

A photograph of a forest scene. In the foreground, there are several palm trees with large, fan-shaped fronds. The background shows a dense stand of taller, thinner trees, possibly pines or cypresses, reaching towards a clear blue sky. The lighting suggests a bright, sunny day.

Biological Control of Weeds

Operational Report

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Presentation Outline

- **Biological control misconceptions.**
- **Operational reports and quarantine research updates:**
 - **Lygodium**
 - **Melaleuca**
 - **Brazilian pepper**
 - **Waterhyacinth**
 - **Waterlettuce**
 - **Rhodomyrtus**
 - **Chinese tallow**
- **Primer on Mass Rearing Annex and associated program.**



Biological Control Misconceptions; What some in the public think:

Misconception

- Dangerous, unsafe, 'playing God',
- "Yeah, that's what you said about _____ (fill in the blank with gypsy moth, mongoose, multiflora rose, etc., etc.)"

Correction

- Biocontrol highly predictable in terms of non-target use. Example: 1 out of 117 established agents used an unrelated native plant (introduced into HI in 1902 without host range testing).
- Mollusc, vertebrate, insect biocontrol not comparable to weed biocontrol because of lack of specificity.
- Not playing God - cleaning up after the people who already 'played God'.



What could go wrong?

Biological Control Misconceptions; What some in the chemical industry think:

Misconception

- Doesn't work, too expensive, takes too long.
- "Controlling weeds with bugs is like controlling dogs with fleas."

Correction

- Developing new pesticide chemistry costs \$200 million US, takes 8-10 years to develop, always produces collateral damage, requires large markets, and has a benefit cost ratio of \$3-\$6.50:1.
- Biological control of weeds usually costs about 5 million US per weed, takes 5-15 years, is specific to the target weed, and has a benefit cost ratio of > \$35:1.
- Anyone with a garden or farm knows what insects can do to plants.



You can take it from here

Biological Control Misconceptions; What some ecologists think:

Misconception

- Too much uncertainty in the process; ineffective agents will provide subsidies to predators or parasites that cause negative and unpredictable effects on food webs resulting in apparent competition, etc.

Correction

- Impossible to move forward with perfect knowledge,
- Most food web interactions are weak; most indirect effects limited in scope, temporary, or theoretical only.



Classic spillover effect?

Biological Control Misconceptions; What some natural area managers think:

Misconception

- Biological control interferes with the important tools needed to manage weeds on a landscape level.
- “Biological control is not a panacea.”

Correction

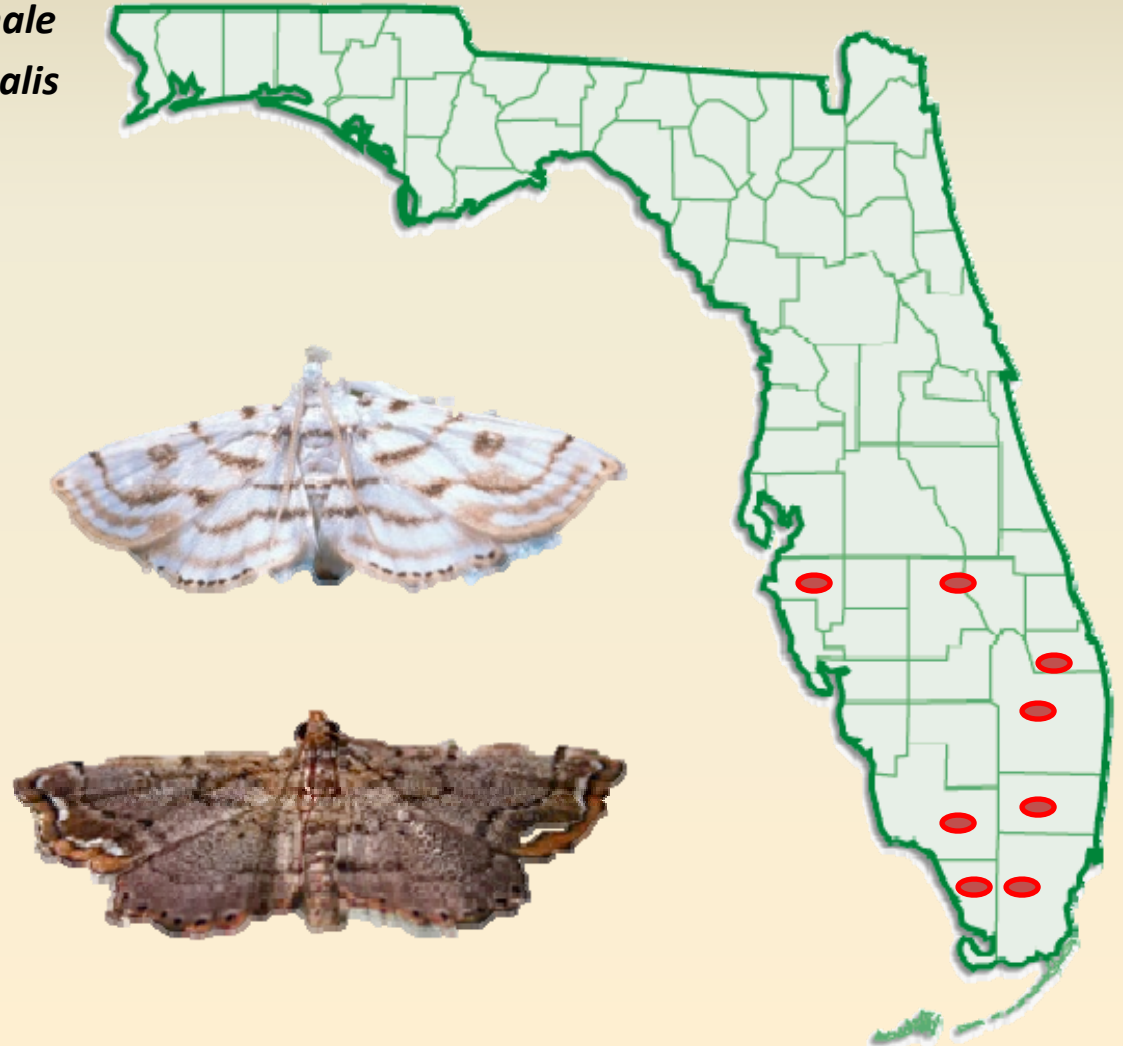
- Biological control rarely controls a weed completely. Most successful programs provide some level of suppression that can complement other tactics like chemical, mechanical, and cultural control. Example: biological control of waterhyacinth reduces biomass by 40-70% and seed production by 90%. Despite this, active intentional integration using “all the tools” is rare.
- There are no ‘panaceas’ with weed management.



It takes everything to hold back the flood

Releases of Lygodium insects

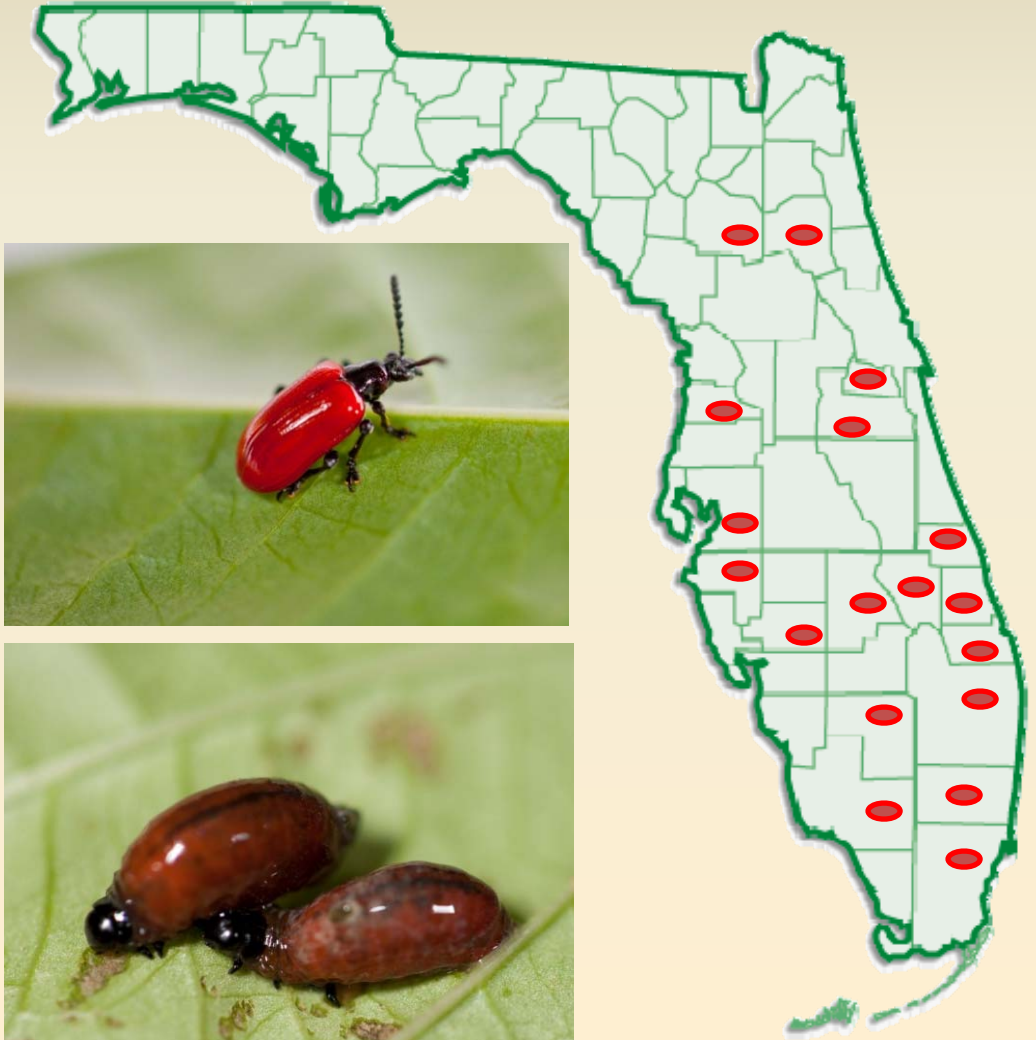
- 1,639 *Austromusotima camptozonale*
- 122,217 *Neomusotima conspurcatalis*



More information: Min Rayamajhi, Ellen Lake, Melissa Smith

Releases of Air Potato insects

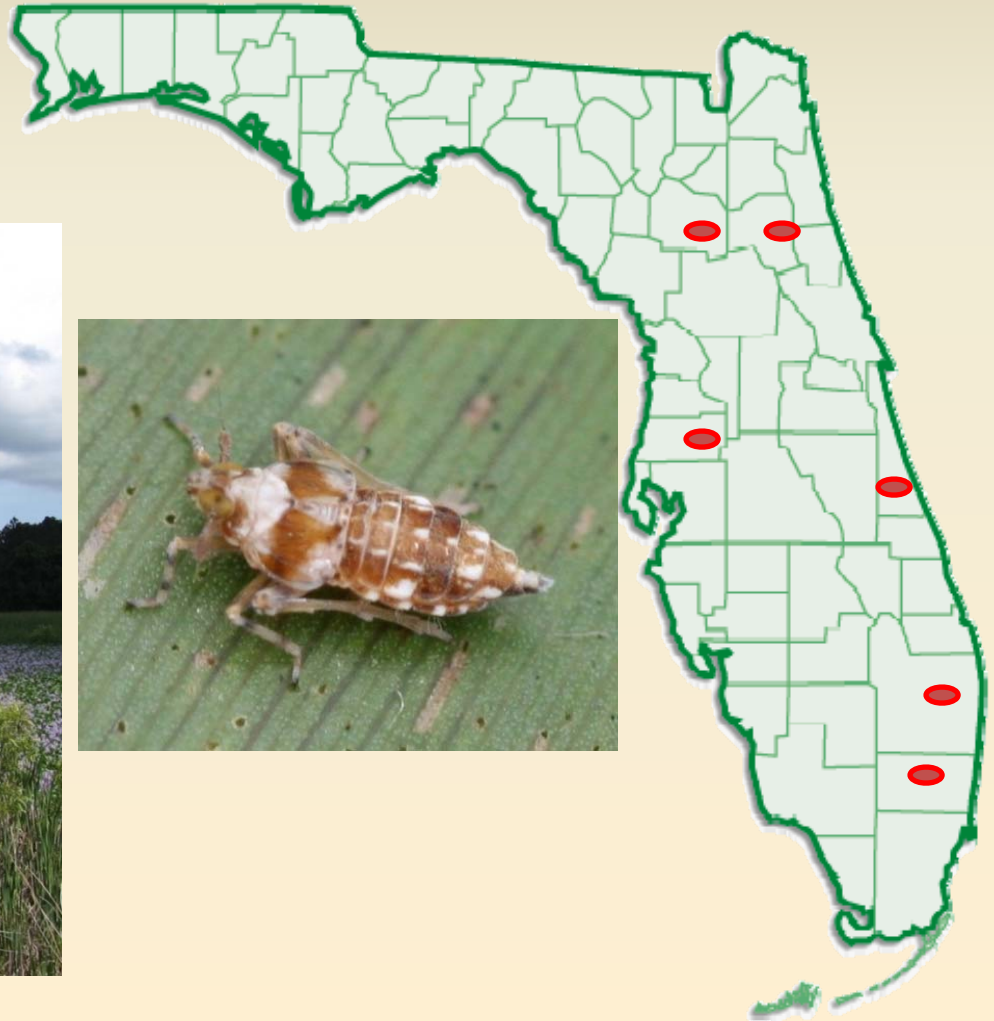
- 38,882 *Lilioceris cheni*



More information: Min Rayamajhi, Ellen Lake, Melissa Smith, Eric Rohrig

Releases of Waterhyacinth insects

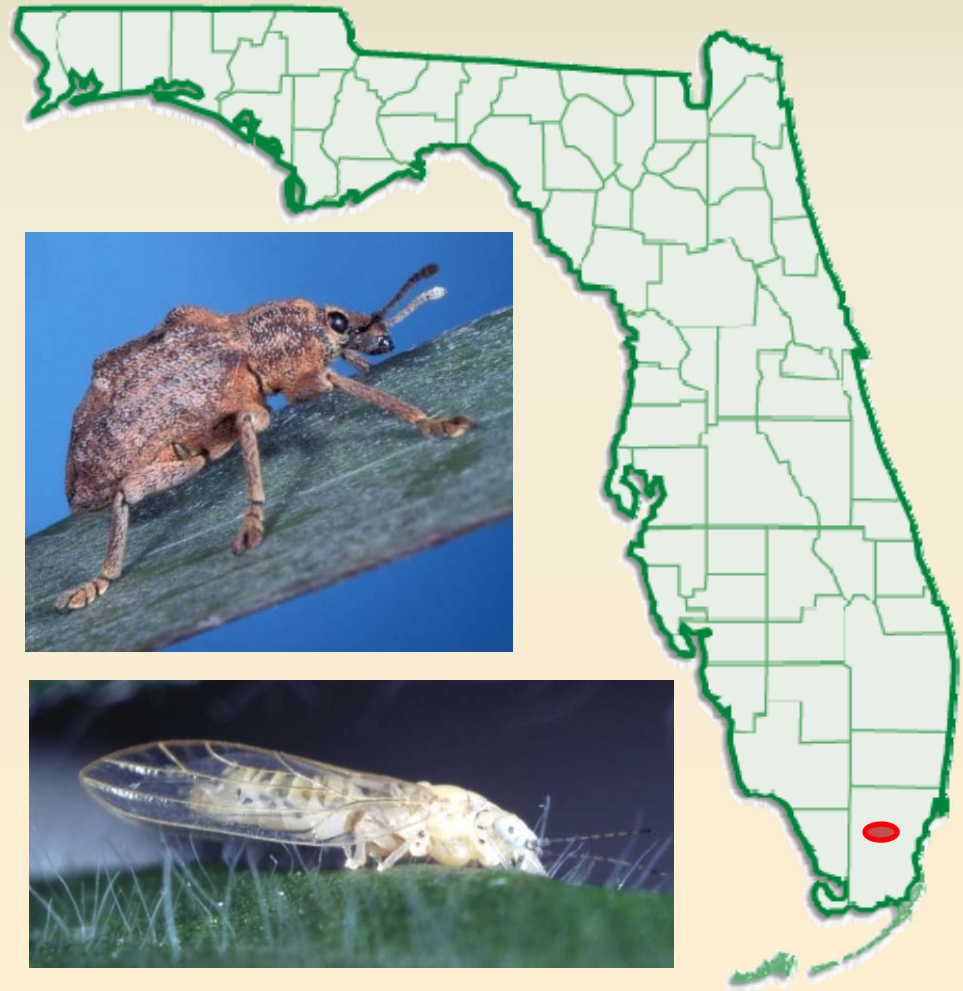
- 8000 Paraguay *Megamelus scutellaris*



More information: Phil Tipping

Releases of Melaleuca insects

- 151,831 *Oxyops vitiosa* (weevil) and *Borieoglycaspis melaleucaae* (psyllid)



More information: Min Rayamajhi

Lygodium insects under development



Lygomusotima stria – another defoliating moth from Asia (2-3 years)



Neostrombocerus albicomus – Sawfly (defoliating larvae) (2 years)

More information: Paul Pratt

Brazilian pepper insects under development



Calophya latiforceps (?)

Pseudophilothrips ichini Thrips (2 years)



More information: Greg Wheeler

Rhodomyrtus insects under development

“Red borer” (5 years)



More information: Paul Pratt

Chinese tallow insects under development



Caloptilia n. sp.
(In the field:
accidental
introduction)

More information: Greg Wheeler

Air potato insects under development

Lilioceris egena (2 years)



More information: Allen Dray

Waterlettuce insects under development



Lepidolphax pistiae (3-4 years)

Argentinorhynchus breyeri
(4-5 years)



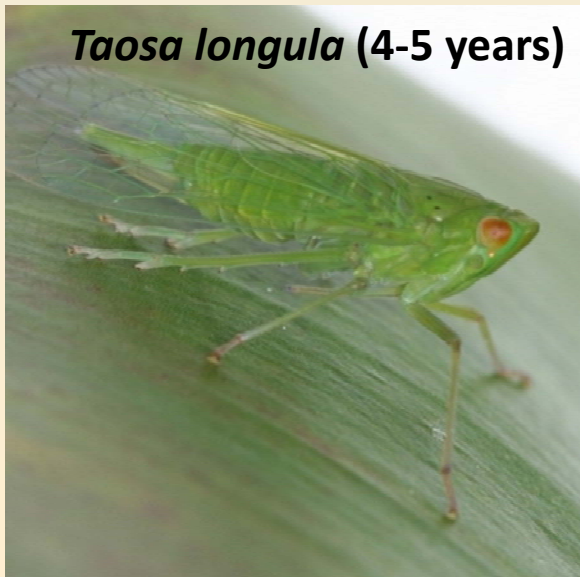
More information: Phil Tipping

Waterhyacinth insects under development



Eccritotarsus catarinensis
(2-4 years)

Megamelus scutellaris
High temperature biotypes
(<1 year)



Taosa longula (4-5 years)



Thyrticus truncatus (3-4 years)

More information: Phil Tipping

Melaleuca Eradication and Other Exotic Plants – Implement Biological Controls

**Operational Project Partnership
SFWMD, USACE, IPRL**

- **Construction Phase (Mass Rearing Annex)**
 - 2700 ft² area,
 - 2 labs, 4 offices,
 - Slated to open FY13 (August?)
- **Programmatic Phase (2013-2034)**
 - Commence Aug., Sept. 2013 (?)
 - Mass production of permitted agents
 - Distribution
 - Integration
 - Evaluation



More information: Allen Dray, Jon Lane

Melaleuca Eradication and Other Exotic Plants – Implement Biological Controls

Conceptual Framework



Research and Development



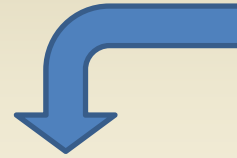
Production and Distribution

More information: Allen Dray, Jon Lane, LeRoy Rodgers, Paul Pratt

Melaleuca Eradication and Other Exotic Plants – Implement Biological Controls

Objectives:

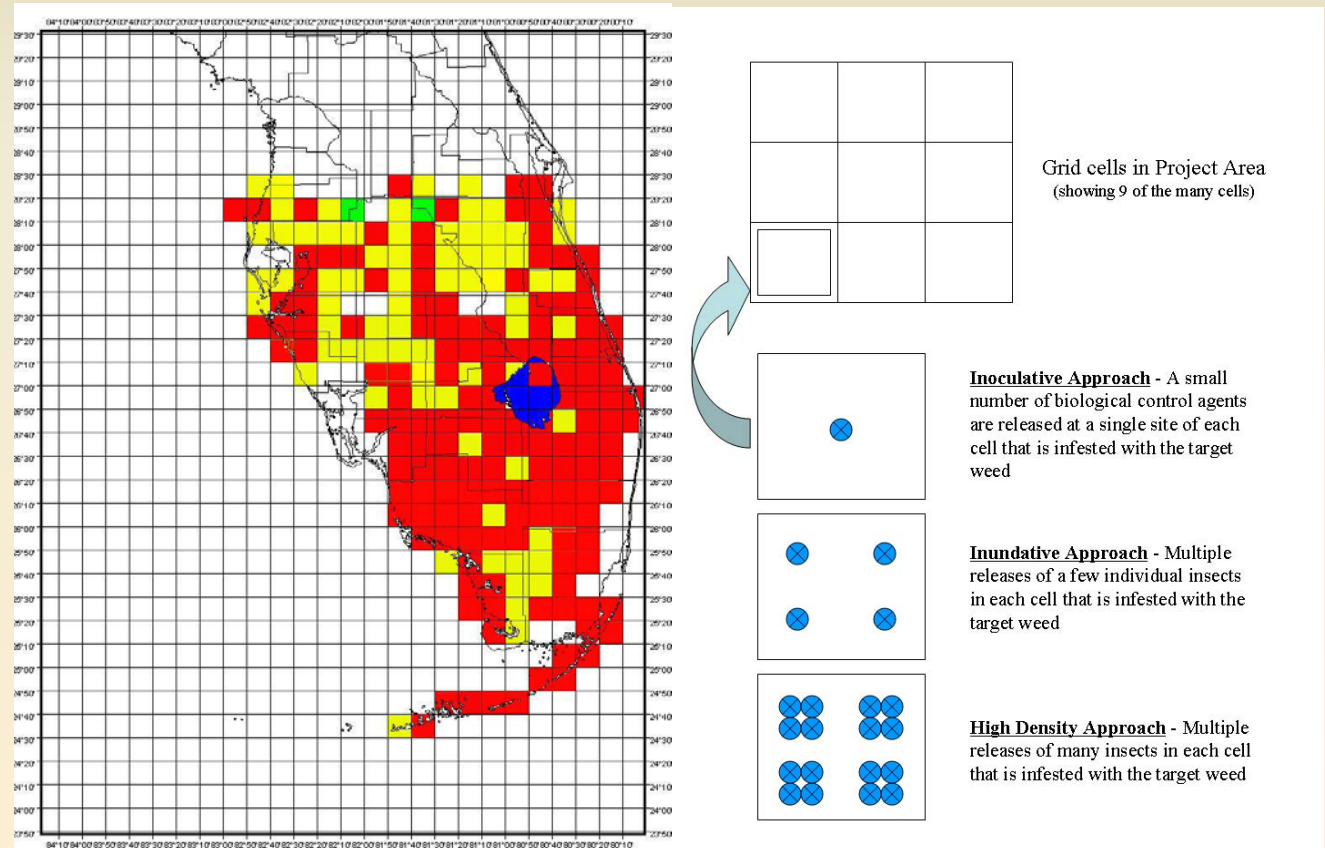
1. Culture and release approved biological control agents at pre-determined field sites,
2. Test release strategies to determine the best and most effective release methods,
3. Monitor field populations of biological control agents and targeted pest plants,
4. Evaluate the efficacy of the biological control agents,
5. Evaluate means for integrating biological control into overall management strategies for the targeted pest plants,
6. Operate the facility according to repair and maintenance guidelines.



Melaleuca Eradication and Other Exotic Plants – Implement Biological Controls

General Approach:

1. Utilize 10 minute cells (SRF) as framework in SFWMD district,
2. Release insects according to specific strategies within specific cells,
3. Set up 3 sentinel sites to assess release points,
4. Monitor biannually,
5. Assess progress, adaptively manage for maximum efficiency and best outcomes.



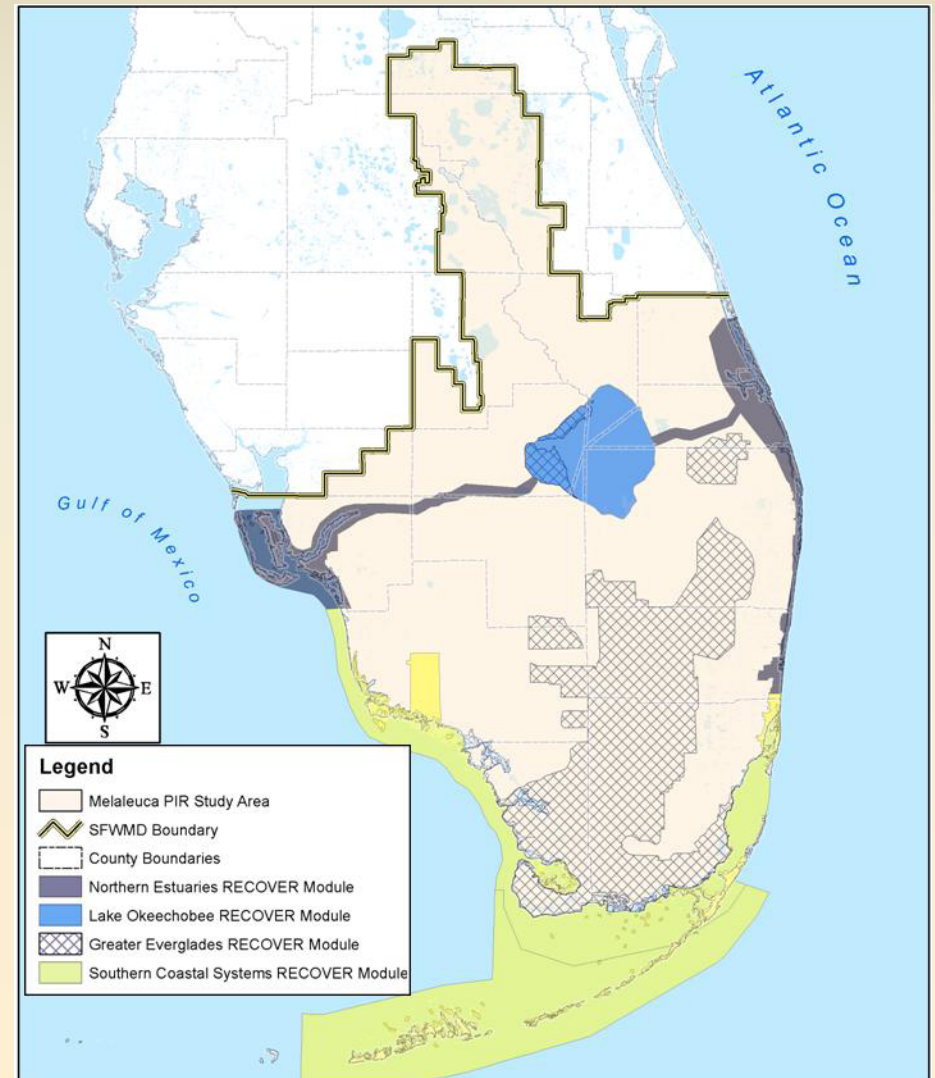
Melaleuca Eradication and Other Exotic Plants – Implement Biological Controls

Goals (10-20 years):

1. Reduce reproductive capacity of target weeds by 70% in 60% of the cells,
2. Reduce density from dense to moderate or moderate to sparse in 30% of the cells,
3. Double seedling mortality in 50% of infested cells.

Original Weed Targets:

1. Melaleuca
2. Lygodium
3. Brazilian pepper
4. Australian Pine



Melaleuca Eradication and Other Exotic Plants – Implement Biological Controls

Potential first weed targets and agents:

Lygodium

- *Floracarus perrepae*
- *Neomusetema conspircatalus*

Air Potato

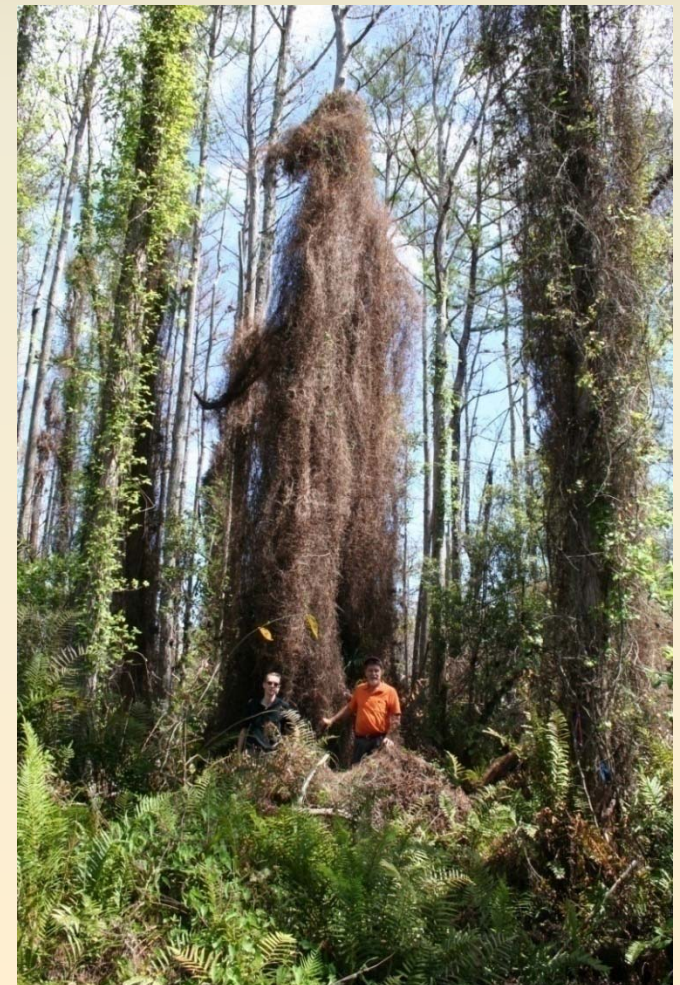
- *Lilioceris cheni*

Waterhyacinth

- *Megamelus scutellaris*



F. perrepae damage



N. conspircatalus damage

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Questions?

