Welcome to Clearwater Beach and the

TENTH ANNUAL EXOTIC PEST PLANT COUNCIL SYMPOSIUM

Program Chair - Jackie Jordan
Florida EPPC Officers, Board of Directors, Committees and Chairs, and Working Groups and Contact are listed below.

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Nursery Growers/Landscape Architects Liaison Richard Moyroud (407) 533-0611
National Outreach/Press Relations Don Schmitz    (904) 488-5631
Welcome to the Tenth Symposium of the Exotic Pest Plant Council. Listed below are some sights of interests for those members that may have their families with them or plan to stay in the area for the weekend.

Area sights of interest

Florida Aquarium - located on the waterfront in the Garrison Seaport Center. The new Tampa-Ybor Trolley stops at the aquarium; fare is 50 cents. Hours are 9 a.m. - 6 p.m. daily. Admission ranges from $6.95 for children 3-12 to $13.95 for adults over 18. Youth and senior discounts are available. For more information call (813) 273-4000.

Busch Gardens - located approximately 30 miles south in Tampa.

St. Petersburg offers several museums featuring the artwork of Salvador Dali and for a limited time the royal jewels of Russian Czars. Contact the St. Petersburg Chamber of Commerce at (813) 821-4715

Tarpon Springs Sponge Docks - a short drive from Clearwater Beach in the town of Tarpon Springs

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Tuesday, May 9, 1995

3:00 p.m. Florida EPC Board Meeting
Tenth Annual EPPC Symposium   Agenda

Wednesday, May 10, 1995

8:00 a.m. until 5:00 p.m. - Registration

10:00 a.m. Call to Order
            Dan Thayer, Chairman

10:05 a.m. Chairman’s Welcome and Address
           Dan Thayer

Keynote Address

10:30 a.m. Working Together: The National Association
           of Exotic Pest Plant Council
           Faith Campbell
           National EPPC Lobbyist
           Washington, D.C.

11:30 a.m. - Funding Sources for Invasive Exotic Plant
           Control and Research
           Tom Brown
           Florida Department of Environmental Protection
           Tallahassee, FL

12:00    LUNCH (on your own)

Moderator - Ted Center

1:15 p.m. The Exotic Species Invasion in Florida: A
           Summary of An Assessment of Invasive
           Non-Indigenous Species in Florida’s Public Lands
           Don Schmitz
           Florida Department of Environmental Protection
           Tallahassee, FL

1:45 p.m. The World Movement of Weeds - An Emerging
           Environmental Issue of the 90’s
           Randy Westbrook
           USDA APHIS PPQ
           Whiteville, NC

2:15 p.m. A Review of Florida’s Efforts to Regulate, Assess, and
           Manage Exotic Fishes
           Paul Shafland
           Florida Game and Fresh Water Fish Commission
           Boca Raton, FL
Tenth Annual EPPC Symposium Agenda

2:45 p.m. Exotic Animals in South Florida
Mark Robson
Florida Game and Fresh Water Fish Commission
West Palm Beach, FL

3:15 p.m. Break

Moderator - Brian Nelson

3:30 p.m. Mitigation Banking and Exotic Plant Control
Ann Redmond
Florida Department of Environmental Protection
Tallahassee, FL

4:00 p.m. Are Florida's Rare Natives Far from the Madding Crowd of Exotics?
Kathy Burks
Florida Department of Environmental Protection
Tallahassee, FL

4:30 p.m. The Invasive Chinese Tallow-tree (Sapindus sebiferum) in the Southeast
Greg Jubinsky
Florida Department of Environmental Protection
Tallahassee, FL

5:00 p.m. Adjourn for the Day - EPPC Business Meeting

Thursday, May 11, 1995

8:00 a.m. until 5:00 p.m. - Registration

Moderator - Amy Ferriter

8:30 a.m. The Cape Florida Restoration Project: Exotics Control in a Changing Post-Hurricane Landscape
Elizabeth Carter
Florida Department of Environmental Protection
Key Biscayne, FL

8:50 a.m. Exotic Plant Management Activities on Lands Managed by SWFWMD
Brian Nelson
Southwest Florida Water Management District
Brooksville, FL

9:20 a.m. Exotic Pest Plant Management at Dry Tortugas National Park: Paradise Lost?
David T. Jones and Doug DeVries
South Florida Natural Resources Center
Miami, FL
Tenth Annual EPPC Symposium Agenda

9:40 a.m.  A Look at Two Species Often Found in Asian Nurseries: Water Spinach (Ipomoea aquatica Forsk.) and Turkeyberry (Solanum torvum Sw.)
    Nancy C. Coile
    Florida Department of Agriculture and Consumer Services
    Gainesville, FL

10:00 a.m.  Break

Moderator - Greg Jubinsky

10:30 a.m.  Control of Exotics Using Critical-Heat Technology
    Daryl Thompson
    Aqua-Heat Technologies
    Mulberry, FL

11:00 a.m.  Ecophysiology and Management of Cogongrass
    [Imperata cylindrica (L.) Beauv.]
    D. Shilling, J. F. Gaffney, and F. K. McDonald
    University of Florida
    Gainesville, FL

11:20 a.m.  Status of Exotic Pest Plant Management on the Right-of-Way
    Jeff Caster
    Florida Department of Transportation
    Tallahassee, FL

11:40 a.m.  Dade County's Integrated Resource Restoration and Management
    Joy D. Klein
    Dade County Environmental Resources Management
    Miami FL

12:00 p.m.  Lunch (on your own)
Tenth Annual EPPC Symposium Agenda

Moderator - Francois Laroche

1:00 p.m.  Hazards: Toxicity of Herbicides
           Dr. Mari Stavanja
           Florida Department of Agriculture and Consumer Services
           Tallahassee, FL

1:30 p.m.  Pesticide Registration Alternatives: EUP, SLN, and Section 18 Exemptions
           James E. Kriner
           Florida Department of Agriculture and Consumer Services
           Tallahassee, FL

2:00 p.m.  Ecology and Biology of Ardisia crenata, An Exotic Invasive Scrub In Alachua County
           Hallie Dozier, Sandra McDonald, Till Rosenberger,
           Kelly McPherson, Deborah Kinnard, Zuileka Pizon,
           and Francis Putz
           University of Florida
           Gainesville, FL

2:20 p.m.  Vegetation Mapping in Lake Okeechobee: A Focus on Melaleuca Expansion and Management Efforts to Reclaim Lost Habitat
           Chuck Hanlon
           South Florida Water Management District
           West Palm Beach, FL

2:40 p.m.  The Role of Cooperative Extension in Exotic Pest Plant Awareness
           Ken Langeland
           University of Florida
           Gainesville FL

3:00 p.m.  Break

Moderator - Jackie Jordan

3:20 p.m.  1994 Progress Report on Biological Control
           Dr. Gary Buckingham
           USDA-ARS
           Gainesville, FL
Tenth Annual EPPC Symposium

3:40 p.m.  Current IFAS Plans for Invasive Exotic Plant Research
Dr. Bill Haller
University of Florida
Gainesville, FL

4:00 p.m.  Tropical Soda Apple (Solanum viarum): An Exotic Pest Invading Florida
J. Jeffrey Mullahey
University of Florida
Immokalee, FL

4:20 p.m.  How to Involve the Public in Exotic Plant Removal
Debbie Carr
Dade County parks
Miami, FL

4:40 p.m.  What Happens After the Trees are Dead?
David Fox
Forestry Resource Management, Inc.

5:00 p.m.  Adjourn

6:30 p.m. until 9:00 p.m.  Social by the Pool

Friday, May 12, 1995

Moderator - Ken Langeland

8:30 a.m.  Exotic Climbing Fern, Lygodium microphyllum, A Pest Species in South Florida’s Wetlands, Some Management Considerations
Richard R. Roberts
Florida Department of Environmental Protection
Hobe Sound, FL

Donald R. Richardson
Ecological Consultants
Tampa, FL

8:50 a.m.  An On-Going Volunteer Effort to Control Schinus terebinthifolius
Judith B. Buhrman
Tampa, FL
Tenth Annual EPPC Symposium Agenda

9:10 a.m. Post-Hurricane Andrew Exotic Plant Management Using GIS, GPS, and Remote Sensing
          Jack Makemson
          Dade County Parks
          Miami, FL

9:30 a.m. Post-Hurricane Hammock Restoration Techniques
          Sandra Vardaman
          Dade County Parks
          Miami, FL

9:50 a.m. Break

Moderator - Dan Thayer

10:10 a.m. Paederia foetida (Skunk Vine) and Paederia cruvasiana (Sewer vine):
          Threats and Management Strategies
          George Gann
          Institute for Regional Conservation
          Miami, FL

          Doria Gordon
          The Nature Conservancy
          Gainesville, FL

10:30 a.m. Prescribed Fire as Follow-up Control of the Exotic Melaleuca in a Cypress/Slash Pine Forest
          Kent Van Horn, James R. Goodwin, Paul S. Ellis,
          and Mia Van Horn
          South Florida Water Management District
          Indiantown, FL

10:50 a.m. Effects of Water Level Variation on the Growth Melaleuca Seedlings from the Lake Okeechobee Littoral Zone
          Christine S. Lockhart
          Florida Atlantic University
          Boyington Beach, FL

11:10 a.m. Closing Statements
          Dan Thayer
ABSTRACTS

The abstracts for many of the talks follow. The abstracts have been arranged in date of presentation order.
Wednesday, May 10

FUNDING SOURCES FOR INVASIVE EXOTIC PLANT CONTROL AND
RESEARCH. Tom C. Brown, Florida Department of Environmental
Protection, Bureau of Aquatic Plant Management, Tallahassee, Florida.

A consideration of possible funding sources for invasive exotic plant control and
research and a report on the results of the 1995 legislative session as relates to this
issue. A discussion of proposed legislation and the fate of that legislation. Also, a
discussion of the possible consequences resulting from the failure of the legislature
to provide funding for the control of non-indigenous species.

THE EXOTIC SPECIES INVASIONS IN FLORIDA; A SUMMARY OF AN
ASSESSMENT OF INVASIVE NON-INDIGENOUS SPECIES IN FLORIDA’S
PUBLIC LANDS. Don C. Schmitz and Tom C. Brown. Florida Department of
Environmental Protection, Bureau of Aquatic Plant Management,
Tallahassee, Florida.

The report to the Legislature on the Creation of the Florida Department of
Environmental Protection (December 1993) contained a mandate stating "By January
1, 1995, the department shall make recommendations to the legislature for the
establishment of a comprehensive program for the research into and control of exotic
plants and animals that are invasive to public lands." As a result of this mandate, the
Bureau of Aquatic Plant Management was assigned the responsibility of compiling a
report designed to be the foundation upon which that comprehensive program is built.
More than 60 scientists and resource managers from universities and state, federal,
and county agencies contributed to this undertaking.

Based on information gleaned from the individual chapters of this report, it is apparent
that invasive non-indigenous species threaten the biological diversity found within the
ecosystems throughout our state parks, wildlife refuges, natural areas, and
waterways. For example, it is estimated that more than 1.5 million acres of Florida’s
remaining natural areas have become infested with non-indigenous plant species that
are destroying native plant diversity. In addition, non-indigenous amphibian, reptile,
and mammal populations are altering complex ecosystem relationships and/or
reducing the food supply for native predators. During the coming years, these
non-indigenous species will increase and overwhelm native species, predictably
leading to biotic impoverishment, and threaten the natural functioning ability of
Florida’s ecosystems.

Laws must be passed that are designed to keep harmful non-indigenous species from
being introduced and greater action is needed to control these species on public lands.
The problem is expected to expand, unless there is immediate state government
leadership, intervention and funding.

THE WORLD MOVEMENT OF WEEDS AN EMERGING ENVIRONMENTAL
ISSUE OF THE 1990s - Randy Westbrooks and Robert E. Eplee

According to Geologists, the super-continent Pangaea began to break up about 180
million years ago. Since then, plants and animals have evolved more or less in genetic
and geographical isolation in six major biogeographical realms that correspond
closely to the continents. Over time, this led to the formation of complex ecosystems
with unique organisms that kept each other in check. However, with the rise of
civilized man and agriculture, numerous species have been moved well beyond their
historical ranges to other parts of the world. Without their co-evolved predators and parasites, some introduced species outcompete native species and further complicate agricultural management practices.

According to the U.S. Congress Office of Technology Assessment, over 4,500 introduced organisms have naturalized in the United States. Of this total, at least 600 species have become invasive. Introduced species that threaten the biodiversity of natural ecosystems, the aesthetics of developed ecosystems (managed areas) and the production potential of agroecosystems are termed biological pollutants (BPs). Unlike chemical pollutants that degrade over time, BPs have the ability to reproduce and spread, creating bigger and bigger problems in their management. Some of the major BPs that have invade the United States include animal diseases such as foot and mouth disease, tropical soda apple which is a serious new pasture weed (Southeast), the aquatic weed hydrilla, imported fire ant (Southeast), gypsy moth (Northeast), and zebra mussel (Great Lakes).

One objective of APHIS PPQ is to prevent the entry of harmful nonindigenous weeds, insects, diseases, snails and other designated pests into the United States through port of entry inspections. Domestic strategies for dealing with biological pollutants that do enter the United States include detection, containment, and eradication of incipient infestations. Biological control is pursued where eradication or traditional control measures are impractical. Authority to exclude and eradicate designated foreign weeds is provided under the Federal Noxious Weed Act (FNWA). Currently, 94 taxa of foreign plants are listed under the Act. Projects to eradicate 13 FNWs from localized infestations in the United States have been initiated.

A REVIEW OF FLORIDA’S EFFORTS TO REGULATE, ASSESS AND MANAGE EXOTIC FISHES - Paul L. Shaffland, Florida Game and Fresh Water Fish Commission.

More exotic fishes are established in, cultured in, and shipped to and from Florida than nearly any other place in the world. The potential of these fishes to affect native species deleteriously has been a major concern of the Florida Game and Fresh Water Fish Commission for more than 30 years. Seventy-five exotic fish species have been collected at least once from Florida waters, 23 of those are reproducing and 18 are established (i.e., have permanent populations). Most exotic fishes were released by private citizens unaware of the environmental consequences and illegality of their actions. In response to this situation, the Commission developed three basic groupings of programs: prevention, assessment, and management. Prevention programs consist of law enforcement activities, coordination and education and, when possible, elimination of localized populations of exotic fishes. Assessment activities are primarily focused in an active research program, while most management practices (e.g., commercial fishing, introducing predators) have been adapted from those used for native species. The Commission's working philosophy concerning exotic fishes is to minimize their detrimental impacts while maximizing any intentional or fortuitously beneficial attributes. The Commission's overall program represents a comprehensive and flexible strategy for dealing with the exotic fishes transported through and X in Florida.
MITIGATION BANKING AND EXOTIC PLANT CONTROL - Ann Redmond, Florida Department of Environmental Protection, Tallahassee, Florida.

The Florida Legislature required the adoption of new rules regarding the use of mitigation banking the Department and the water management districts. The rules became effective statewide in early 1994. The Legislature specifically found that impacts of development activities may be offset by the creation and maintenance of regional mitigation areas or mitigation banks, as a means to minimize mitigation uncertainty and provide ecological benefits. It was required that provisions for the consideration of creation, restoration, enhancement, and preservation of wetlands and uplands as part of a mitigation bank be included in the new rules. The adopted rules specifically state that Mitigation Banks should emphasize restoration and enhancement of degraded ecosystems and the preservation of uplands and wetlands as intact ecosystems rather than alteration of landscape to create wetlands. As such, this would seem to suggest that exotic removal proposals are excellent candidates for mitigation banking. Given the statutory requirement that bank are expected to reduce mitigation uncertainty, the foremost requirement of any bank is that it has a high likelihood of success. This talk will explore the necessary balance between likelihood of successful eradication of exotics and the role of exotic removal projects in mitigation banking.

ARE FLORIDA'S RARE NATIVES FAR FROM THE MADDING CROWD OF EXOTICS? - Kathy Craddock Burks, Florida Department of Environmental Protection, Bureau of Aquatic Plant Management, Tallahassee, Florida

A suggested answer to the question will follow an overview of the current status of endangered and threatened plant species in Florida and consideration of several case histories. Particular exotic plant species will be referenced, such as Ligustrum sinense, Lygodium spp., Paederia foetida, Schefflera actinophylla, and Schinus terebinthifolius.

THE INVASIVE POTENTIAL OF CHINESE TALLOW-TREE (SAPIUM SEBIFERUM) IN THE SOUTHEAST - Jubinsky, Greg, Florida Department of Environmental Protection, Bureau of Aquatic Plant Management, Tallahassee, Florida.

A native of eastern Asia, in the same latitudes as the southeastern U. S., the Tallow-tree (or Popcorn-tree) has long been a popular landscaping choice in this region. For its brilliant fall color, distinctive seed capsules, and easy care as an ornamental. It is shade-, sun-, drought-, flood-, freeze-, and salt-tolerant, as shown in recent experiments. These and other characters, such as its adaptability to a wide range of soils and its ease of dispersal via birds, water, and humans, suggest that this introduced species has a high risk potential as an invasive plant outside of cultivation. Recent surveys conducted by Florida's Department of Environmental Protection demonstrate the increased spread of Tallow-tree into disturbed and undisturbed, upland and wetland sites. For example, more than 10,000 Sapium trees have been documented as naturalized in a large wetland preserve (Paynes Prairie) south of Gainesville, Florida. Over half (57%) of Florida's counties now have naturalized populations of the tree. Distribution information from other southern states is also presented, and current options for control of this hardy plant are discussed.
Thursday, May 11, 1995

THE CAPE FLORIDA RESTORATION PROJECT: EXOTICS CONTROL IN A CHANGING POST-HURRICANE LANDSCAPE - Elizabeth Carter, Bill Baggs Cape Florida State Recreation Area, Florida.

Since Hurricane Andrew toppled the near-monoculture of Australian-pines that had existed on Cape Florida since the 1950’s, a major project has been in progress to re-establish native plant communities in this 400+ acre park. The physical removal of the felled Australian-pines and the control of emerging seedlings were only the first, if major, steps in the effort to control exotic plants invading this heavily impacted site. As conditions have changed over the last three years, the dynamics of both old and new populations of invasive species have changed, and various techniques have been used to combat them.

EXOTIC PLANT MANAGEMENT ACTIVITIES ON LAND MANAGED BY THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT - Brian Nelson, Southwest Florida Water Management District, Brooksville, Florida.

The Southwest Florida Water Management District manages numerous properties totaling nearly 250,000 acres. The exotic species cogongrass (Imperata cylindrica), Brazilian pepper (Schinus terebinthifolius), melaleuca (Melaleuca quinqueneria), tropical soda apple (Solanum viarum), air potato (Dioscorea bulbifera) and skunk vine (Paederia foetida) currently require management. The treatment methods utilized, status of ongoing projects, as well as the policies governing exotic revegetation management on District-owned lands will be discussed.

EXOTIC PEST PLANT MANAGEMENT IN DRY TORTUGAS NATIONAL PARK: PARADISE LOST? - David T. Jones and Doug M. DeVries, South Florida Natural Resources Center, Everglades National Park, Homestead, Florida.

The primary goal of natural resources management in the National Parks is to manage the natural resources of the National Park System - forests, minerals, water, wildlife - in order to preserve their historical, recreational and ecological integrity. The challenge in management of these resources is to protect and restore them in the face of impacts from human use activities, including the introduction of exotic plants and animals. Ever since their discovery in 1513, the marine and terrestrial resources of the "Dry Tortugas" have been exploited, at one time or another, by the many explorers, mariners and other visitors to these islands. As a consequence of these activities and a long history of human habitation, the natural landscapes of some of the islands have been altered dramatically, especially with regard to vegetation. The vegetation management program at DRTO is centered around exotic pest plant control on Loggerhead Key where more than half of its flora is of non-indigenous origin. The Australian pine (Casaurina), planted extensively on the island for decorative and utilitarian purposes as early as 1904, now forms extensive stands and has replaced native plant communities and interfered with the nesting of the threatened Loggerhead sea turtle. The current management plant, administered by the SFNRC Vegetation Program and Fire Management Office of Everglades National Park, involves the gradual removal of Australian pine through herbicide treatments, followed by a controlled burn. Vegetation sampling has recently been carried out on the island to document pre-treatment conditions and will be carried out periodically after treatment.
to monitor vegetation response and recovery. The status and impacts of other exotic pest plants which occur on the island, e.g., Agave, Scaevola, Colubrina, will be presented.

A LOOK AT TWO SPECIES OFTEN FOUND IN ASIAN NURSERIES: WATER SPINACH (IPOMOEA AQUATICA FORSK.) AND TURKEYBERRY (SOLANUM TORMUM SW.) - Nancy C. Coile, Florida Department of Agriculture and Consumer Services, Division of Plant Industry, Gainesville, Florida.

These two species are often grown in Asian nurseries for culinary use. Each species will be described and the features which caused them to be listed as undesirables will be emphasized. Water spinach is on DEP's prohibited plant list; turkeyberry is on FDACS/DPI's noxious weed list.


Cogongrass is a perennial rhizomatous C grass which reproduces from rhizomes and seed. The persistent and aggressive rhizomes can be a mechanism of spread. In addition, the rhizomes are extremely difficult to manage and are the main reason that long-term control is presently impossible. Consequently, cogongrass is a serious plant pest throughout the tropical and semi-tropical regions of the world and is ranked as the 7th most serious weed worldwide. In Florida cogongrass has infested large tracts of reclaimed phosphate mined land, forests, roadsides, parks, pastures and natural habitat. Continued invasion by cogongrass into natural and disturbed ecosystems is assured if left unchecked. Therefore, research which is funded by the Florida Institute of Phosphate Research is being conducted by the University of Florida and to investigate various methods of control, mechanisms of dissemination, and factors affecting persistence and control.

Sexual and asexual reproduction of cogongrass will be studied to determine the mechanism of establishment and dissemination into new areas. Greenhouse and field studies will include herbicide evaluation, timing of herbicide application, mechanical control (burning and diskng), cultural control (competition from desirable vegetation), and biological control. The relationship between source-sink and development will be studied to better understand how to optimize herbicide translocation to rhizomes and thereby improve efficacy. Radioisotope studies will be used to study factors affecting herbicide translocation and accumulation in rhizomes. These studies should allow a determination of how best to utilize preventative chemical, mechanical, cultural, and biological control measures for the management of cogongrass. Ultimately, our goal will be to integrate these methods into an effective yet flexible cogongrass management strategy based on long-term control.

STATUS OF EXOTIC PEST PLANT MANAGEMENT OF THE RIGHT-OF-WAY - Jeff Caster, Associate, ASLA, Environmental Management Office, Florida Department of Transportation, Tallahassee, Florida.

Cogongrass, tropical soda apple, Chinese tallow tree, Brazilian peppertree, melaleuca, skunk vine, air potato, Australian pine and other exotic pest plants found on your state roads are being removed. While being careful not to overwhelm the Department's personnel or other resources, the Florida Department of Transportation (FDOT) is gradually rescuing pieces of the state's environment. We are discouraged
however, when we look over the right-of-way fence, only to see uncontrolled spread of the same pestiferous species. Never the less, FDOT will do what it has to, to maintain restored and undisturbed sites.

In the last year, the Department has successfully treated 300+ acres of cogongrass. 27,000 Australian pine and melaleuca trees have been removed from the Florida's Turnpike. Volunteers have pulled down skunkvine to protect an endangered species. Intergovernmental and Interagency cooperation on public demonstration projects netted the removal of Brazilian Peppertrees and Chinese tallow trees from the right-of-way. A new topsoil specification is helping to eliminate the spread of exotic pest plants during earthwork activities. Since the last EPPC symposium, the Department has found and begun treating extensive patches of Tropical Soda Apple. With so much activity associated with exotic pest plants, FDOT employees are getting quite good at identification even at 65 miles per hour.

In the coming year, the Department will work towards an Exotic Pest Plant Policy and a plan for implementation. Awareness of exotic pest plant issues will be increased in all phases of Departmental operations. Additional training programs will be prepared for employees and consultants. Improved specifications for sod and hay will be adopted to help avoid the introduction of pest plants onto the right of way. Research in biological control, has been selected for funding over the next three years. Maintenance personnel, with an improved eye for finding cogongrass will be retreating the extensive sites along the highways. The department will sponsor a symposium this fall to develop strategies for an ecosystem approach to exotic pest plant management on both sides of the right-of-way fence.

FDOT appreciates the patience and generous support of the public and private agencies and citizens who shared their expertise, time, and energy with the Department to protect and restore Florida's roadside.

DADE COUNTY'S INTEGRATED RESOURCE RESTORATION AND MANAGEMENT - Joy D. Klein, Dade County Environmental Resources Management, Miami, Florida.

Currently there are 4,000 acres of pine rockland and 350 acres of tropical hardwood hammock in Dade County. Approximately half of these lands are still in private ownership. The plant species in these areas are unique due to the limestone substrate, and the tropical climate which creates a temperate/tropical mixture of plant species.

The pine rocklands area fire-dependant community which, in the absence of fire, will succeed to hardwood hammock. Pine rocklands are rich in flora, containing over 50 woody species, 200 herb and graminoid species of which 55 are endemic to South Florida. Four federally listed endangered species occur in Dade County's pine rocklands.

Southern Dade County contains most of the remaining tropical hardwood hammocks and pine rocklands. On August 24, 1992, Hurricane Andrew severely impacted these forests by snapping off trees and removing canopy, increasing light levels in the understory. In the hardwood hammocks, this effect is clearly seen as shade-loving groundcover species including rare, endemic ferns have declined due to the decreased moisture levels. The pine rocklands of southern Dade County have also lost the majority of their canopy. Initially, pine trees were tipped up or snapped off, but later the slash pine mortality has increased to 98% due to post-hurricane stresses, including insect predation.
The hurricane also expanded the problem of invasive plant species. These exotic pest plants tend to be fast growing and outcompete native species. Management in these areas are now a top priority.

A flurry of natural resource management planning has occurred since Hurricane Andrew. Since many local, state, and federal agencies are involved, DERM felt it was important that a network of communication and coordination be established and maintained. In addition, a dramatic increase in governmental coordination and education of landowners is desirable to facilitate management of privately-owned forested areas.

Many landowners had requested management assistance from DERM since homeowners insurance policies do not cover these types of losses. In the past only minimal technical assistance and support were available to the public; Hurricane Andrew had dramatically increased the Department's need to initiate resource management efforts on private property.

PESTICIDE REGISTRATION ALTERNATIVES: EUP, SLN and SECTION 18 EXEMPTIONS - James E. Kriner, Florida Department of Agriculture and Consumer Services, Tallahassee, Florida

The Florida Pesticide Law and Rules (Chapter 487, F.S.; Chapter 5E-2, F.A.C. Chapter 5E-9, F.A.C.) and Federal Insecticide, Fungicide, Rodenticide Act (FIFRA) are the laws which regulate the distribution, sale, and use of pesticides with the purpose of protecting people and the environment from adverse effects of pesticide in the state of Florida. The initial entry point into Florida and other states is through the distribution and sale of pesticides. Under Chapter 487.041 (Registration) an Rule 5E.2.031 (Procedures for Pesticide Registration) the initial screening for the introduction of a new active ingredient, experimental use compound, special local need use, and any significant new use of a pesticide active ingredient is accomplished. The Florida Department of Agriculture and Consumer Services along with consultation of other state agencies through the Pesticide Registration Evaluative Committee (PREC) and the Pesticide Review Council (PRC) review submit product chemistry, toxicological, environmental fate, residue chemistry, and worker/applicator safety data from the product's registrant. This data must provide scientific evidence that the pesticide will not cause any unreasonable adverse effects on public health or the environment. After review of the data and provided the submitted data are adequate to address Florida specific concerns the Department will either fully approve the registration; or conditionally register the product; or notify the applicant or registrant of intent to deny registration.

The pesticide registration requirements for Experimental Use Permits, Special Local Needs and the requirements for Crisis and Specific Exemptions will be briefly described. The impact that these registrations can have on exotic pest plant control will be highlighted.

ECOLOGY AND BIOLOGY OF ARDISIA CRENATA, AN EXOTIC INVASIVE SHRUB IN ALACHUA COUNTY - Hallie Dozier, Sandra K. McDonald, Till Rosenberger, Kelly McPherson, Deborah Kinnard, Zulieka Pinzon, Francis E. Putz

Ardisia crenata Sims was introduced into Florida from Asia as early as 1900. The species (sometimes misidentified as A. crenulata Vent.) is a treelet/shrub found in Alachua County primarily in understories of mixed hardwood forests where recent
disturbance is not evident. We examined several aspects of its biology and ecology in four mesic second-growth hardwood sites in Alachua County. Species richness and number of individual species both were lower in the presence of A. crenata, regardless of its density. Ardisia crenata seedlings accounted for the highest proportion of plants in dense stands and the smallest stature reproductive plants were growing in moderately dense stands. Ardisia crenata growing in dense stands reduced understory light reaching the forest floor by about 75% but it did not seem to compete with native plants for soil moisture. Two control measures were examined for cost effectiveness and impact on overall species richness. While total control cost per hectare did not differ between chemical and mechanical treatments, mechanical removal of A. crenata was more effective and had less negative impact on species richness than herbicide treatment. This research suggests that it would be most effective to control moderately-sized outlier or "satellite" populations using mechanical removal.

VEGETATION MAPPING IN LAKE OKEECHOBEE: A FOCUS ON MELALEUCA EXPANSION AND MANAGEMENT EFFORTS TO RECLAIM LOST HABITAT - Chuck Hanlon

Lake Okeechobee's 40,000 ha littoral zone (marsh) makes it one of the largest in the country and larger than the total surface area of most lakes in North America. Associated with this vast ecosystem is an abundant number of animals and fish that utilize this area for nesting, foraging, and protection from predation. During recent years, exotic vegetation, including melaleuca (Melaleuca quinquenervia), has invaded thousands of hectares of the lake's marsh. As a result, valuable wildlife habitat has been lost and the ecological integrity of the lake ecosystem has been seriously threatened.

In order to monitor short and long-term changes in the distribution of native and exotic vegetation in Lake Okeechobee, a GIS database documenting vegetation coverage is being developed by the South Florida Water Management District. The database includes detailed information describing the location, condition, density, and aerial coverage of emergent plant communities in quantitative evaluations of management strategies designed to reduce the aerial coverage of exotic vegetation will be conducted. In addition, successional changes and the potential re-establishment of native plant communities will be documented. The data presented here describe baseline conditions (1994) of melaleuca coverage in Lake Okeechobee, and focus on the District's multi-million dollar effort to eradicate melaleuca from the lake and reclaim lost wildlife habitat.

1994 PROGRESS REPORT ON BIOLOGICAL CONTROL - Dr. Gary Buckingham, USDA, Gainesville, Florida.

Hydrilla verticillata and Myriophyllum spicatum, or Eurasian watermilfoil, are submersed aquatic plants that are immigrant weeds in the United States. Surveys to collect insects for biological control of these two species were made in Heilongjiang and Liaoning Provinces and near Beijing, People's Republic of China, in cooperation with the Sino-American Biological Control Laboratory (SABCL), CAAS, in Beijing. Adults of Phytobius spp. and Bagous sp. weevils that attack the flowers and stems of watermilfoil were imported to the quarantine facility in Gainesville, Florida, for biological studies in cooperation with FAES. Larvae of Macroplea chrysomelid beetles were reared to adults in China from the roots of watermilfoil, hydrilla, and other
aquatic plants. A cooperating plant pathologist from Army Corps of Engineers (ACE), Waterways Experiment Station (WES), made initial surveys from pathogens of hydrilla and watermilfoil near Beijing and sent samples to quarantine in Fredricksburg, MD.

The two Chinese weevils, Phytobius spp., were colonized in quarantine and watermilfoil flowers were no longer available in the field. Adults and larvae of both species ate flowers and seeds. Larvae often bored into the flower stalk and stem in cages, but this was not observed in the field. Lack of flower prevented extensive host range testing, but these species were only found on two species of milfoils in China. Attempts to colonize another Chinese weevil, Eubrychius sp., whose larvae and adults each submersed milfoil leaves, were not successful. The Bagous sp. was colonized in quarantine but testing is being delayed until the colony increases. It has not oviposited on various test plants placed with hydrilla in the rearing cages.

Adult feeding tests were completed in quarantine with an Australian weevil, Oxyops vitiosa, which attacks young leaves and stems of melaleuca trees. This immigrant weedy tree has invaded the Everglades National Park and other habitats of southern Florida. More than 100 plant species were tested. Feeding on all species was less than on melaleuca and most newly emerged adults died quickly when confined to high risk test plant species. Eggs were deposited on some test plant species but in number less than on melaleuca; the young larva did not develop. Older larvae transferred from melaleuca to test plants fed on a few more plant species than did young larvae, but few completed development and no adults were produced. Additional oviposition and larval feeding tests are needed to confirm the narrow host range observed both in quarantine and in the native Australia. This species is expected to help control saplings and young growth on older trees, if it is eventually approved for field release.

Importation of the melaleuca sawfly, Lophyrotoma zonalis, from Australia were continued into the quarantine facility. Ten females emerged along with males from progeny of a female that had been observed mating. These were the first two females produced in quarantine. Their production suggests that previous recovery of only males might be due to mating problems rather than to host plant incompatibility. Females oviposited on a couple of test plant species but generally only on melaleuca. No larvae developed on the test plants. Larvae produced in quarantine were supplied to a chemist for studies of defensive chemicals. If this species is eventually approved, it might be a good candidate for biocontrol of melaleuca because its larvae defoliate large trees in Australia.

TROPICAL SODA APPLE (SOLANUM VIARUM) AN EXOTIC PEST INVADING FLORIDA. J. Jeffrey Mullahay, University of Florida, Institute of Food and Agricultural Sciences, Southwest Florida Research and Education Center, Immokalee, 33934.

Tropical soda apple (TSA), an exotic weed in Florida, displaces native plants and pasture grasses resulting in significant economic and ecological losses. At maturity, TSA is 1-2 m tall and the entire plant has prickles up to 20 mm long. Leaves are alternate, pubescent, 8-16 cm wide, and the globular fruit is 3 cm in diameter and yellow when mature. The plant is readily identified by its immature fruit, which is green with white mottling like a watermelon. Wildlife (feral hogs, deer and birds) and livestock feed on the fruit and become vectors for spreading seed through the feces. In 1993, infestation of pastures by TSA were estimated to be 400,000 acres, compared to 25,000 acres in 1989. Current research by the University of Florida involves a systems-oriented, agro-ecological approach to weed management that includes...
chemical control strategies, reproductive ecophysiology, and seed dispersal. For broadcast treatments, triclopyr (1%) or glyphosate (3%) has controlled TSA. With either application method, repeated herbicide applications will be necessary to eliminate TSA because of rapid seedling emergence following control of existing plants. Biological control is being investigated using insects and pathogens collected from plants in Brazil. Land owners must utilize chemical, cultural (grazing management), mechanical (mowing), and preventive tools and techniques to manage this noxious plant.

HOW TO INVOLVE THE PUBLIC IN EXOTIC PLANT REMOVAL - Debbie Brownfield-Carr

Since 1989, the Dade County Park and Recreation Department has had a Natural Areas Management Section responsible for managing over 6060 acres of County-owned natural areas. During these six years, Natural Areas Management has utilized volunteers to assist with exotic plant removal and trash pick up in pine rocklands, hardwood hammocks, and coastal habitats. The number of volunteer hours contributed have increased from 60 hours in 1989 to 1227 in the first six months of the 1994-95 season.

Natural Areas Management has been able to increase volunteer hours by adding a volunteer coordinator to staff, increasing public awareness by hosting open houses, setting up information booths at public fairs, and taking advantage of the local school’s service hour requirements.

The N.A.M. volunteer program includes an on-site educational component for volunteers, as well as involving them in meaningful work which:

1. Keeps volunteers interested and promotes repeat volunteerism.
2. Interests new potential volunteers and increase attendance.
3. Shows people that the goal of exotic control in natural areas is feasible.
4. Provides public support for funding exotic control.
5. Brings in awareness that the problems we face with exotic plant control extend beyond our natural areas’ borders and into their backyards.
6. Increases the labor force attacking the problem with a relatively small budget.

WHAT HAPPENS AFTER THE TREES ARE DEAD? David Fox

Methods of exotic plant control range from hand-pulling to using bulldozers. Physical removal of plant stems, while seemingly the optimum remedy, is labor-intensive and costly; site damage may also become extensive. Herbicidal control of unwanted vegetation has proved to be a cost-effective way of treating large infested areas quickly with minor site disturbances.

Like mosquito control, treatment of exotic plants is not a one-time event but a continuous commitment. In general, the only basis for exotic plant control is habitat restoration. This paper will examine several practices that are necessary after primary treatment to diminish the rate of re-infestation. The effects of herbicide application on non-target plants will also be noted along with monitoring needs and supplementary restoration practices.
EXOTIC CLIMBING FERN, LYGODIUM MICROPHYLLUM, A PEST SPECIES IN SOUTH FLORIDA'S WETLANDS, SOME MANAGEMENT CONSIDERATIONS

(1) Richard R. Roberts and (2) Donald R. Richardson
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The climbing fern was first reported as adventive in the mid-60's and is now naturalized in Palm Beach and Martin counties. It's aggressive behavior and habit has allowed this species to cover acres of forested cypress swamps throughout it's range and poses a long-term threat to these natural communities. Climbing, as the name implies, to the tree tops provides a natural avenue for fire spread into the canopy of these usually fire resistant communities. To curtail the spread of this exotic pest plant within Jonathan Dickinson State Park, a research program to identify possible management practices was conducted using a variety of herbicide and burning treatments. Since this species is usually restricted to wetland communities, Rodeo herbicide was utilized as the herbicide of choice. Five treatments 1) sprayed control untreated and unburned, 2) burned to soil, 3) burned to rachis mat, 4) sprayed with Rodeo herbicide without burning and 5) sprayed with Rodeo with burning were applied to a series of eight 5 x 5 meter study plots within the park. Percent with cover, height and number of stems were recorded for each treatment from July 1991 to October 1993. The results indicate that there is little reason to support that fire by itself can control the spread of this pest plant, but short-term control may be attained by herbicide applications. Further study will be required as to the future long-term role for both fire and herbicide combinations in control of this species.

AN ON-GOING VOLUNTEER EFFORT TO CONTROL SCHINUS TEREBINTHIFOLIUS - Judith B. Buhrman, Pinellas Park, Florida.

Fort De Soto Park, the "crown jewel" of the Pinellas County Park system, has long been known internationally as a birding hot-spot. This 900 acre barrier island park is a first land-fall or jumping-off point for migratory birds, and significant to many resident and wintering birds. 2.5 million people a year visit the park, which as been traditionally managed as a "people park." Yet, significant portions are undeveloped, retaining much of the native vegetation despite massive disturbance by early military installations, WW2 bombing practice (live bombs are still found there), and development for recreation. A small group of volunteers was formed and trained in early 1994. Teams of three to five worked weekends for two-and-a-half months. The volunteers were assigned to Schinus-infested areas unamendable to mechanica removal or foliar spraying. Garlon 4 low-pressure basal spray, in conjunction with frilling or girdling, is the method used. Native recruitment is notable after Schinus death, and species persisting in reduced circumstances beneath the pepper canopy respond rapidly. A chemical use controversy has arisen. A second group of volunteers was trained in September, 1994, and work continues. First season kill was about 50%, reflecting a learning curve; the volunteers' goal is 95% or better.
POST-HURRICANE ANDREW EXOTIC PLANT MANAGEMENT USING GIS, GPS, AND REMOTE SENSING - Jack Makemson, Dade County Parks, Miami, Florida

Following Hurricane Andrew, the Institute for Environmental Studies at the University of Wisconsin-Madison implemented a land information management and monitoring system (LIMMS) for Dade County Parks Natural Areas Management. LIMMS uses an integrated system of remote sensing, GPS, and GIS to collect, store and analyze biological and management data. Most of the Parks Department management actions have involved the herbicidal treatment and/or removal of exotic vegetation.

The remote sensing component of LIMMS utilizes yearly color infrared (CIR) aerial photography, scanned at 1/2 meter resolution, and computer analyzed to detect biological and physical changes is extremely useful in distinguishing changes in biomass, species identification, and soil moisture content.

The LIMMS project uses a GPS (Global Positioning System) to locate permanent biological monitoring quadrants and transects within each site with sub-meter accuracy. These plots are also being used to locate and map management plots, plant community boundaries, burn areas, archeological features, rare plants, and other features not distinguishable on the CIR images. GPS will be used in the future to monitor individual reintroduced slash pines.

Features collected with the GPS units are converted into ArcInfo GIS (Geographic information System) coverages. This site-specific information is used in conjunction with existing county coverages such as property parcels, edge of pavement, and hydrography. Sampling and management data is entered into a database and related to the appropriate GIS polygon coverage. The GIS can then be queried to show change in indicator species as related to time and management. These changes are used to assess management actions, and to prioritize future activities.


Skunk vine (Paederia foetida L. s. str.) and sewer vine (P. cruddasiana Prain) are woody, perennial vines in the Rubiaceae. P. foetida is an invasive non-native that is well-established in central Florida and is present on three of the main islands of Hawaii. It may also be naturalized in Louisiana. P. cruddasiana is naturalized in south Florida. Both species have the capacity to cause damage or death to native vegetation and to effectively alter natural community structure. They are capable of establishing in a wide variety of (hydric-)mesic(-neric) habitats. The species suppress or kill canopy and subcanopy trees as well as understory vegetation. Based on life form, natural range, and broad ecological tolerances, these species pose a threat to natural communities throughout Florida, Hawaii, and beyond.

In Florida, P. foetida is naturalized in a number of natural communities from Alachua County southward to Hillsborough County. P. cruddasiana is only known to be naturalized in Dade County. While little is known about the precise ecological requirements of either species, the broad natural distribution of P. foetida suggests that it can tolerate a wide range of climatic, hydrologic and soil conditions. In extratropical areas, P. foetida flowers primarily from early summer to early autumn (c. May, June - September, October) and fruits from July to December.
Pollination and seed dispersal are unknown although ruby-throated hummingbirds (Archilochus colubris) have been observed visiting flowers of P. cruddasiana in Dade County. No significant predators or diseases affecting either species are known.

Control techniques have been developed for P. cruddasiana, while less work has been done on P. foetida. Preliminary research indicates that prescribed fire may be effective in slowing or perhaps reversing the spread of P. foetida in fire-adapted natural communities. Control of P. cruddasiana has been achieved with basal applications of 10% Garlon 4 (triclopyr) in diesel fuel or Penevator Basal Oil. A complete kill may not be achieved if the plant is well-rooted at several nodes along the stem, and some re-growth from root-shoots has also been observed. Three percent Roundup (glyphosate) has been found to be effective in causing leaf-drop of P. cruddasiana, thus allowing for more effective targeting of stems with Garlon 4 or 3A. The aerial portion of P. cruddasiana may be killed by severing the aerial stem from the rooted portions of the plant, and seedlings are easily hand-pulled. Control techniques developed for P. cruddasiana are expected to be effective in the control of P. foetida.

Further research is necessary for both species. While information on life history and limits to distribution are necessary, perhaps the most immediate research need is to determine whether methods used to eradicate P. cruddasiana will be effective on P. foetida.

PRESCRIBED FIRE AS FOLLOW UP CONTROL OF THE EXOTIC MELALEUCA IN A CYPRESS/SLASH PINE FOREST - Van Horn, Kent, James R. Goodwin, Paul S. Ellis and Mia Van Horn. South Florida Water Management District.

The South Florida Water Management District is responsible for purchasing, restoring and managing lands of important water resource value. The 55,000 ac Corkscrew Regional Ecosystem Watershed (CREW) project supports a number of wetland communities including cypress and wet pine flatwood forests. In addition to seasonal flooding, these communities are also shaped by periodic fires. These communities have been impacted by the exotic Melaleuca (Melaleuca quinquenervia) tree which forms dense stands, shading out native ground cover and displacing native trees.

Current control methods for Melaleuca use manual cutting and herbicide application. This method typically results in a release of viable seed which produces abundant seedlings requiring expensive follow up treatment. The remaining slash from such control methods also suppresses recover of the native ground plants. The Melaleuca in this program were treated with the manual cut-stump or hack and squirt methods with a 25% solution of the commercial herbicide Arsenal in February and March, 1994. This project left significant slash covering the ground, some missed seedlings and the anticipation of a large Melaleuca seedling response. A prescribed burn was conducted in May, 1994 to control any seedling/saplings present and to stimulate growth of native ground cover through removal of slash. Sixty square meter plots
were randomly located in the Melaleuca treatment area to measure percent cover of
ground and shrub layer plants. Thirty of these were located in a burned unit and 30
were located in an unburned unit. The sites were sampled 3 weeks (May) and 4
months (September) post burn.

The burned unit had only a 3 percent frequency of remaining live Melaleuca prior to
the burn but all were eliminated following the burn. The unburned unit had 17 percent
frequency of live Melaleuca in both the May and September samples. In the burned
unit the species richness of the ground layer increased from 13 to 15 following the fire
while the unburned unit decreased in species richness from 8 to 3 during the same
period. The mean percent ground cover of the burned unit increased from 8% to 18%
following the burn while the mean percent ground cover of the unburned unit
decreased from 10% to 7% during the same period.

The anticipated increase of Melaleuca seedlings following the chemical treatment and
the need for follow up control was not observed in this study. This may have been a
result of the seasonal water rise during this period. The area was dry in May but had
an average depth of 9 cm in September.

These data are inconclusive regarding fire as a follow up control of Melaleuca,
however, the prescribed fire had a positive effect on the restoration of the site. The
prescribed fire helped to reduce the slash associated with the chemical control and
increased species diversity and percent cover in the ground layer of this wetland
forest.

THE EFFECT OF WATER LEVEL VARIATION ON THE GROWTH MELALEUCA
SEEDLINGS FROM THE LAKE OKEECHOBEE LITTORAL ZONE - Christine S.
Lockhart, Florida Atlantic University

The invasive exotic tree, Melaleuca quinquenervia, continues to rapidly expand
throughout seasonally wet areas of southern Florida. As part of the Everglades
ecosystem, water managers are concerned whether lowering Lake Okeechobee
water levels, which would benefit various natural resources, would stimulate the
Melaleuca population. Saplings and seven-week old seedlings were subjected to
various hydroperiod treatments, based on a simulation of historical water level
variations. Saplings grew taller, increased shoot number, and increased root biomass
under longer hydroperiods with fluctuating water levels, including short periods of
submersion. Age affected seedling response-those submersed at seven weeks grew
slower and had less biomass than submersed 12-week old seedlings, yet mortality
was low at both ages. While Melaleuca's plasticity allows it to adapt to hypoxic,
aquatic conditions by means of aquatic heterophylly and adventitious roots, like other
wetland trees, Melaleuca has limited flood tolerance. Algae and drought also increase
mortality.