

Melaleuca Eradication and Other Exotic Plants – Implement Biological Controls

John Morgan
South Florida Water Management District

Shauna Allen
U.S. Army Corps of Engineers



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Briefing Purpose

- Provide a brief overview of the project, alternatives, costs and benefits, and project milestones
- Consultation with Water Resources Advisory Commission on status of plan formulation process





Altered Hydrology is not the Only Stressor in the Everglades Ecosystem

- An invasive species is an organism that is out of its natural environment and is causing harm to its new environment
- Invasive Species can alter:
 - Geomorphology
 - Hydrology
 - Biogeochemistry
 - Structure
 - Recruitment
 - Resource Competition
 - Threatened and Endangered Species
 - Fire Regimes





So

- **If invasive exotic species alter all these things in the Everglades, do we really still have an Everglades?**
- **And if we actually “Get the water right” will it merely flow through a landscape of invasive exotic species?**
- **And if so, is it really restoration?**



Project Purpose

To manage Melaleuca and other exotic plants threatening the South Florida Ecosystem by increasing the effectiveness of biological control technologies



Yellow Book Feature

| Component | Status |
|--|---|
| Part A - Construction of a new biological control quarantine research facility | Complete A new facility was constructed in Davie as joint venture between USACE and USDA with funding from DOI, SFWMD, and USDA |
| Part B - Renovation of existing facility at University of Florida in Gainesville | Complete State implemented repairs to this facility out of their own funds. |
| Part C – Mass rearing, field release, establishment, and field monitoring of approved biological control agents for Melaleuca and other invasive exotic species | In Progress Subject of this PIR |



This is a Reaffirmation PIR!

- **Project included in Yellow Book**
- **Needs/objectives have not changed**
- **No new purpose added**
- **Other alternatives considered**

**USDA Quarantine Facility in
Davie (Broward County)**





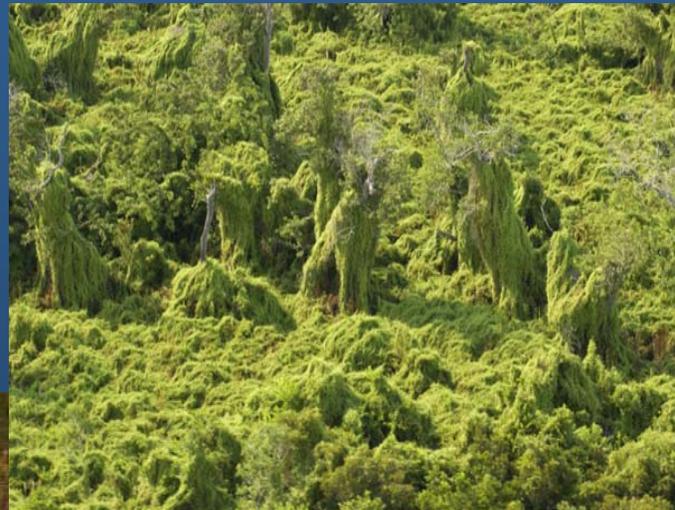
Melaleuca in Everglades Graminoid Wetland



Alters geomorphology, structure, recruitment, and resource competition



Old World Climbing Fern in Tree Islands and Pinelands



Alters structure, recruitment, and resource competition, fire regimes, geomorphology, and hydrology



Brazilian Peppertree in Everglades Wetland



Alters hydrology, biogeochemistry, structure, recruitment, and resource competition

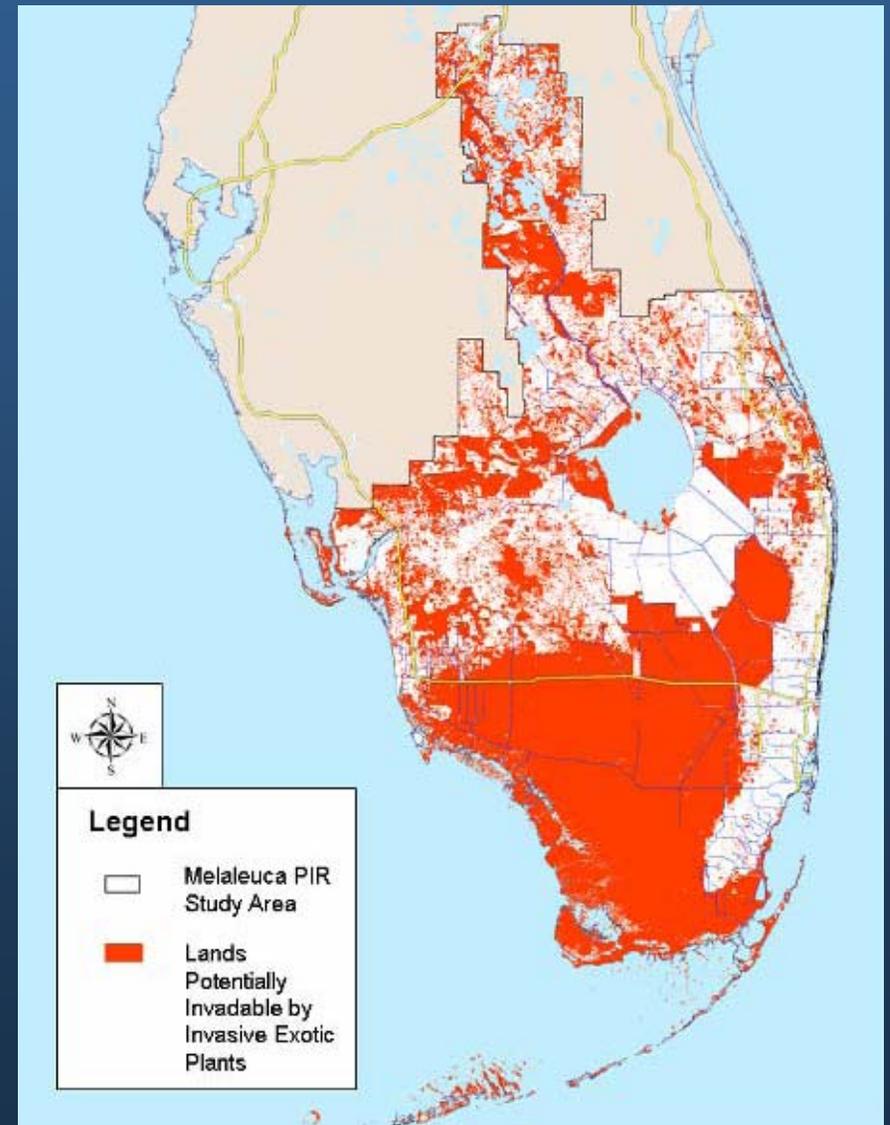
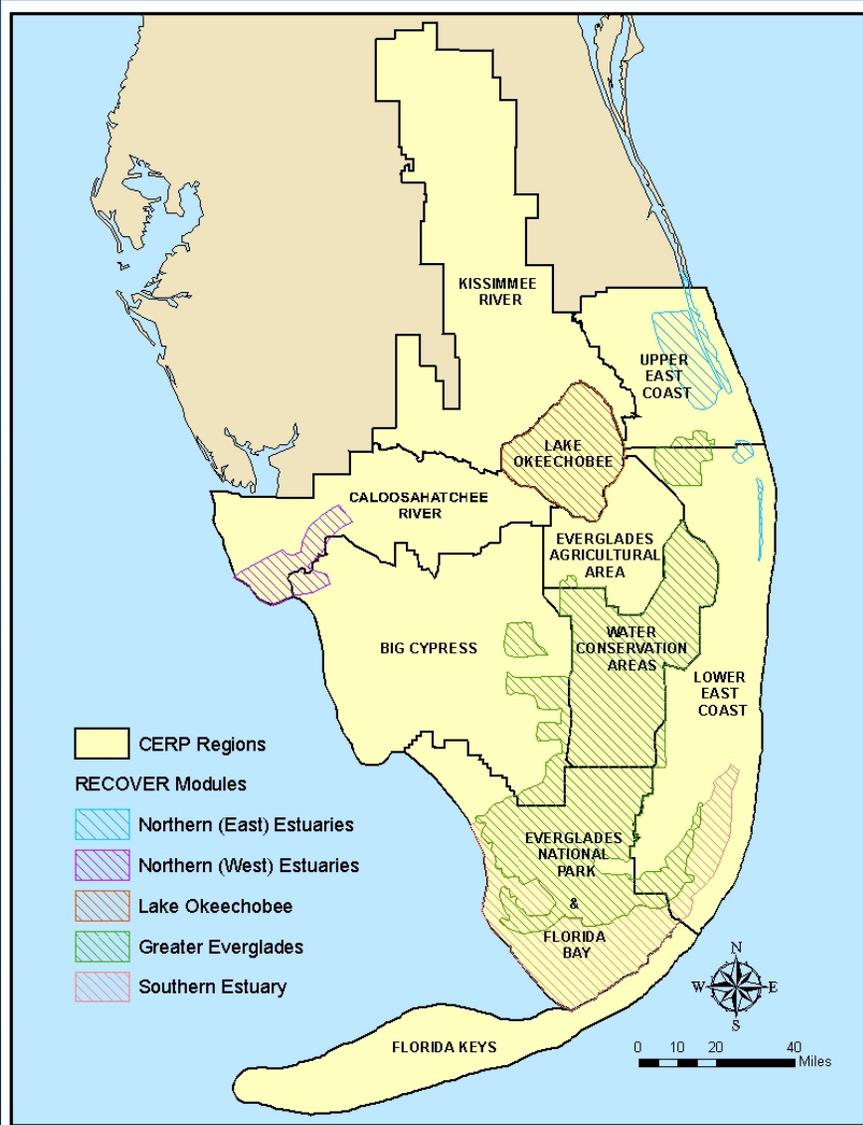
Australian Pine in Coastal Zones



Alters geomorphology, biogeochemistry, structure, recruitment, resource competition, threatened and endangered species

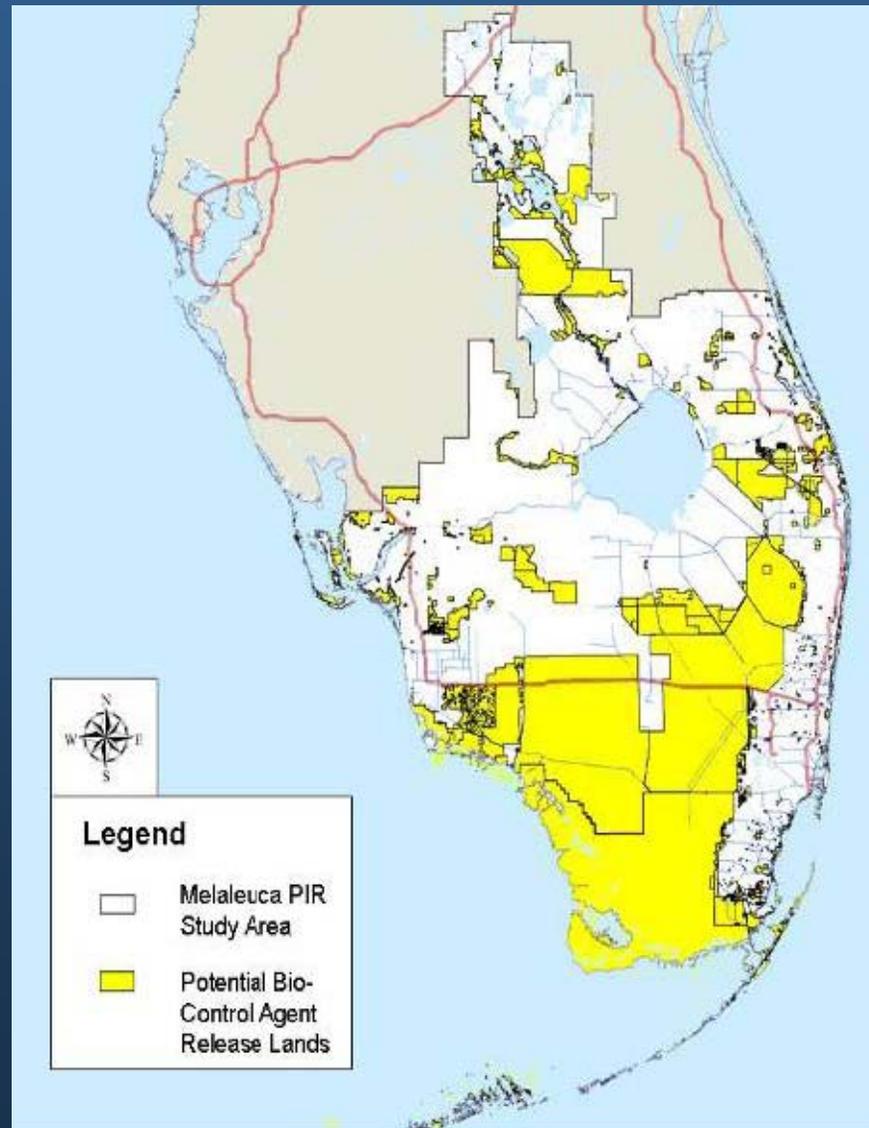


Project Study Area and Lands Subject to Invasion





Potential Biological Control Release Areas





What is Biological Control?

- The re-association of natural enemies with their host species
 - Where the host is not native
 - The host has become invasive
 - The host is causing ecological harm



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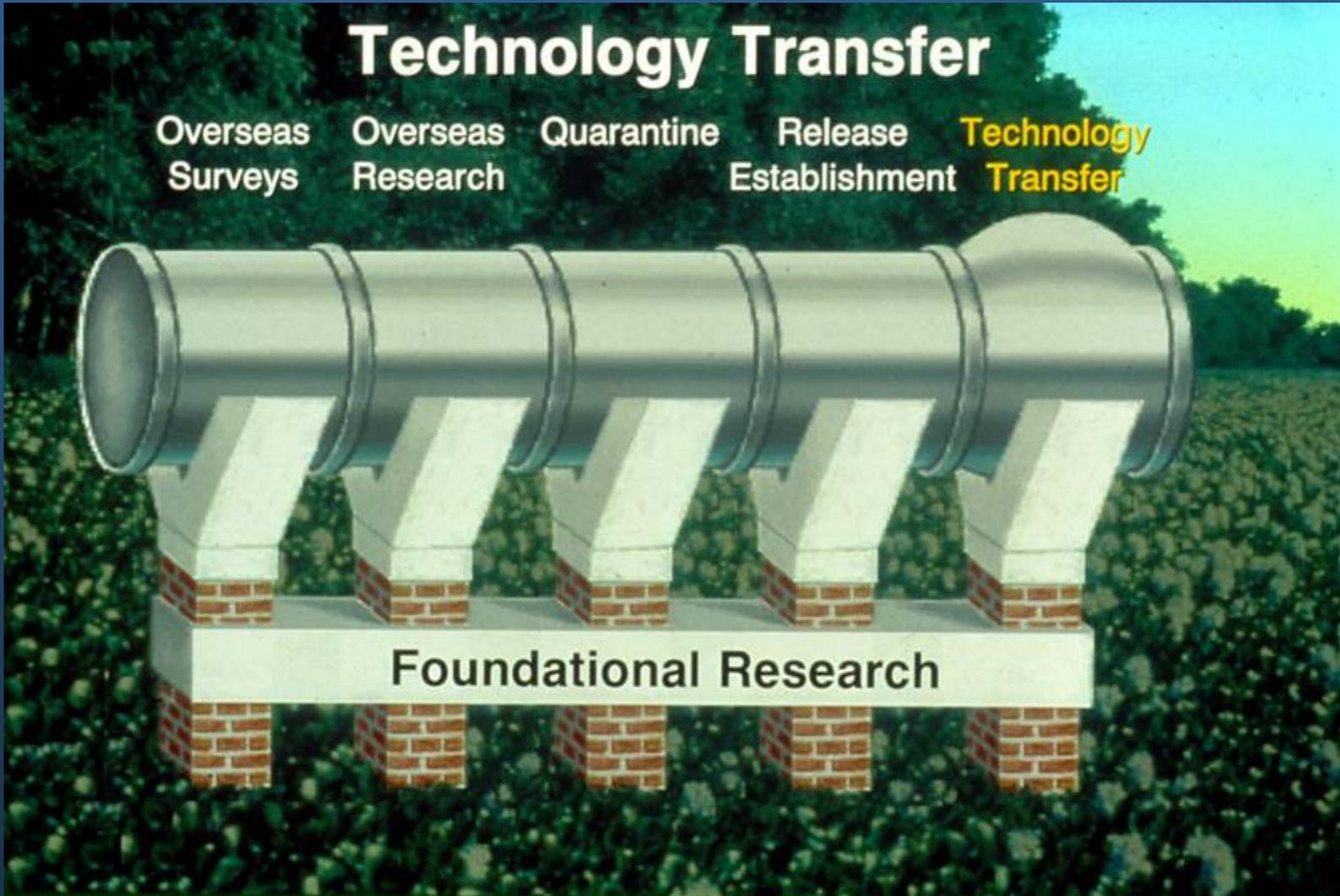


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How are Biological Control Agents Evaluated and Approved?





Biological Control Agents Approved or in the "Pipeline"

- **Melaleuca – 4 approved, 2 in process**
- **Old World Climbing Fern – 3 approved, 2 in process**
- **Brazilian Pepper – 1 approved, 2 in process**
- **Australian Pine – 1 in process**



Why an Adaptive Management Approach is Ideal for Biological Control Projects

- **Provides a structured approach for a program with many unknowns; particularly new species**
- **Provides a platform for sharing information from one biological agent to another (reduces uncertainties)**
- **Encourages collaborative decision making among participating agencies**
- **Provides a vehicle to incrementally adjust priorities/dispersal strategies based on new knowledge (reduces uncertainties)**

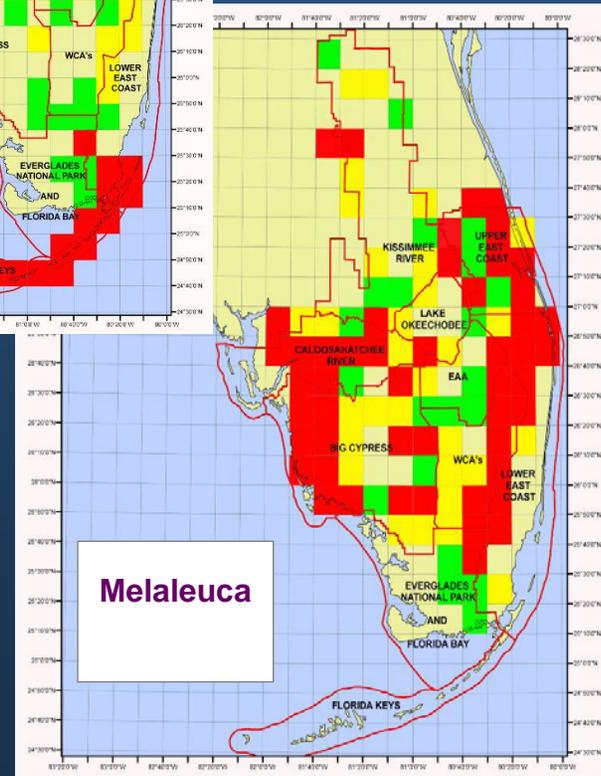
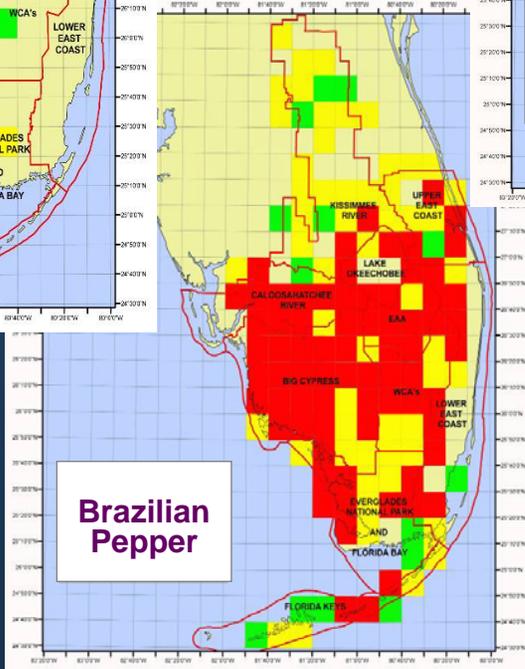
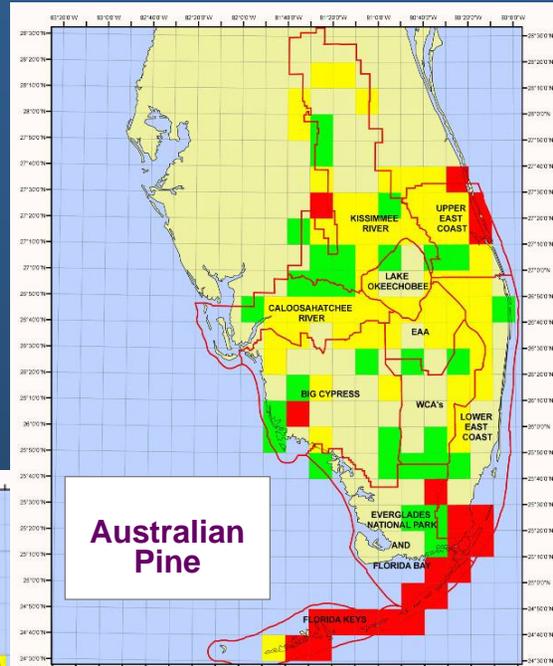
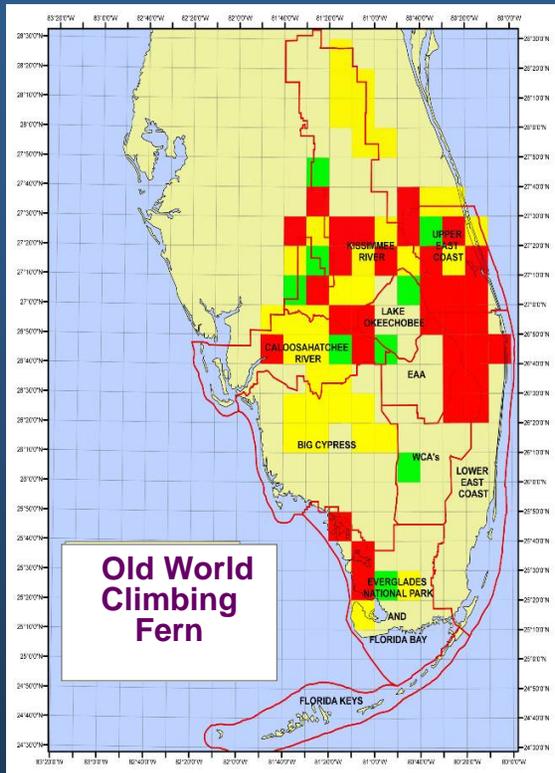


Three Factors Considered in Formulating Alternatives

- Levels of infestation to be treated can be varied
- Intensity of releases can be varied
- Construction of mass rearing facilities (screen houses) can accelerate release efforts



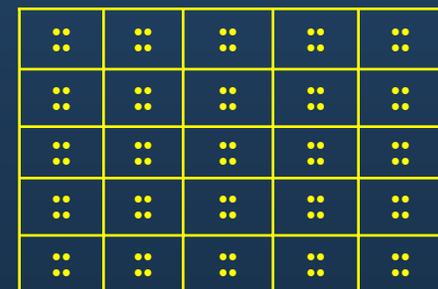
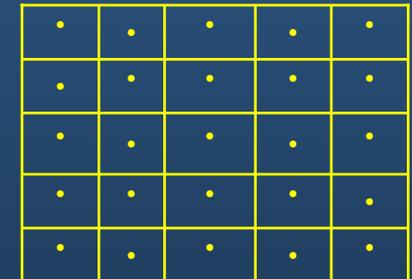
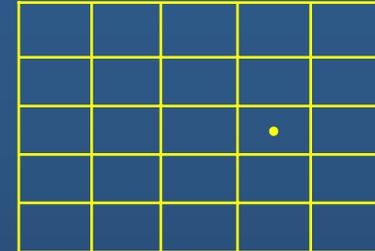
Extent of Exotic Plant Invasion





Strategies for Getting Biological Controls Out Into the Field

- **Inoculative Approach:** Small number of biological control agents are released at a single site that is infested with the target weed in hopes of establishing a viable population.
- **Inundative Approach:** Regional impacts are realized through multiple releases of a few individual insects in the area.
- **High Density Releases:** Multiple releases at high densities. Requires the most effort, but meets the objectives of the biological control program in the shortest amount of time.



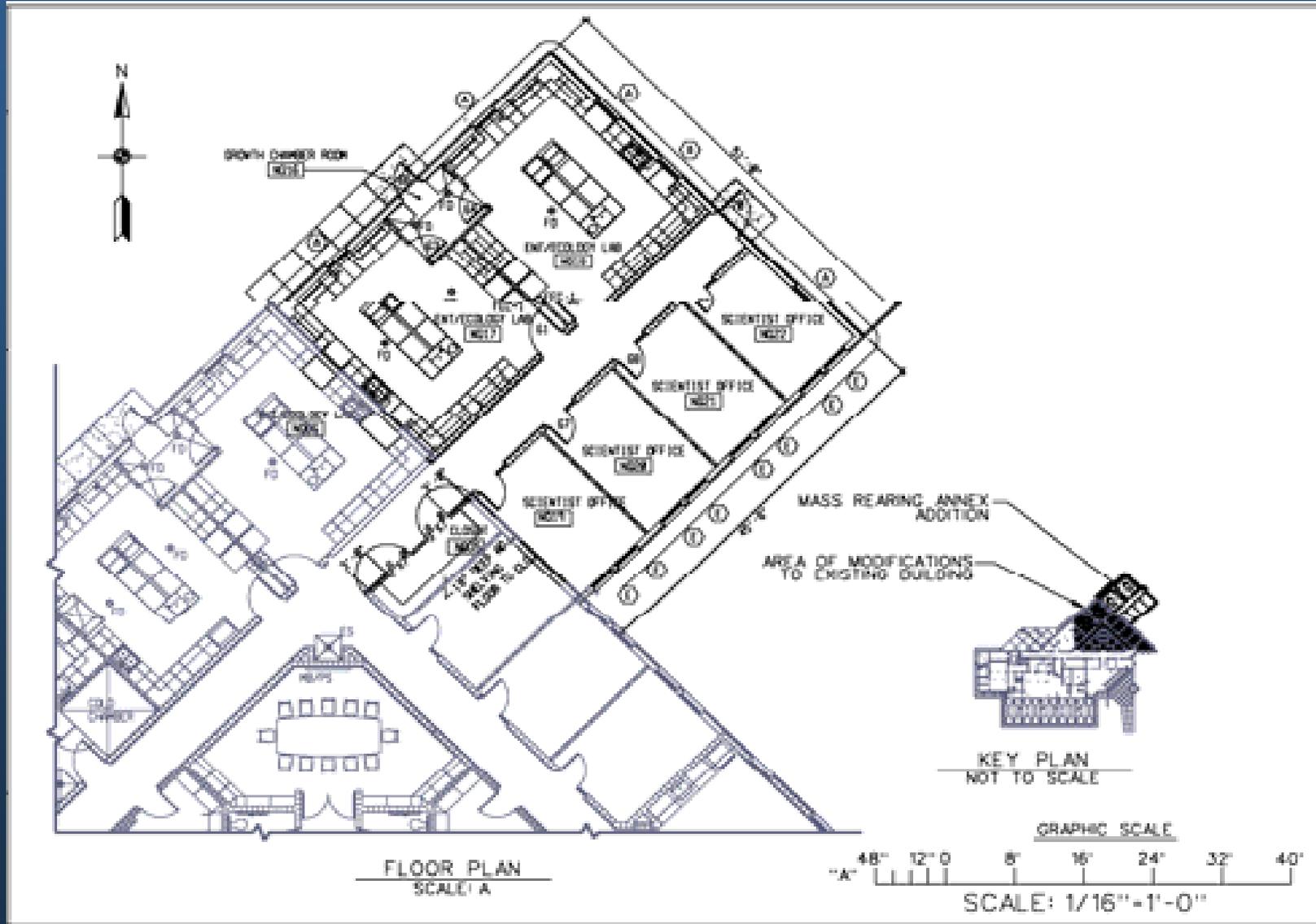


Release Strategy Trade Offs and Impacts

| Release Type | # Insects per Location | # Locations within Cell | Amount of Effort | Time to Max Weed Impact |
|--------------|------------------------|-------------------------|------------------|-------------------------|
| Inoculative | Few | One | Little | Long |
| Inundative | Few | Many | Moderate | Moderate |
| High Density | Many | Many | High | Short |



Mass Rearing Facility





Formulation of Alternatives

Formulation summary:

- Factor 1 - rearing annex: 2 levels
- Factor 2 - release quantities: 3 levels
- Factor 3 - plant densities: 4 levels
- Do Nothing alternative

$(2 \times 3 \times 4) + 1 = 25$ Alternative Release Strategies



Initial Criteria for Screening Alternatives

- **Plan is ecologically unwarranted (based on USDA experience with previous biological control projects)**
- **Impacts not achieved until beyond CERP planning horizon**
- **Does not provide for construction of rearing annex**



Additional Screening Criteria

Biological criteria:

- Reduce plant densities by one order of magnitude in at least a third of project cells
- Double seedling mortality in at least half of project cells
- Reduce reproductive capacity (number of flowers and seeds produced) by 70%

Economic criteria:

- Costs vs. ecological lift



Alternative Evaluation

| Alternative Plan | Factor 2 | | | Factor 3 | | | Factor 1 | |
|------------------|------------------|------------|--------------|------------------------------------|-------|-----|---------------|---------|
| | Release approach | | | Infestation level of treated cells | | | Rearing Annex | |
| | Inoculative | Inundative | High Density | Moderate | Dense | All | With | Without |
| 1 | | | | | | | | X |
| 2 | X | | | | | X | | X |
| 3 | X | | | | | X | X | |
| 4 | X | | | | X | | | X |
| 5 | X | | | | X | | X | |
| 8 | | X | | | | X | | X |
| 9 | | X | | | | X | X | |
| 10 | | X | | | X | | | X |
| 11 | | X | | | X | | X | |
| 12 | | X | | X | | | | X |
| 13 | | X | | X | | | X | |
| 15 | | | X | | | X | | X |
| 16 | | | X | | | X | X | |
| 17 | | | X | | X | | | X |
| 18 | | | X | | X | | X | |
| 19 | | | X | X | | | | X |
| 20 | | | X | X | | | X | |



Final Array of Alternatives

| | Alternative 3 | Alternative 5 | Alternative 9 | Alternative 16 |
|------------------------------------|---------------|---------------|---------------|----------------|
| Release approach | Inoculative | Inoculative | Inundative | High Density |
| Infestation level of treated cells | All | Dense | All | All |
| Time to establishment | 6 years | 11.5 years | 8 years | 11 years |
| Time to saturation | 12 years | 20 years | 8 years | 11 years |
| Time to full benefits | 19 years | 24 years | 13 years | 14 years |



Cost Comparison

| | Alternative 3 | Alternative 5 | Alternative 9 | Alternative 16 |
|--------------------------------|---------------|---------------|---------------|----------------|
| Annual cost | \$103,000 | \$103,000 | \$162,000 | \$274,000 |
| Habitat lift: | | | | |
| Melaleuca | 97,574 | 87,813 | 104,638 | 103,632 |
| Old World Climbing Fern | 1,674,140 | 1,570,847 | 1,882,759 | 1,844,867 |
| Brazilian Pepper | 1,585,843 | 1,489,705 | 1,779,044 | 1,742,974 |
| Australian Pine | 1,214,281 | 141,147 | 1,357,911 | 1,331,913 |



Total Estimated Cost

Total Estimated Cost: \$13,631,000

- **Implementation and Monitoring – \$ 12,844,000**
(May 2007 price level)
- **Rearing Lab Annex Construction – \$ 787,000**
(May 2007 price level)

Yellow Book Estimated Cost: \$ 10,800,000

(October 1999 price from Yellow Book)



Major Milestones

| | |
|---|-----------------|
| Feasibility Scoping Meeting | Oct 2006 |
| Alternative Formulation Briefing | Nov 2007 |
| Alternative Formulation Briefing Guidance Memorandum | Nov 2007 |
| Selected Alternative Plan (SAP) | Nov 2007 |
| Draft PIR Published in Federal Register | May 2008 |
| Final PIR Published in Federal Register | Dec 2008 |
| Initiate Project Cooperation Agreement (PCA) | Apr 2009 |



Why is This Project Needed Now?

Melaleuca is reported to spread at a rate of 7,043 acres/year



- Originally released at 13 locations (~ 10 CERP cells)
 - Established at 9 sites (~ 8 cells)
 - Spread rate of 0.5 mile per year
-
- Melaleuca currently infests 108 of the 11.5 x 11.5 mile grids within CERP boundaries
 - At 0.5 mile per year, Oxyops would take 180 years to spread naturally from Fort Lauderdale to Naples
 - Implementing the “Best Buy” Alternative Plan takes 8 years to spread throughout the project area and 13 years to achieve benefits

Thank You



Questions ?