



Gaining Ground on *Lygodium microphyllum*



E.M. Call¹, S. Duke-Sylvester², A.G. Snow¹, L.A. Brandt³, D.L. DeAngelis⁴, and L.J. Gross².

¹U.S. Geological Survey ²University of Tennessee ³U.S. Fish and Wildlife Service ⁴U.S. Geological Survey, Department of Biology, University of Miami

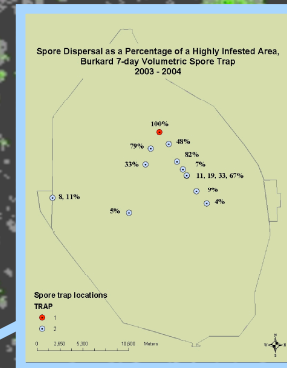
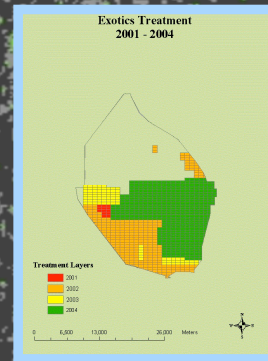
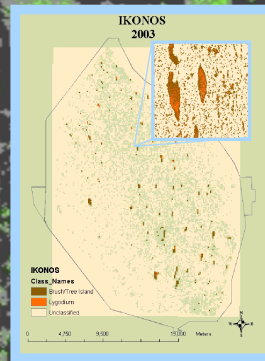
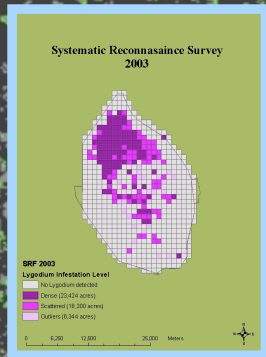
Background:

The Everglades ecosystem is under threat from invading species. One species that is spreading at an alarming rate is Old World Climbing Fern (*Lygodium microphyllum*). This native to Africa, Australia, Asia, and Melanesia was discovered as a naturalized population in 1965 in South Florida. The rapidity of this exotic's invasion can be explained by its efficient reproductive strategies. Spores are released from fern fronds in the tree canopy and dispersed by wind. Each fertile leaf has the potential to produce 20,000 spores. To address *L. microphyllum* infestation within A.R.M. Loxahatchee National Wildlife Refuge, an optimal control model is being developed. The model incorporates information relating to spore dispersal patterns, levels of infestation, treatment costs, and effectiveness. This model will serve as a tool to aid managers in identifying the most efficient way to treat *L. microphyllum*.



Study Objective:

- Provide a method to collect all available data and suggest additional requirements.
- Provide a means to assess the impacts of alternative possible control schemes.
- Provide guidance to managers regarding the economics of control.



Treatment Effectiveness Research

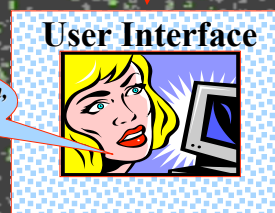
Ground: The cut and spray (glyphosate) method is highly effective but costly and may not be logistically feasible at a large scale (Thomas and Brandt 2003).

Aerial: Glyphosate and Escort showed different effectiveness 12 and 24 months post treatment.

	12 months*	24 months*
Glyphosate	97%	57%
Escort	66%	8%

*% decrease in live Lygodium from pretreatment values.

Optimal Control Model



Lygodium microphyllum, you are done for!

Treatment Costs

Treatment Method	Relative (est.) Cost Per Acre (cpa) Per Tree Island Per Treatment Method/Type			
	Ground	Aerial		
Treatment Type	cut 'n spray	foliar	Escort	glyphosate
Lightly infested	\$300	\$45	\$40	\$85
Moderately infested	\$600	\$90	\$40	\$85
Moderate-heavy	\$875	\$125	\$40	\$85
Heavily infested	\$1,100	\$150	\$40	\$85

What are our management goals?

- Stop the spread of *L. microphyllum*.
- Keep infestation levels where plants are unable to reproduce.
- No new infestations over X number of years.
- Obtain maintenance control by 2017.

Significance of results:

The Optimal Control Model will serve as a tool that will allow managers to answer important questions such as:

- What is the most optimal control strategy, given treatment must occur in X amount of time?
- What is the best treatment strategy to attain maintenance control by 2017?
- How often do we have to treat to maintain maintenance control?
- Given a number of different treatment scenarios, what is the level of infestation for each at 5, 10, 15, 20 years post treatment?
- Which areas are best to treat to avoid spread?
- Given X amount of funding, what is the best treatment strategy?

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Citations:

- Brandt, L.A. and F.J. Mazotti. 2003. Effectiveness of different aerial spray for control of *Lygodium microphyllum* on tree islands - 12 month monitoring report.
- Thomas, W.G. and L.A. Brandt. 2003. Monitoring ground treatments of Old World Climbing Fern (*Lygodium microphyllum*) on the Arthur R. Marshall Loxahatchee NWR. *Wildland Woods*. Vol. 6, Number 2.

