the potential of these herbivore species as potential biological control agents.

Biological Control of Chinese Tallow; Results from Foreign Exploration and Host Testing.

Wheeler[1], Greg, Sedonia Steininger[2], Susan Wineriter Wright[2], Ding Jianqing[3]
[1]USDA-ARS, Ft. Lauderdale, FL, [2]USDA/ARS, Gainesville, FL, [3]Chinese Academy of Science, Wuhan, Hubei, China

Chinese tallow is among the worst environmental weeds in Florida and other areas of the southeastern US. This species occupies diverse habitats causing many environmental problems including decreased biodiversity of the infested areas. Although chemical controls are known and used to control this invasive species, biological control presents an attractive alternative when practiced safely. The native range of this species primarily includes central and southern China. The USDA/ARS Invasive Plant lab, colleagues at the Chinese Academy of Science have been conducting foreign surveys searching for insects that will be safe and effective at controlling Chinese tallow in the US. Surveys have revealed many new herbivores throughout the native range of these species. These include many new weevil, thrips, psyllid, eriophyid mites and lepidopteran species. Several of these species are, or have undergone preliminary testing to determine suitability for release here. Progress will be presented describing the potential of these herbivore species as potential biological control agents.

Managing Exotics is Easy: Getting the Job Done without Any Staff or Budget.

Williams[1], Sherry
[1]Seminole County Greenways and Natural Lands, Geneva, FL

In 2008, the staff responsible for treating exotics on passive parks, trails, and Natural Lands properties were reassigned to other areas and their ability to continue exotic species management was greatly reduced. Rather than forego all of the work the program had accomplished, staff enlisted volunteers, applied for and received several grants, and used money from a tree fund the County had received for mitigation. In 2010, the staff expects to achieve the largest amount of acreage ever treated by the Greenways and Natural Lands Division without spending a dime of the annual budget.

Potential Alternatives to Ornamental Invasives in Florida.

Wilson[1], Sandra, Gary Knox[2], Zhanao Deng[3], and Rosanna Freyre[4]
[1]University of Florida, Fort Pierce, FL, [2]University of Florida, Quincy, FL, [3]University of Florida, Wimauma, FL, [4]University of Florida, Gainesville, FL

As the fastest growing segment of U.S. Agriculture, ornamental horticulture has been recognized as the main source to plant invasions worldwide. As the second largest producer of ornamental plants in the U.S., Florida is a state with increasingly high propagule pressure. Many of ornamentals listed by FLEPPC as invasive have numerous cultivars that have been selected for attractive flower color, plant form, foliage, drought tolerance, or cold hardiness. As they are generally propagated vegetatively, relatively little is known about their seed production, seed viability and growth rate under varying conditions. To identify potential alternatives to ornamental invasives, researchers at the University of Florida have evaluated numerous cultivars of *Ruellia tweediana*, *Ligustrum* spp., *Pennisetum setaceum*, *Stachytarpheta* spp., *Nandina domestica*, and *Lantana camara*. Breeding efforts are underway to develop sterile forms of *Lantana*, *Nandina*, and *Ruellia*.

Biological Control of Old World Climbing Fern, *Lygodium microphyllum* - Recent Progress with the Brown Lygodium Moth.

Boughton[1], Anthony J. and Ted D. Center[1]
[1]USDA-ARS Invasive Plant Research Lab, Ft. Lauderdale, FL

Old World climbing fern, *Lygodium microphyllum*, is one of the most serious invasive weeds impacting natural areas in southern and central Florida. Management of this weed using traditional methods has proved difficult and expensive, and has prompted efforts to develop biological control options for this damaging weed. The brown lygodium moth, *Neomusotima conspurcatalis* was the first biological control agent to establish field populations on lygodium in Florida. This insect was first released in Jonathan Dickinson State Park in Martin County, Florida in early 2008 and rapidly developed large populations that caused substantial defoliation damage to lygodium at release sites. During the first 8 months following releases, caterpillar-induced defoliation reduced ground cover of lygodium at release sites by about 53% from an initial 49% to 20% at the end of 2008. Over this same period, ground cover of lygodium at control sites, where the moth was not present, remained relatively static at about 43%. The moth remained present at release sites during 2009, although populations were smaller than those observed during late 2008. When vegetation was next measured in early 2010, lower feeding pressure by the moth had allowed some regrowth of the weed to occur and lygodium ground cover at release sites had recovered to 27%, although this was still only about half that present before the moth was released. Control plots were colonized by the moth during 2009 and suffered heavy defoliation, reducing lygodium cover by about 47% from the previously observed average of 43% seen in early 2009 down to 22% in early 2010. Observations confirmed that the brown lygodium moth, which is primarily a tropical insect in its native range, is adversely affected by cold weather during the winter season in south Florida. We also suspect that parasitism of caterpillars by native parasitic wasps may account for some of the declines in moth populations observed after 2008. New releases of a second biocontrol agent, the lygodium moth, *Austromusotima camptozonale*, are planned for 2010. A third biocontrol agent, the lygodium sawfly, is currently undergoing regulatory evaluation and research continues in Australia on several stem-boring moths that appear to have great potential for lygodium biocontrol.

Biology, Population Growth, and Feeding Preferences of *Calophya terebinthifolii* (Hempitera: Psyllidae), a Candidate for Biological Control of Brazilian Peppertree, *Schinus terebinthifolius* (Anacardiaceae).

Christ[1], Lindsey R., James P. Cuda[1], William A. Overholt[2] and Marcelo D. Vitorino[3]
[1]University of Florida, Gainesville, FL, [2]University of Florida, Fort Pierce, FL, [3]Fundacao Universidade Regional de Blumenau, Blumenau, Santa Catarina, Brazil

Brazilian peppertree, *Schinus terebinthifolius* Raddi (Anacardiaceae), a perennial woody plant native to Brazil, Argentina, and Paraguay, has become one of the most invasive weeds in Florida. A leaflet pit galling psyllid, *Calophya terebinthifolii* (Burckhardt & Basset), has been identified as a potential biological control agent for Brazilian peppertree. However, biological information on the psyllid, including its life history and rearing procedures, is lacking. This type of information is essential when importing an insect for biological control purposes. From May-August 2009, field and laboratory research was conducted at the Laboratory of Monitoring and Forest Protection (LAMPF) in Gaspar, Santa Catarina, Brazil with psyllids collected from the Atlantic coastal region of Santa Catarina. The results of field studies showed that the open pit galls produced by the developing nymphs were located on the adaxial (upper) side of the leaves (2.58 ± 0.10 galls/leaf). Laboratory studies on the psyllid focused on: female fecundity, age-specific survivorship, life table construction, mean generation time, and the number and duration of the immature stages and eggs. Adult females laid on average 55.33 ± 8.91 eggs. The net replacement rate was low for the psyllids (Ro = 0.68). A mean generation time from egg to adult was 48 ± 2.45 days. Preliminary evidence from feeding trials

suggests the psyllids are locally adapted to specific genotypes of Brazilian peppertree. Using collection and survey locations of the psyllids in their native range, a potential habitat distribution map was created for Florida using the current distribution of Brazilian peppertree. The model projection for the psyllid matches with the known distribution of Brazilian peppertree in Florida. Further host range testing is needed to determine whether *C. terebinthifolii* is sufficiently host specific to release in Florida and the extent of its adaptation to Florida genotypes of Brazilian peppertree and their hybrids.

Effects of Light Intensity on Tropical Soda Apple and the Consequences for Performance of its Biological Control Agent, *Gratiana boliviana* (Chrysomelidae).

Diaz[1], Rodrigo, William A. Overholt[2], Greg Wheeler[2] and Carlos Aguirre[3]
[1]University of Florida, Fort Pierce, FL, [2]USDA, Ft. Lauderdale, FL, [3]Zamorano University, Tegucigalpa, Francisco Morazan, Honduras

Tropical soda apple (*Solanum viarum*) (TSA) is an invasive shrub that causes major problems in pastures and conservation areas across Florida. TSA is equally invasive in shaded hammocks and open pastures in Florida. Due to its negative impacts in Florida, a classical biological control program was initiated in 1994. A chrysomelid beetle, *Gratiana boliviana*, was released for the first time in Polk County in 2003. We examined how light intensity affected the architecture, aminoacid content and trichome density of TSA. Plants were grown in a greenhouse either covered with a shade cloth (75% blockage) or under open conditions. Plants growing in shade had larger leaves, higher aminoacid content, and lower trichome density than plants grown in the open. We assessed how these differences affected the performance of *G. boliviana*. Immatures had shorter development time and higher survival, and adults had higher fecundity on shaded plants compared to open plants.

Ornamental Grasses: The Good, The Bad, and The Ugly

Duever[1], Linda C.
[1]Conway Conservation, LLC, Micanopy, FL

This project involved creation of a banner-style poster for display at Florida Federation of Garden Clubs events. Deciding which species to use to illustrate "good" readily available native ornamental grasses, "bad" relatively non-threatening exotics, and "ugly" potentially invasive exotics has been an informative process suggesting other invasive grass education needs.

Promoting the Reestablishment of *Cladium jamaicense* and *Muhlenbergia capillaris* in the Hole-in-the-Donut Restoration Area of Everglades National Park.

Fisher[1], Caitlin, Jonathan Taylor[1], Jennifer Richards[2], Shane McKinley[1], and Lauren Serra[1]
[1]Everglades National Park – HID Project, Homestead, FL, [2]Florida International University, Miami, FL

The Hole-in-the-Donut (HID) is a 6,600-acre wetland restoration project within Everglades National Park (ENP). The restoration area was farmed for up to 50 years before it was acquired by ENP in 1975. As agriculture ceased, the fields became dominated by the non-native Brazilian pepper plant (*Schinus terebinthifolius*). The only effective treatment to get rid of this invasive exotic involves removing all the nutrient-rich farming soil and scraping down to the limestone bedrock. Successful restoration is accomplished by restoring the area to a marl prairie plant community dominated by *Cladium jamaicense* and *Muhlenbergia capillaris*.

An adaptive management study was conducted to determine if successful establishment of *Cladium jamaicense* and *Muhlenbergia capillaris* could be enhanced by seeding a newly scraped restoration area. The objectives of the study were as follows: 1) Determine the best period to collect viable *Cladium jamaicense* fruits. 2) Determine if *Muhlenbergia capillaris* and *Cladium jamaicense* will germinate and survive if seeded within a newly restored site. To conduct the study, *Cladium jamaicense* seeds were collected in the HID restoration area at four different sampling dates to determine which sampling date had the highest number of potentially viable fruits, identified as those with intact endosperm. We tested 50 debracted seeds for 7/28/09 and 40% of those seeds were

potentially viable. The debracted *Cladium jamaicense* seeds dated 7/28/09 and *Cladium jamaicense* seeds collected from Shark River Slough on 8/11/07 were scattered separately in 14 random 0.5x2m plots at the 2009 east restored site. *Cladium jamaicense* seeds collected from the three remaining sampling dates were scattered in three random 0.5x2m plots in the newly scraped 2009 east restored site. *Muhlenbergia capillaris* seeds dated 10/29/09 were scattered in 13 0.5x2m random plots in the 2009 east restored site. A total of 10 random control plots were also installed in the 2009 east restored site. Monitoring will be conducted every two weeks for three months after the seeds are planted and monthly thereafter. Germination and survival rates will be determined for the project.

Tropical Soda Apple IPM Field Guide.

Gioeli[1], Ken, William Overholt[2], and Rodrigo Diaz[2]
[1]University of Florida/IFAS – St. Lucie Co Extension, Fort Pierce, FL, [2]University of Florida/IFAS – Indian River Research & Education Center, Fort Pierce, FL

The University of Florida / Indian River Research and Education Center and the Florida Division of Plant Industries are mass rearing tropical soda apple biological control agents for distribution in Florida. The Florida Cooperative Extension has experts throughout the state whose role is to serve as the primary technology transfer agents for the University of Florida / IFAS.

Over two hundred field visits have been logged by experts releasing tropical soda apple biological control agents in Florida. A stratified random sample of people requesting tropical soda apple biological control agents through the St Lucie County Cooperative Extension's distribution efforts indicates that nearly one third of people requesting tropical soda apple biological control agents misidentified the invasive plant. This resulted in a thirty three percent reduction in efficiency. The Florida Exotic Pest Plant Council provided funds to develop the Tropical Soda Apple IPM Field Guide. Use of this Field Guide increased program efficiency by reducing misidentification of tropical soda apple and by improving tropical soda apple biological control agent distribution efforts.

The Effect of Thrips Herbivory on the Performance of Different Genotypes of Brazilian Peppertree in Florida.

Manrique[1], Veronica, Rodrigo Diaz[1], William A. Overholt[1], Dean Williams[2], and James P. Cuda[3]
[1]University of Florida, Fort Pierce, FL, [2]Texas Christian University, Fort Worth, TX, [3]University of Florida, Gainesville, FL

Brazilian peppertree (BP) *Schinus terebinthifolius* Raddi (Anacardiaceae), native to South America, is one of the most problematic and invasive weeds in Florida. Genetic studies have revealed that two BP haplotypes (A and B) were originally introduced into Florida, and extensive hybridization has occurred between these types since their arrival. The thrips *Pseudophilothrips ichini* Hood (Thysanoptera: Phlaeothripidae) was found feeding on BP haplotype A near the city of Ouro Preto, Brazil in 2007. Both larval and adult stages damage the host plant by feeding on the growing shoot tips and flowers causing flower abortion. Previous laboratory studies revealed that this thrips is well adapted to Florida genotypes since immature survival (~50 % survived to adulthood) and adult longevity (~ 30 days) were similar when tested on BP haplotypes A and B and hybrids. The objective of this study was to examine the impact of *P. ichini* herbivory on Florida BP genotypes in the greenhouse. Three Florida genotypes were used for this experiment (20 plants per genotype); BP haplotype A, BP haplotype B, and BP hybrid A (all plants were 5 months old). Eight plants from each genotype were caged with 20 thrips adults (10 females: 10 males), and eight plants were left as controls (no thrips). After one month, all thrips (larvae, pupae, adults) found on plants were counted and removed. Several plant parameters were measured before herbivory, immediately after herbivory, and 2.5 months following herbivory. Results showed that number of leaves, green stems and plant height were reduced on all plants exposed to insect damage. However, plant biomass was similar between treatments and controls except for BP hybrid A. Two and ½ months after herbivory, a reduction of above and below ground biomass was obtained for BP hybrid A exposed to herbivory compared to controls. The detrimental effect of *P. ichini* on plant performance may translate in a

decrease in reproduction and competitive capability of BP in the field. However, further studies are currently being undertaken to determine whether *P. ichini* is sufficiently host specific for release as a biological control agent of BP in Florida.

The World of Hygrophila: Projected Distribution at Future Climate Scenarios

Mukherjee[1], Abhishek, Mary C. Christman[1], James P. Cuda[1] and William A. Overholt[2]
[1]University of Florida, Gainesville, FL, [2]University of Florida, Fort Pierce, FL

A central premise of biogeography is that the 'bioclimatic envelope' of a species determines its range. Altering this envelope via changing the climate can significantly affect species spatial distribution. Several modeling techniques for predicting impact of changing climate on species distribution have been developed and tested. Our recent study includes one such widely used model called MaxEnt. This model predicts impacts of two future climatic scenarios, namely A2 and B2 on the potential distribution of the invasive aquatic weed *Hygrophila polysperma* (Roxb.) T. Anders (Acanthaceae). This weed was brought to United States initially as an aquarium plant. It eventually escaped cultivation and now is widespread throughout Florida. Hygrophila is typically found in flowing freshwater channels and structured shorelines. It forms dense vegetative stands that occupy the entire water column, affecting navigation, irrigation, and flood control activities. A visible increase in the number of water bodies invaded by hygrophila since 1990 suggests that current methods employed to control this weed are inadequate. In this study, we used 271 presence only point locations of hygrophila to project its future climatic distribution. Locality information from its invasive range includes Florida (149 points) and Texas (5 points) in the USA, Mexico (20 points), and Australia (5 points). Locations from its native range include India (76 points), China (3 points) and Bangladesh (13 points). In total, 20 ESRI grid 2.5 arc-minute resolution environmental parameters, including altitude and 19 bioclimatic variables, were used in the MaxEnt model. Two projected scenarios of the Canadian Centre for Climate Modeling and Analysis (CCCMA) climate model, A2a and B2a for the years 2020, 2050 and 2080, were used to predict hygrophila's potential distribution. All climate data were downloaded freely from the Worldclim® database. The simulation results predicted hygrophila range expansion for both scenarios. As evidenced from the fractional predictive area (fraction of all pixels predicted suitable), except for 2050, range expansion for B2a scenarios were found to higher than those for the A2a scenario. However, no range shift has been predicted for any of these years. Using the ecological niche modeling approach, we concluded that the changing climate will likely create new areas vulnerable to invasion by hygrophila.

Successful Biological Control of Tropical Soda Apple by a South American Leaf Feeding Beetle.

Overholt[1], William A. and Rodrigo Diaz[1]
[1]University of Florida, Fort Pierce, FL

Tropical soda apple (TSA), *Solanum viarum* Dunal (Solanaceae), is a prickly, perennial weed from South America which was first reported in Florida in 1988. It invades rangelands, improved pastures and natural areas, and rapidly spread through Florida and into other southern states. A leaf feeding beetle from South America, *Gratiana boliviana* Spaeth (Coleoptera: Chrysomelidae), was first released in Florida as a biological control of TSA in 2003. By October 2009, nearly 200,000 beetles had been released in the state. We evaluated the impact of *G. boliviana* on TSA by comparing the performance of plants protected with either insecticide or cages to the performance of unprotected plants. Protected plants were taller, had wider canopies, and greater cover than unprotected plants. Plants protected with insecticide produced fewer fruit than plants growing in the open. A second study followed the population dynamics of TSA and *G. boliviana* at four locations for 3 years. At the location which initially had the most TSA, plant density dramatically decreased from 10 to 0.125 plants/4m2. At the other three locations, TSA density remained more or less stable throughout the study at <0.5 plants/4m2, suggesting that *G. boliviana* is capable of regulating TSA density at a level of about 0.5 plants/4m2. Population growth of *G. boliviana* tended to be positive during the spring and summer and negative during the winter.

Factors Limiting Native Species Establishment on Former Agricultural Lands.

Weiler[1], Annalisa
[1]University of Central Florida, Orlando, FL

Land-use legacies associated with agriculture, such as increased soil fertility and elevated soil pH, promote invasions by exotic species on former agricultural lands. After agricultural abandonment exotics, which are typically stronger competitors under these modified conditions, displace and inhibit the establishment of native species. Restoring natural soil conditions (i.e. low fertility and low pH) may be an effective, long term method to control and reduce the abundance of exotic species that invade abandoned agricultural lands. In this study, we are examining how lowering fertility with carbon additions and lowering pH by applying sulfur affects exotic species richness and cover (specifically of *Panicum maximum* and *Rhynchelytrum repens*) in two former citrus groves that were once (or historically?) scrub/ scrubby flatwoods. Exotic biomass was removed by one of three methods (tilling, topsoil removal, black plastic) in addition to a control (in which no biomass was removed), and was combined with a soil amendment of sulfur, sawdust, sulfur plus sawdust, or none. In the north site, soil pH was significantly reduced (by 0.5) in the tilling plus sulfur treatment; however there were no significant changes in pH in any other treatments. The south site, which had a higher initial cover of exotic species, showed no significant changes in pH per treatment, suggesting that cover of exotic biomass may hinder the effectiveness of sulfur for lowering pH. There was a slight decrease or no change in exotic species richness in the tilled plots and the topsoil removal plots in the north site; however exotic species richness increased in the all biomass control plots, where we did not remove the above ground cover of plants. In the south site, exotic species richness actually decreased in all biomass control plots in which no vegetation was removed, but showed no trends in any other treatment. These results suggest that disturbing the soil (e.g. tilling and topsoil removal) is an effective method for removing exotic biomass, but must occur several times in order to significantly reduce exotic species richness and cover. Likewise, the addition of soil restoration amendments may have to occur several times in order to detect any changes in soil chemical properties.

Risk assessment: progress of quarantine biocontrol research on Chinese Tallow, Melaleuca, and Downy Rose Myrtle.

Wright[1], Susan A., Sedonia Steininger[1], Greg S. Wheeler[2], James A. Lollis[1], and Ted D. Center[2]
[1]USDA-ARS Invasive Plant Research Lab, Gainesville, FL, [2]USDA-ARS Invasive Plant Research Lab, Ft. Lauderdale, FL

Flea beetle larvae of *Bikasha collaris* penetrate and feed on young roots of Chinese tallow. Plant stability in the soil, ability to absorb water and dissolved minerals, and capacity to store carbohydrates are reduced. Primitive adult weevils of *Heterapoderopsis bicallosicollis*, feed on tallow leaves, skeletonizing them. Females oviposit one to four eggs in undamaged leaves rolled into burrito-like nidi. Implementation of a biocontrol program with a root feeder and leaf feeder for Chinese tallow would be desirable. Preliminary results indicate that both species completely develop only on tallow, but adult weevil feeding damage on nontarget species is a concern.

Adults of the weevil *Haplonyx multicolor* feed on new growth of melaleuca. Females oviposit eggs downward through feeding holes in buds, one egg/bud, then cover the distal portion of the eggs with tightly packed melaleuca hairs some of which protrude through the feeding holes. Females then partially sever stems 1-2 cm beneath the oviposition sites killing the plant tissue above. Larvae feed and complete development on the dead plant bud. Thus far, the laboratory host range of this insect is limited to *Melaleuca* spp. with low numbers developing on congeneric species other than *M. quinquenervia*. It is likely a determination of whether this weevil will enhance biocontrol efforts will be made this year.

A new quarantine project on Downy Rose Myrtle, *Rhodomyrtus tomentosa*, was initiated in 2009. This species is native to Asia but is problematic in Florida, displacing native vegetation. Shrubs grow to 6 feet though plants can be up to 12 feet tall. After being introduced as an ornamental it has spread into native areas, particularly in the understory of pine forests and sloughs. Infestations

occur in central and southern Florida including Lee, Palm Beach, Broward, Dade and Pasco Counties. This plant is fire adapted and significantly resprouts after burning and herbicide application. *R. tomentosa* can tolerate some frosts and low salinity. It flowers prolifically in spring and regeneration occurs through seed drop but not vegetatively. The fruits are edible and seeds are therefore distributed by birds and animals. (Information provided by University of Florida, Center for Aquatic and Invasive Plants, http://plants.ifas.ufl.edu/node/364). In Southeast Asia, particularly Thailand and Hong Kong, *Rhodomyrtus* is very common but not problematic, with many insect herbivores. A small moth, *Agriothera* sp., will be imported this year for colonization and host range tests in quarantine. Matthew Purcell, USDA ABLC/CSIRO reports its larvae tunnel in flower buds and fruit, and also appear to tunnel in tips of stems resulting in their death.