Invasive Plants in Florida’s Natural Areas
**INVASION CURVE**

- **Prevention**
  - Pre-Import Regulations (e.g., Lacey Act)
  - Education & Outreach
  - Interception
  - Most cost effective

- **EDRR**
  - Attempt to eradicate or contain
  - Moderate cost, low impact, short term

- **Control**
  - Manage species at lowest feasible levels
  - Long-term impact & highest cost financially and ecologically
Water Hyacinth
(*Eichhornia crassipes*)

South American native
Early 1880s intro to N. America
St. Johns River impassable by 1889
1889 Rivers and Harbors Act
Severe problems world-wide

• Water lettuce, *Pistia stratiotes*

• Papyrus and hyacinth, Nile River • Chopping hyacinths, Lake Chapalla, Mexico
Melaleuca: Our First Upland Plant From Hell

- *Melaleuca quinquenervia*
  - Australian native
  - Arrived early 1900s
  - Not prohibited until late 20th century
  - Imported for:
    - timber
    - Landscaping/Agriculture
    - to “dry out” wetlands
Melaleuca Management Plan

Defining the Problem

- Extent of infestations:
  - South of Hwy 60
  - Mainly concentrated near areas of early plantings

- How much is out there?
  - Various techniques tried
    - satellite images
    - false color infrared
    - aerial reconnaissance
  - Estimates varied
    - 495,300 - 2.5 million acres

Melaleuca Distribution
Natural Areas
Defining the Problem

- Existing control options
  - Millions of seeds per tree
  - Many herbicides tried
  - Effectiveness varied
  - Treatments result in dense, even-aged seedling stand
  - Treated trees often resprout
  - Mechanical removal very expensive & unsuited for most natural areas
Melaleuca Management Plan

Implementing the Plan

- Ecological studies:
  - Reproductive ecology
    - Large (21 m) trees hold up to 51 million seeds
    - 15% of seeds have embryo
    - Seeds can germinate under water
  - Florida vs. Australia
    - More seeds germinate
    - Seedlings more abundant
    - Greater tree density
    - Greater stand biomass

- Oz: 800 trees/ha
- Fla: 25,000 trees/ha
Melaleuca Management Plan
Implementing the Plan

• How quickly do infestations grow?

- Aerial photos of 1 mi² areas (1:3600 scale)
- 8 areas in Dade & Broward Counties
- 25 yrs to go from 5% (30 acres) to 95% (600 acres) cover

\[
\text{% Infestation} = \frac{97.91}{(1 + 77.52 \times 0.74^{\text{year}})}
\]

\[ R^2 = 0.94 \]

Source: Laroche & Ferriter 1992
J. Aquatic Plant Manage. 30: 62-65
Melaleuca Management Plan
Implementing the Plan

• Oxyops vitiosa
• >400 herbivores on Melaleuca in Australia
• Several candidate insects identified
• Quarantine testing
• Built new quarantine lab

• Biocontrol studies:
  • Boreiglycaspis melaleucae
  • Haplenyx multicolor
  • Lophyrotoma zonalis
Melaleuca Management Plan

Implementing the Plan

Herbicide studies:
- Ground application
  - Hack/squirt & Cut/stump
  - completely girdle tree
  - treat stumps shortly after cut
- Aerial application
  - Novel microfoil boom with small (0.02) nozzle
  - overlap spray paths by 50%
  - treat twice
Shrubs/Groundcovers
Scratchthroat (Coral ardisia)

**Ardisia crenata**

- Multi-stemmed clumps to 6’
- Overwhelming densities
- Moist soils
- Bird/wildlife spread fruit
- Wavy leaf edge
- Resembles native Marlberry (*A. escallonioides*)
- Native from Japan to India
Shoebutton
Ardisia elliptica

- Multi-branched shrub to 20 ft
- Leaves alternate, simple, elliptical
- Pale lavender, star-shaped flowers
- Copious production of fertile black wildlife-dispersed fruit
- Very invasive in wetlands
- Established in FL, HI
- FLEPPC Category I invasive
- Native to S.E. Asia
Eugenia uniflora
Surinam cherry

- Large shrub/small tree, to 20'
- Native to tropical Americas
- Edible red/orange fruit
- Widely cultivated in tropics
- Fragrant white flowers
- FLEPPC Category I
- Fruit dispersed by wildlife
- Broad ecological tolerances
Shrubverbena (Lantana)  
*Lantana camara*

- Multi-stemmed clumps to 6’ or more
- Simple opposite, aromatic leaves
- Small multi-colored flowers in clusters
- “100 World’s Worst Weeds”
- Contaminates native lantana gene pool
- Bird-dispersed fruit
- Overwhelms understory
- In well-drained soils
- Toxic to livestock
Tuberous sword fern
*Nephrolepis cordifolia*

- Clump-forming fern on other plants, rocks, soil to 3'
- Densest growth in partial to full shade, drained soils
- Blunt pinnae tips
- Kidney-shaped spore cases
- Overlapping pinnae conceal stem
- Spores wind-borne
- Asian native
Britton’s wild petunia
(Mexican petunia)
Ruellia simplex

- Evergreen perennial shrub to 3’
- Leaves linear, lanceolate, serrate
- Purple, pink, white flowers
- Purple stems, leaf veins
- Aggressively self-seeds
- Frost intolerant
- Sterile varieties?
- Native to Mexico
Small-leaf spiderwort
(*Tradescantia fluminensis*)

- Weedy in its native Brazil, Argentina
- Glossy forest-green, parallel-veined leaves
- Spreads most rapidly in moist forests
- Small clusters of 3-petaled flowers
- Forms dense overwhelming blankets
- Spreads by fragmentation
Monk Orchid, Spotted Oeceoclades
Oeceoclades *maculata*

- Terrestrial orchid
- Dark green ovoid pseudobulbs to 2 inches
- Leaves nearly erect, mottled green to 12 in long by 2 in wide
- Spread by minute seed
- Flowers light brown to pinkish green, $\frac{1}{2} \times \frac{1}{2}$ inches
- Established in FL, Bahamas, Americas
- Native to Africa
Grass-leafed Orchid

*Eulophia graminea*

- Terrestrial orchid
- Inflorescence spike to two-feet
- Flowers $\frac{1}{2}$-inch across
- Leafless when flowering
- Ovoid pseudobulbs at ground level
- Spread by minute seeds
- Mulch contaminant
- Leaves linear, lanceolate to one foot long
- Native to subtropics of eastern Asia
- Also introduced to Australia
Wedelia

*Sphagneticola trilobata* (syn. *Wedelia trilobata*)

- Perennial, evergreen, mat-forming
- Native to South and Central America
- FLEPPC Category II
- Wide ecological tolerances
- Naturalized around the globe
- Little fertile seed produced
- Expands quickly, rooting from nodes
- Spread by discarded yard waste
GRASSES

*Arundo donax*

Photo by Shirley Denton

Photo by Alvin Diamond
Giant reed

**Arundo donax**

- Erect perennial cane grass to 25’
- Large plume-like flat flower spikes
- Leaves broad, 2-ranked
- Thick, hollow, branching rootstock
- Blade basal lobes nearly surround stem
- Aggressive riparian invader
- Eurasian native
Napier grass, elephant grass (**Pennisetum purpureum**) 

- Dense monocultures to 15 feet
- Native to tropical Africa
- FLEPPC Category I
- Leaf blades to 2 ½ feet long, white mid-rib
- “Bottlebrush” cylindrical seedhead to 1 ft
- Grows along dikes, ditches
- Wide range of ecological tolerance
Common reed (Phragmites australis)

- World-wide distribution with varying haplotypes
- Invasive European haplotype spreading quickly in N. America
- To date, Florida Phragmites native – Overholt
- Sheaths overlap, ligule a ring of stiff hairs
Tropical American Watergrass (*Luziola subintegra*)

- Discovered in 2007 in Lake Okeechobee
- New to North America
- Separate male and female panicles
- Opportunistic seed, mostly viable
- Hundred of seeds per plant annually
- Tremendously invasive, rapid overwhelming growth.

Flat, ridged leaf blade
Ligule large triangular membrane
Air potato

Dioscorea bulbifera

- FLEPPC Cat. I list
- Asian native
- Overwhelming vining growth
- Great youth activity plant
- New biocontrol! *Lilioceris chenii*
**Abrus precatorius**

Rosary pea

- Aggressive vine
- Native to S.E. Asia
- Broadly naturalized in southern states
- FLEPPC Category I
- Poisonous bicolor red/black seed
- Single seed may cause blindness or death
Autumn virginsbower (Clematis ternifolia)

- Semi-evergreen vine native to Asia
- Climbing, overwhelming growth
- Showy, fragrant flowers with four petals
- Extremely hardy, drought tolerant, etc.
- FLEPPC and SE-EPPC listed
- Spread by seed
- Native C. virginiana has serrate leaves
Arrowhead vine

*Syngonium podophyllum*

- High-climbing epiphytic vine
- Young leaves heart-shaped, mature leaves 5 to 11 lobed, to 2-feet
- Flowers in clusters on column within fleshy-spath
- Fruit orange-red poisonous berry
- Central American native
- FLEPPC Category I
Old-world climbing fern

*Lygodium microphyllum*

- Delicate twining fronds to 100’
- Pinnae along stemlike rachis
- Pinnae oblong, not divided
- Sterile pinnae lance-shaped
- Fertile pinnae fringed with spore lobes
- *Lygodium* moths (*Neomusitima*) establishing in FL
- Native to much of Old World tropics – Africa, Asia, Pacific
Japanese climbing fern
*Lygodium japonicum*

- Delicate twining fronds to 100’
- Pinnae along stemlike rachis
- Prefers moist, part-shade - pinelands
- Pinnae triangular, pinnately divided
- Sterile frond edges deeply incised
- Fertile fronds less elongated
- True fern – no flowers
- Windborne spores
- Contaminant of pine straw bales
Staghorn fern
*Platycerium bifurcatum*

- Epiphytic fern
- Fleshy, hairy light to dark green fronds
- Frond hairs star-shaped
- Sheathing fronds cover rhizomes
- Fertile fronds forked, erect or drooping, to 3 feet, patches of sori underneath
- Spread by wind-borne spores
- Introduced to FL, HI
- Native to Australia, SE Asia
Catclawvine
Macfadyena unguis-cati

- High-climbing woody vine
- Tuberous roots
- 3-forked tendril with tips stiffly hooked, clawlike
- Showy yellow trumpet-like flowers
- Fruit linear capsule with oblong, winged seeds
- Rapidly overtops any structures
- Difficult to control – tubers
- Native from Caribbean to Argentina
Bischofia javanica
Bishopwood

- Evergreen tree to 60’
- Native to Asia, Australia
- Leaves, papery, bronze/green, trifoliate, toothed margins
- Smooth bark at maturity
- Heavy seed producer, tan berries
- Fruit dispersed by wildlife
- FLEPPC Category I
Chinese privet (Ligustrum sinense)

- Thicket-forming shrub to 30 feet
- Showy clusters of small white flowers
- Deep purple ovoid berries
- Bird and wildlife dispersal of berries
- Serious pest of tree plantations
Carrotwood

*Cupaniopsis anacardioides*

- Compact, evergreen single-trunk tree to 30’, 1950s FL introduction
- FLEPPC Category I, Florida
- DACS 1999 listed Noxious Weed, many counties
- Leaves oblong, compound, leathery
- Numerous three-lobed yellow fruit contain red seeds
- Birds (esp. fish crows) and wildlife disperse fruit widely
- Wide range of FL habitats invaded
- Native to Australia
Ficus benjamina
Weeping fig

- Large evergreen tree to 100’
- Native to S.E. Asia, Australia
- Invasive roots lift pavement, clog pipes
- Ficus whitefly spreading and defoliating
- Numerous cultivars, variegated foliage, etc.
- Specific pollinator wasp not in FL
- No fertile seed yet in FL
- Most over-planted plant in FL
- Other spp.: F. benghalensis, F. microcarpa
Brazilian pepper
Schinus terebinthifolius

- Shrubby evergreen tree to 40’
- Leaves alternate, once-compound
- Leaflets usually 7-9, toothed
- Flowers unisexual, small white
- Copious bright red drupes in clusters
- Forms dense, vast thickets
- Birds/wildlife transport berries
- Family includes poison ivy, strong allergens
- Several biocontrol insects in “pipeline” for FL release
- Native to Argentina, Brazil, Paraguay
References and Credits

- Pacific Islands Ecosystems At Risk website: (http://www.hear.org/Pier/)

Center for Aquatic and Invasive Plants
Institute of Food and Agricultural Sciences

The Bugwood Network