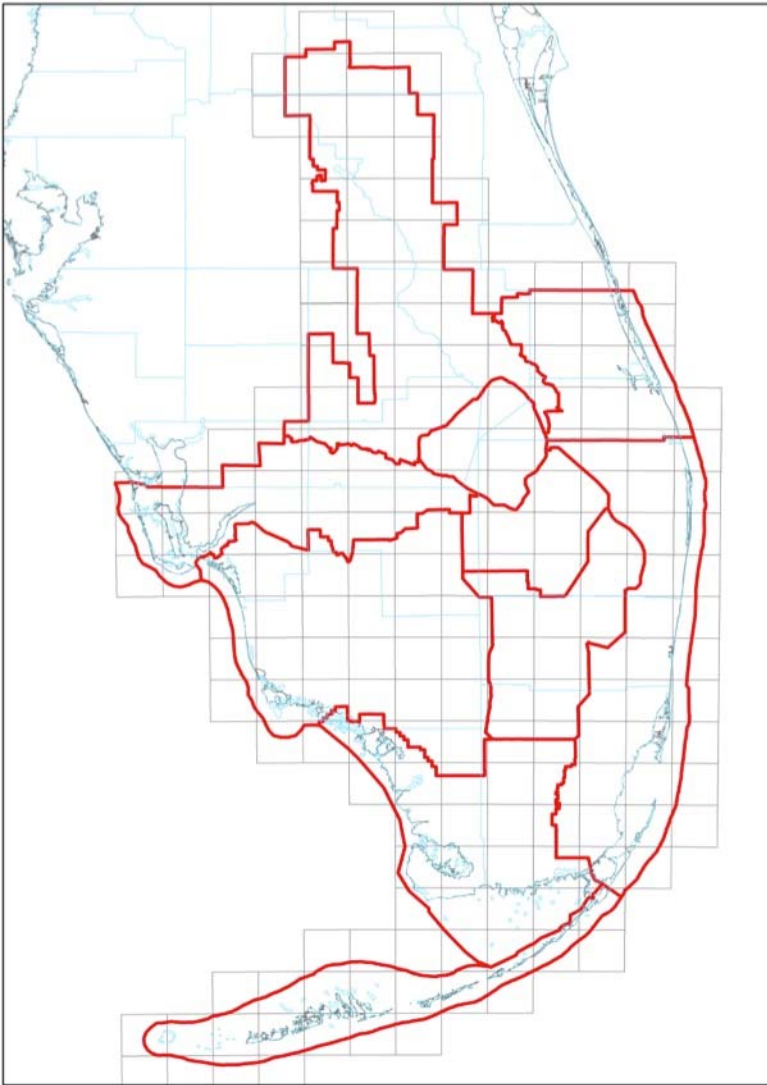


Biological control releases on  
*Lygodium microphyllum* in Cape Sable  
Wilderness Area, Everglades  
National Park: CERP implementation  
and monitoring for success

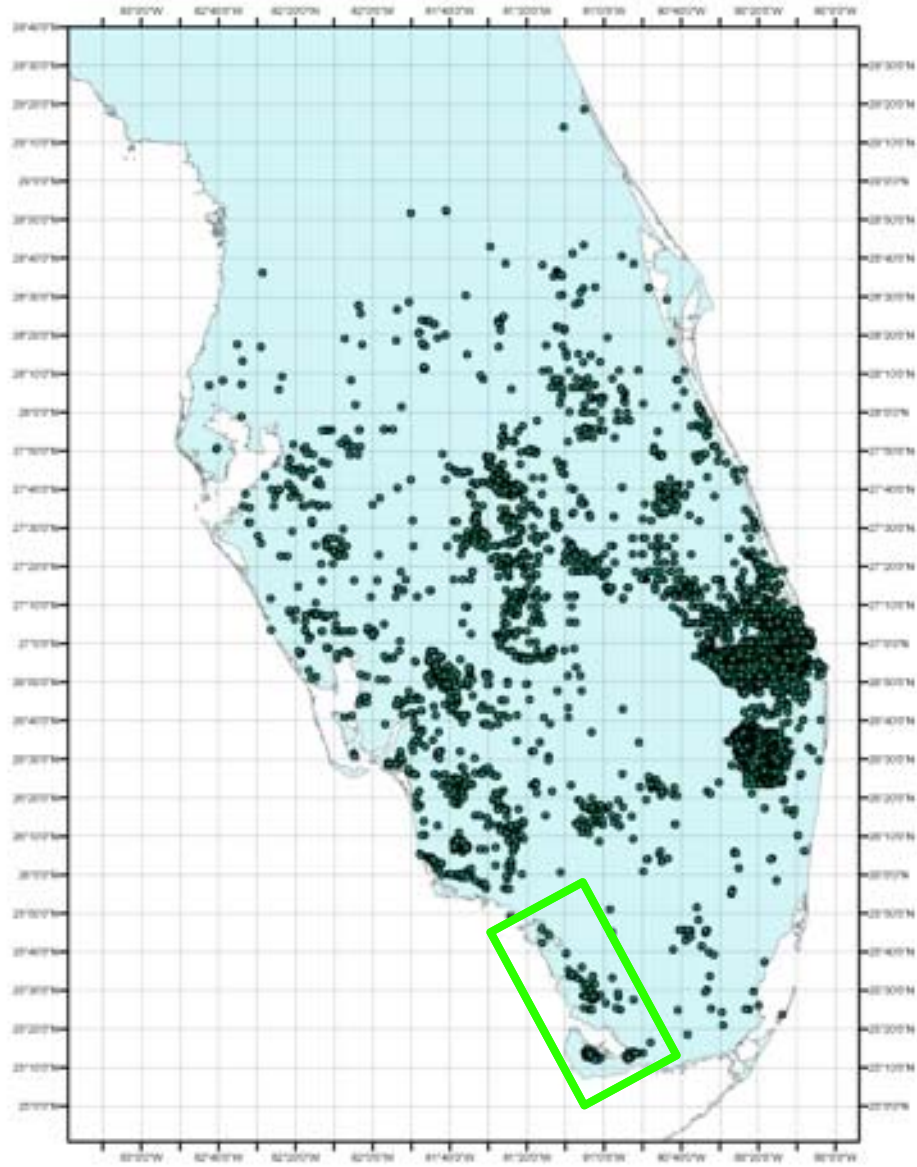
Melissa C. Smith  
Ellen Lake  
Phil Tipping  
April 23, 2015  
GEER 2015

# Comprehensive Everglades Restoration



## Project Goals:

- Implement Biological Control throughout CERP area
  - Release within grid system
  - Follow up to determine establishment and density
  - Make more releases



# Lygodium in Cape Sable



# Lygodium in Cape Sable



# Lygodium in Cape Sable



# Controlling Lygodium in Cape Sable

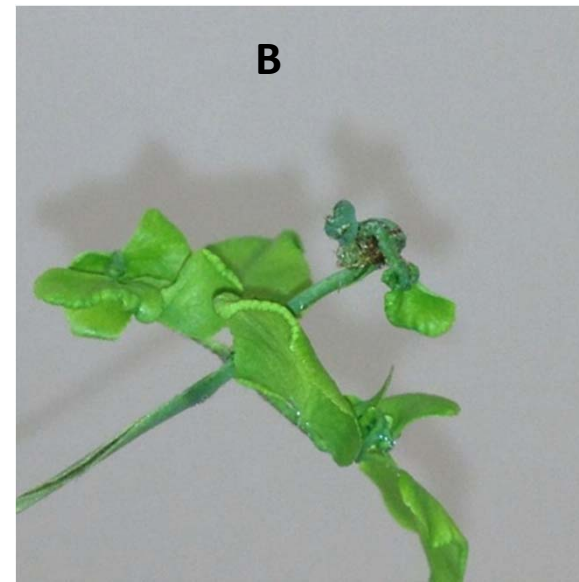
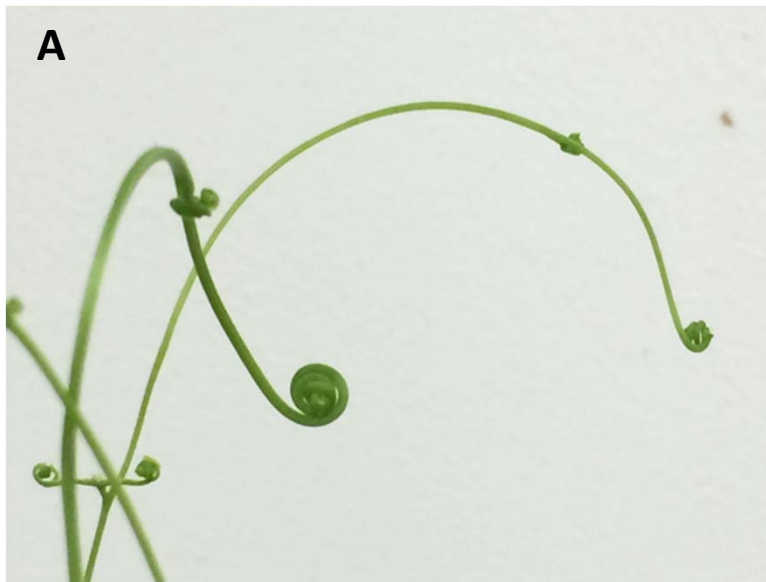
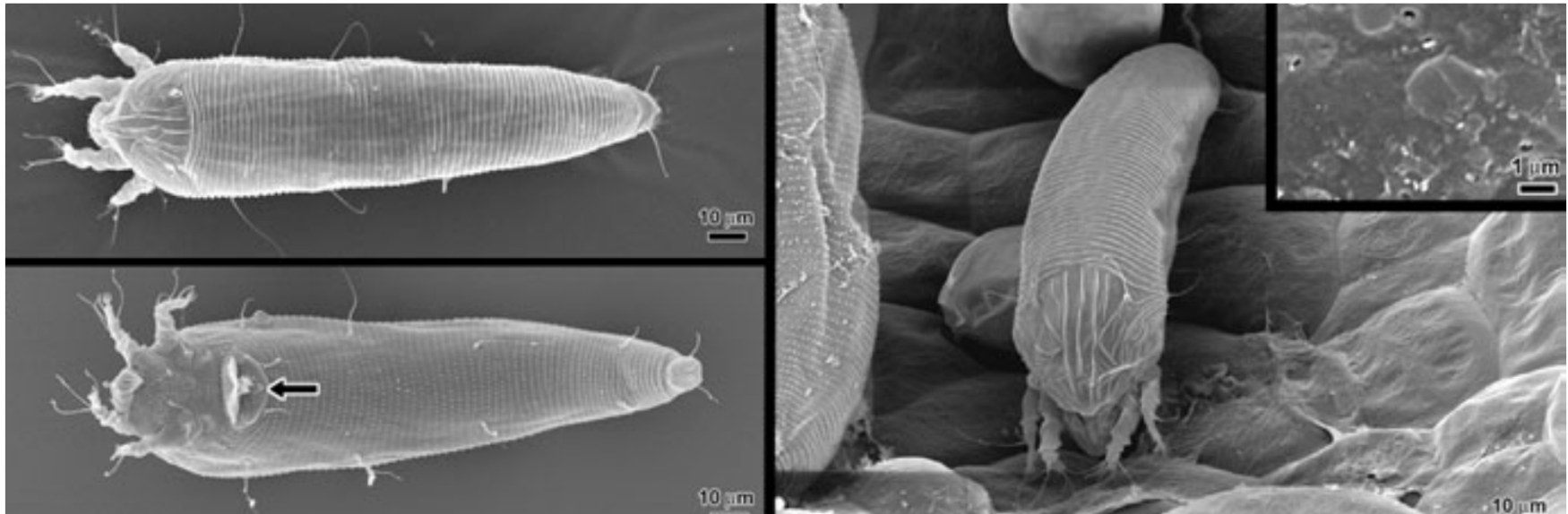
- Fire
- Herbicide
- Since 2010, Biological Control

Biological control for Lygodium:  
*Neomusotima conspurcatalis*





# *Floracarus perrepae* (Eriophyidae)



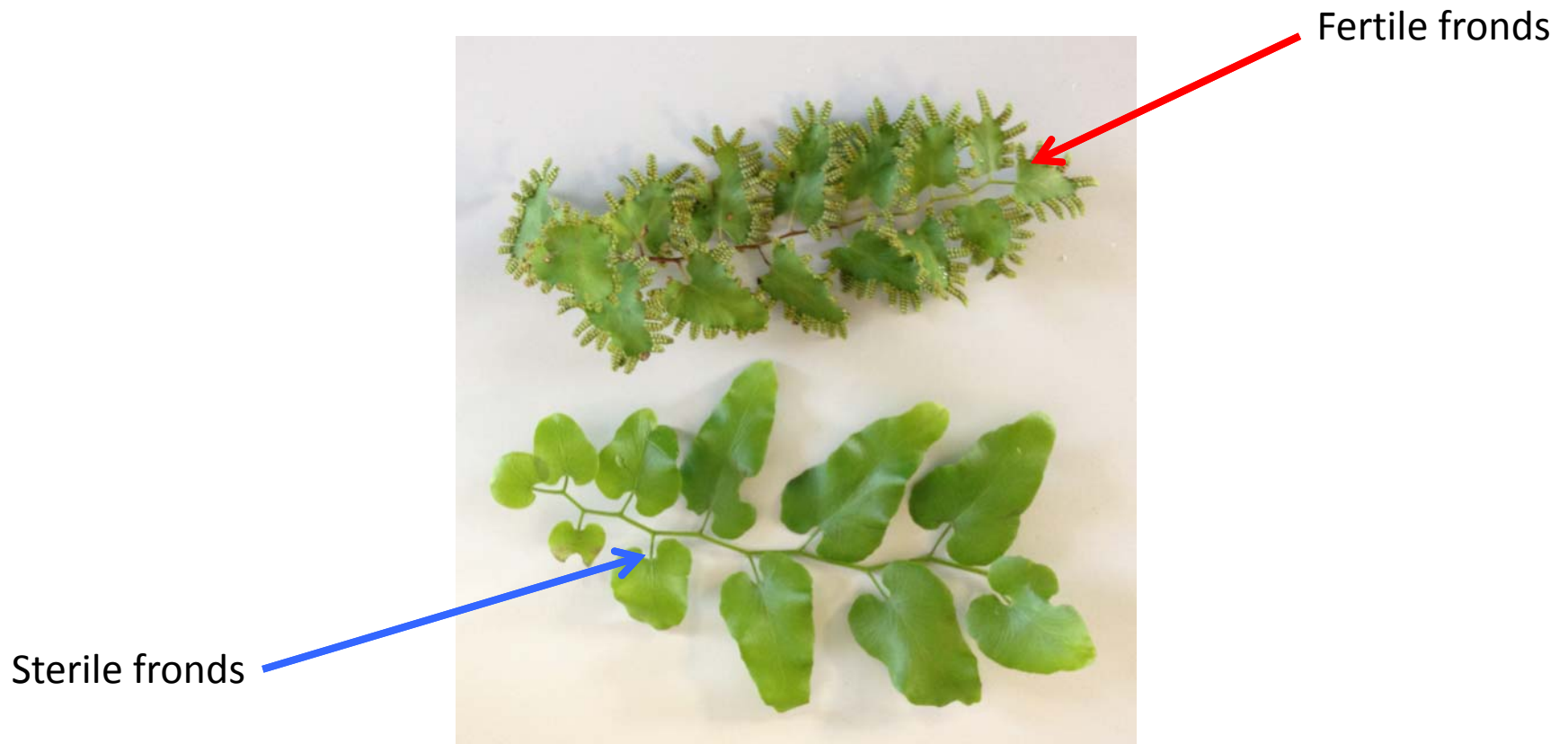
## *F. perrepa* leaf roll gall



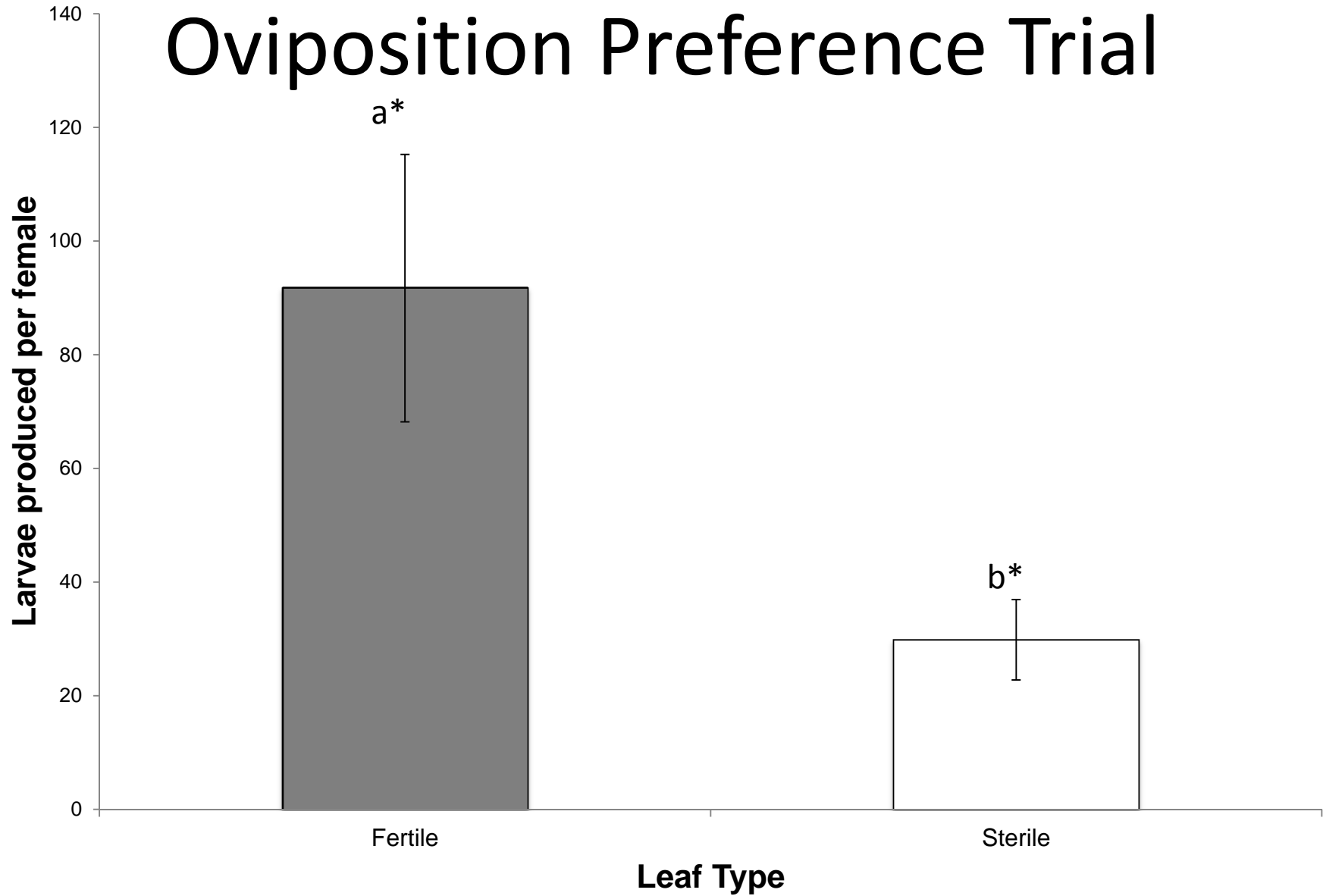
- From Goolsby et al. (2004) in Australia
  - Reduced aboveground biomass by 49%
  - Reduced belowground biomass by 35%

# Impact of *Neomusotima* on *Lygodium*

Females preferentially oviposit eggs on fertile fronds



# Oviposition Preference Trial



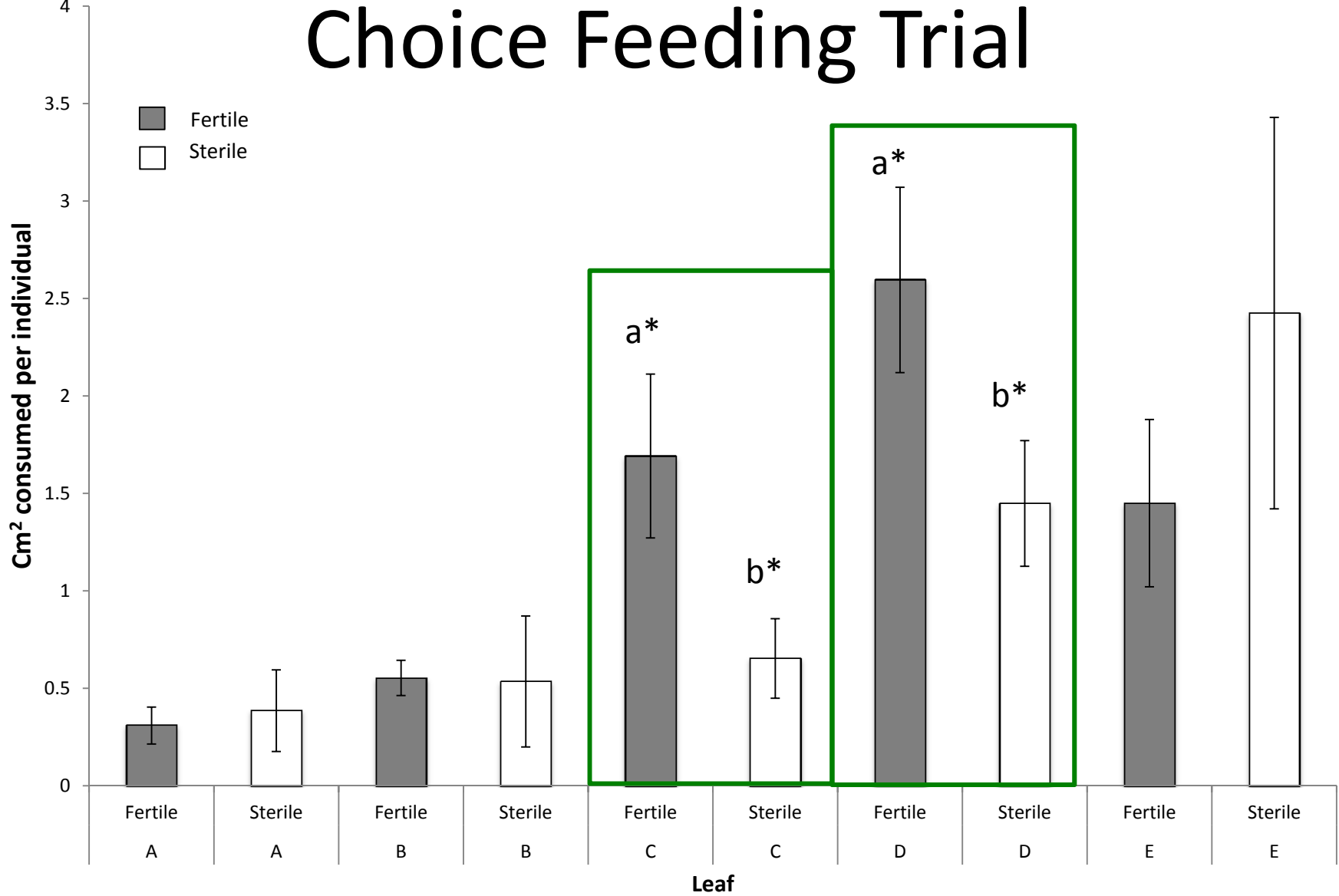
# *Neomusotima* impact

## Feeding preference

- Choice and No-choice
- Record area consumed
  - Instar (head capsule)



# Choice Feeding Trial



# CERP Releases in ENP

- *N. conspurcatalis* released in 2014 and 2015
- Follow-up in 2014 and 2015 recovered *N. conspurcatalis* at north Cape Sable site
- No recovery at southern and burned sites
- Additional releases planned for 2015



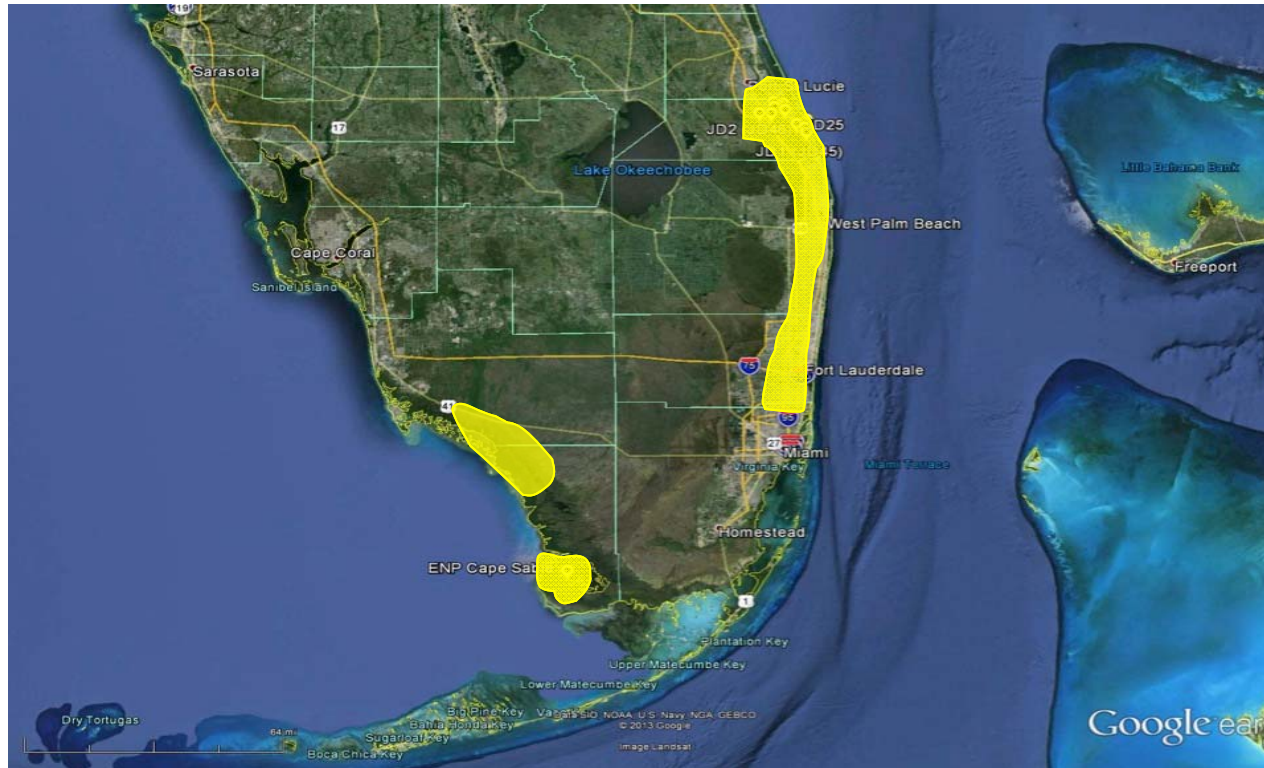
# CERP Releases in ENP

- *F. perrepae* released in 2011
- Recovered in 2013 at previously unknown site
- Released in 2015 at 3 sites
- Recovered in 2015 post-burn





# *F. perrepa* range 2015



Range surveys planned for 2015

# Future Directions

- MORE MITES!
  - Extensive surveys of AU and FL for matching fern haplotypes
  - Recollect mites from AU → rapid screening for release in FL
  - Develop Integrated Weed Management using biological control agents, fire and herbicide for ENP

# Acknowledgments



Southwest Florida  
Water Management District

