

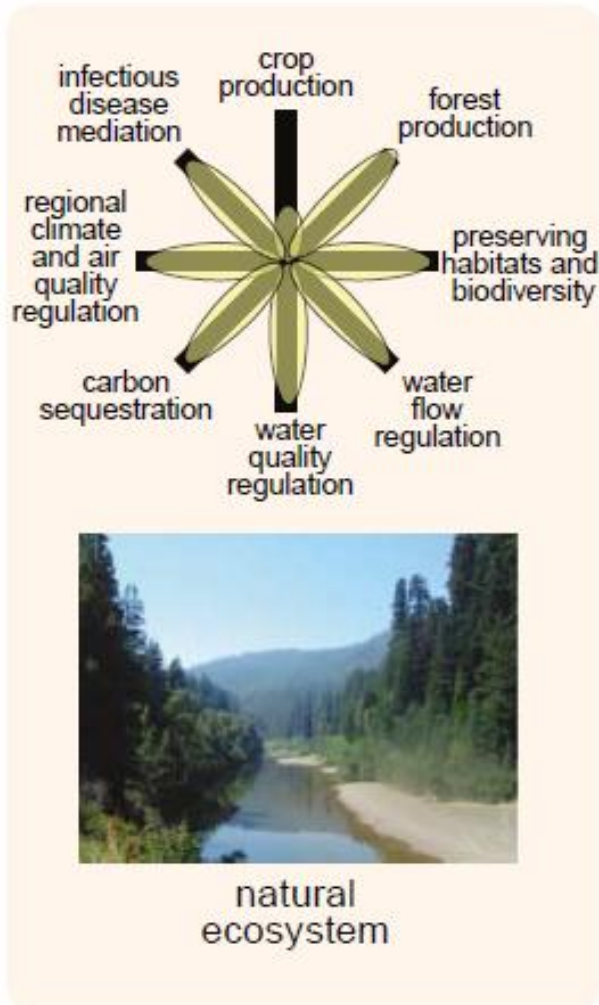
A black cow with a yellow ear tag stands in a shallow, marshy wetland. The water is clear, reflecting the sky and the surrounding vegetation. In the background, a dense line of palm trees stretches across the horizon under a bright, overcast sky. The overall scene is a natural, rural landscape.

# Assessing Tradeoffs Among Wetland Ecosystem Services in a Payment-for-Ecosystem-Services Program on Florida Ranchlands

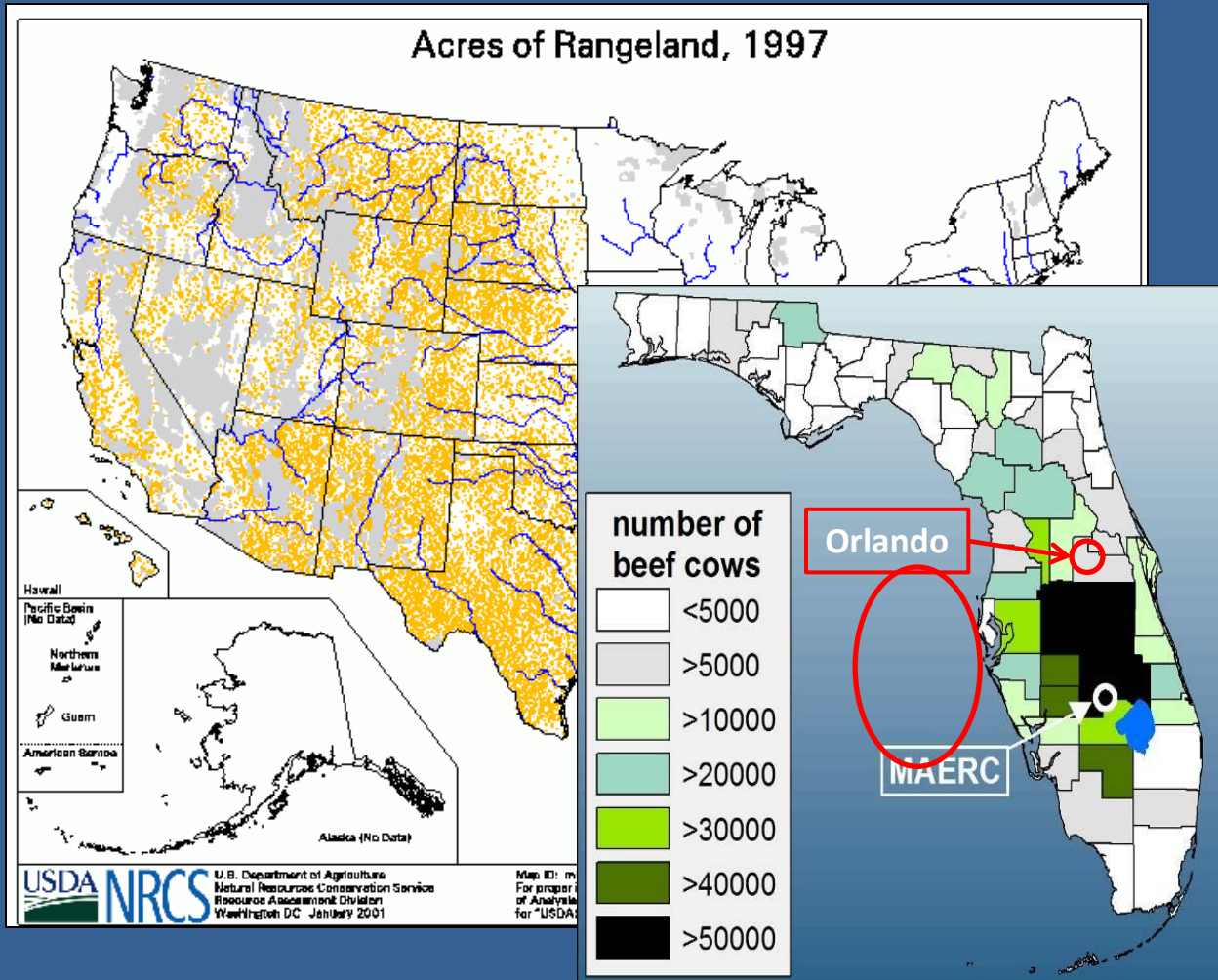
Patrick Bohlen, Elizabeth Boughton, John Fauth, David Jenkins, Pedro Quintana-Ascencio, Sanjay Shukla and Hilary Swain



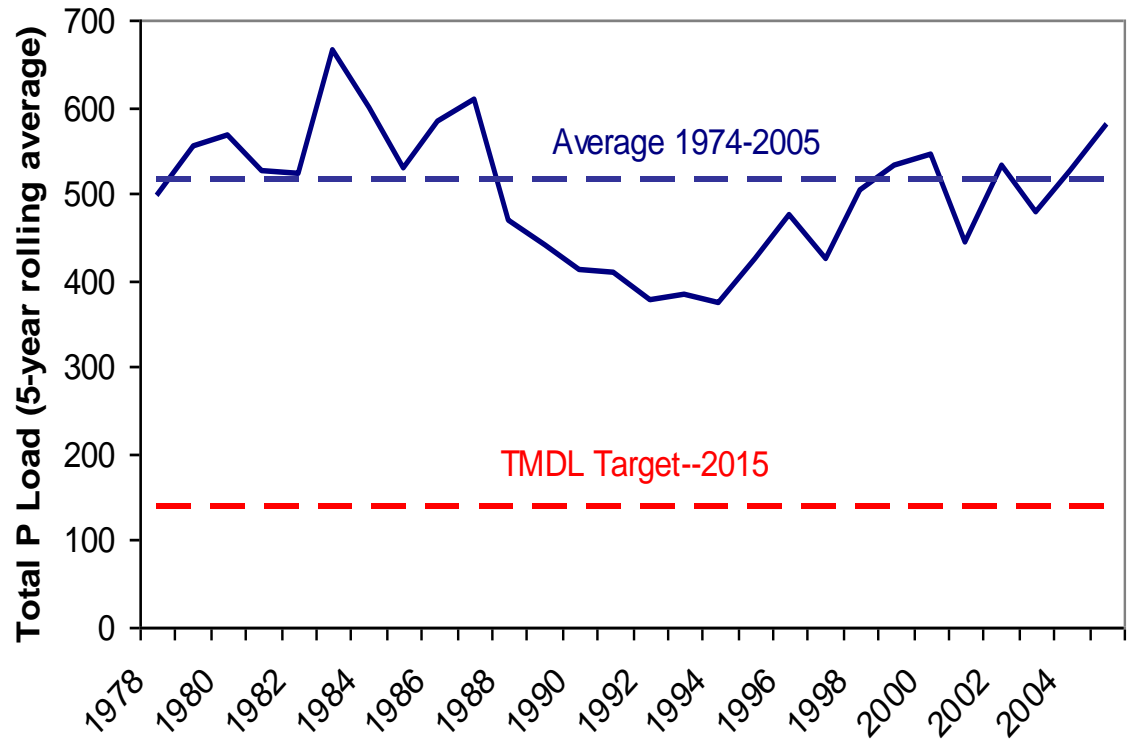
# Ecosystem services



# Florida's Unique Rangelands

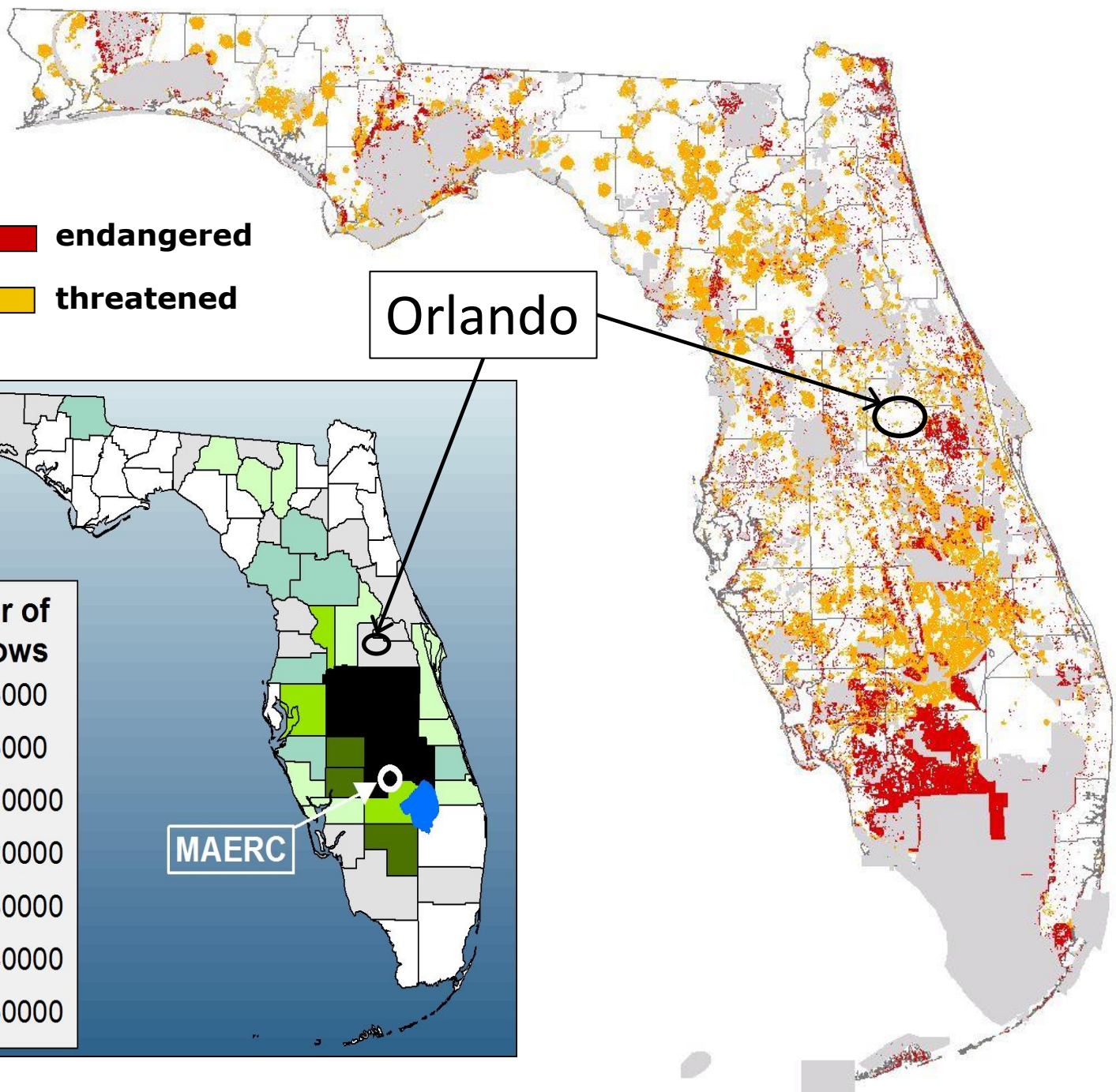
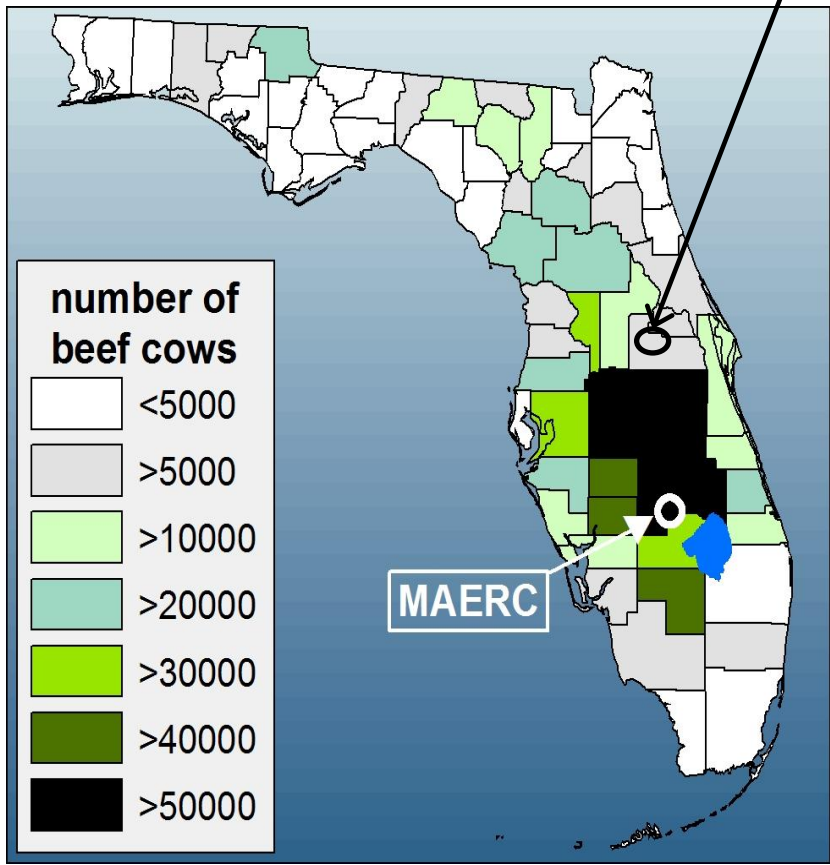


# Role of ranches in regional water quality and supply issues



**endangered**  
**threatened**

Orlando





# Payment for Environmental Services (PES)

- FL Ranchlands Environmental Services Project (FRESP) Pilot Effort
  - Pilot projects to develop market-based approach to water and nutrient retention services

# Florida Ranchlands Environmental Services Project

[Home](#)

[Restoring the  
Northern Everglades](#)

[Payment for  
Environmental Services](#)

[Water Management](#)

[Pilot Projects](#)

[Resources](#)

[Contact Us](#)

## Resources

### Publications

[Designing a Payment for Environmental Services Program for the Northern Everglades](#)

[Regulatory Challenges to Implementing a Payment for Environmental Services Program](#)

[Compilation of Benefits and Costs of STA and Reservoir Projects in the South Florida Water Management District](#)

[Background and Context for Interpreting the Compilation of Benefits and Costs of STA and Reservoir Projects in the South Florida Water Management District for the Northern Everglades Payment for Environmental Services Program](#)

[Estimates of Average and Marginal Costs per Pound of Phosphorus Removed Using RASTAs](#)

[Assessing On-Ranch Provision of Water Management Environmental Services](#)

[Field Testing a Pay-for-Environmental-Services Program](#)

[Paying for Environmental Services from Agricultural Lands: an Example from the Northern Everglades](#)

### Presentations

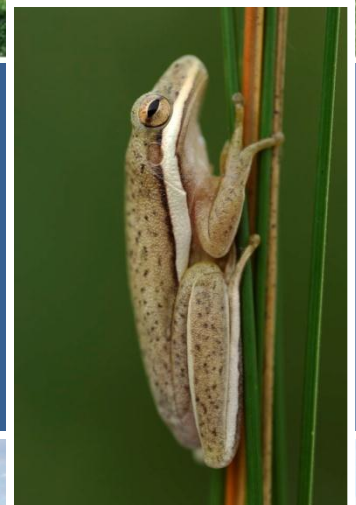
[Northern Everglades – Payment for Environmental Services Contracts](#)

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[contact@fresp.org](mailto:contact@fresp.org)

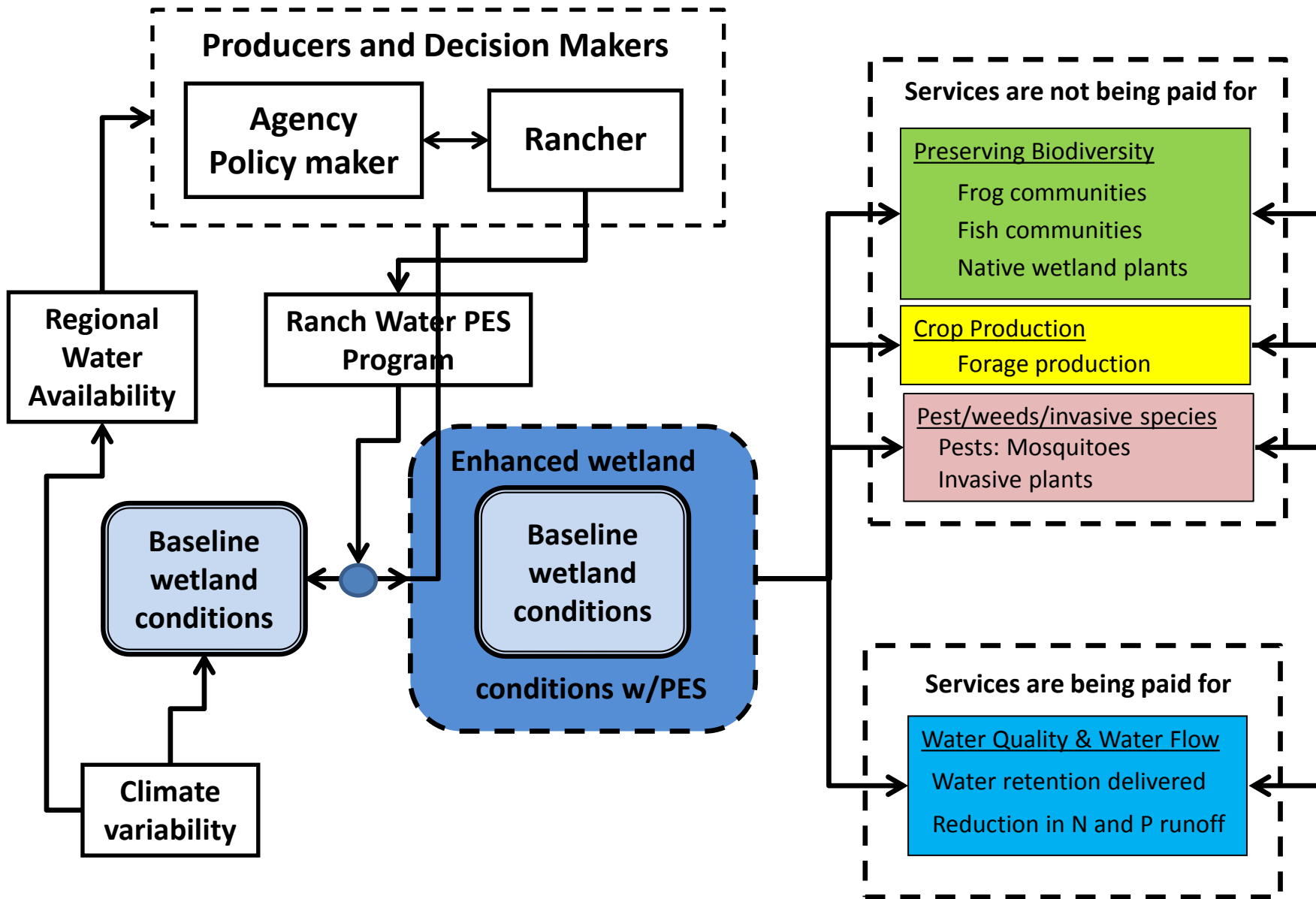
[www.fresp.org](http://www.fresp.org)

# Pilot program

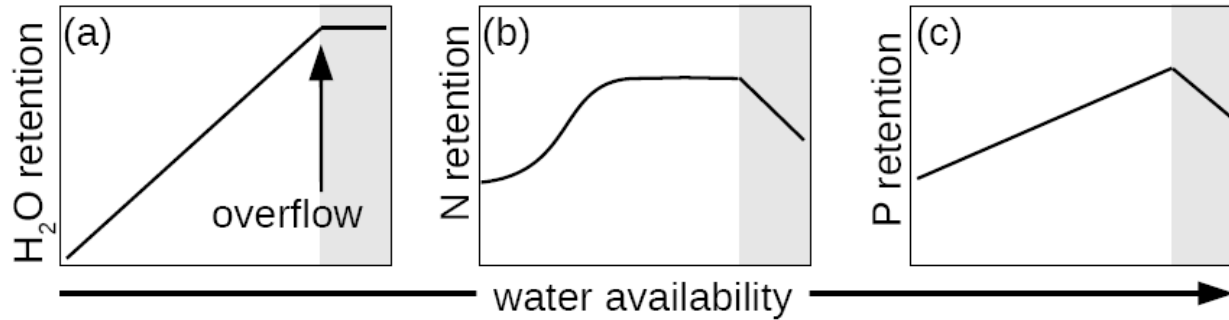
- 
- A map of Florida with a semi-transparent overlay showing the locations of several ranches. The map includes labels for Rafter Ranch, Alderman-Delaney Ranch, Payne & Sons Ranch, Williamson Ranch, Lightsey XL Ranch, Syfrett Ranch, Lykes Bros. Inc. Ranch, and Buck Island Ranch. Lake Okeechobee is also labeled. Arrows point from the labels to the specific locations on the map.
- Rafter Ranch
  - Alderman-Delaney Ranch
  - Payne & Sons Ranch
  - Williamson Ranch
  - Lightsey XL Ranch
  - Syfrett Ranch
  - Lykes Bros. Inc. Ranch
  - Buck Island Ranch
- Lake Okeechobee



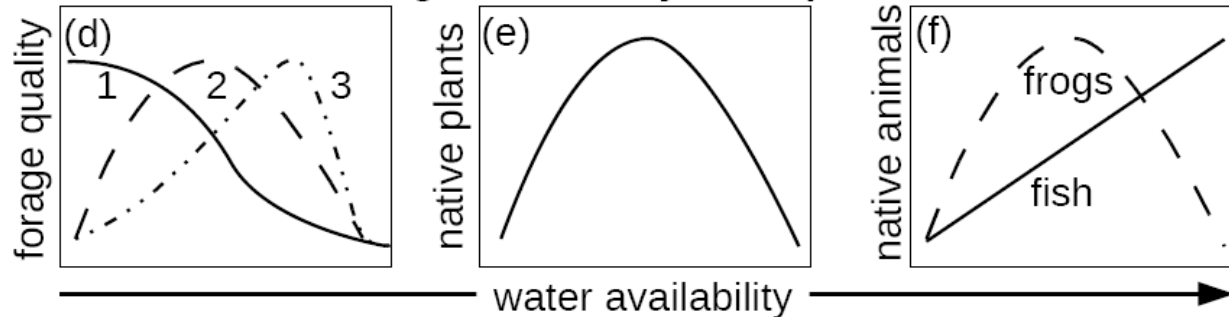




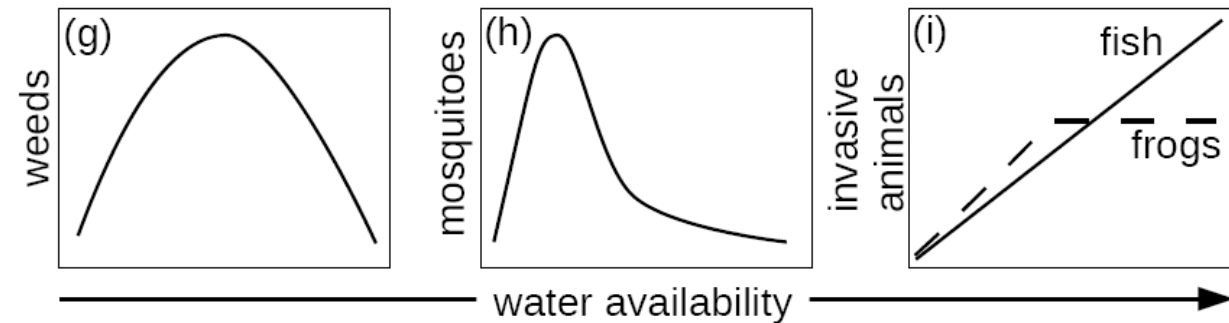
**Ecosystem Services:  
Water Retention & Reduced Nutrient Runoff**



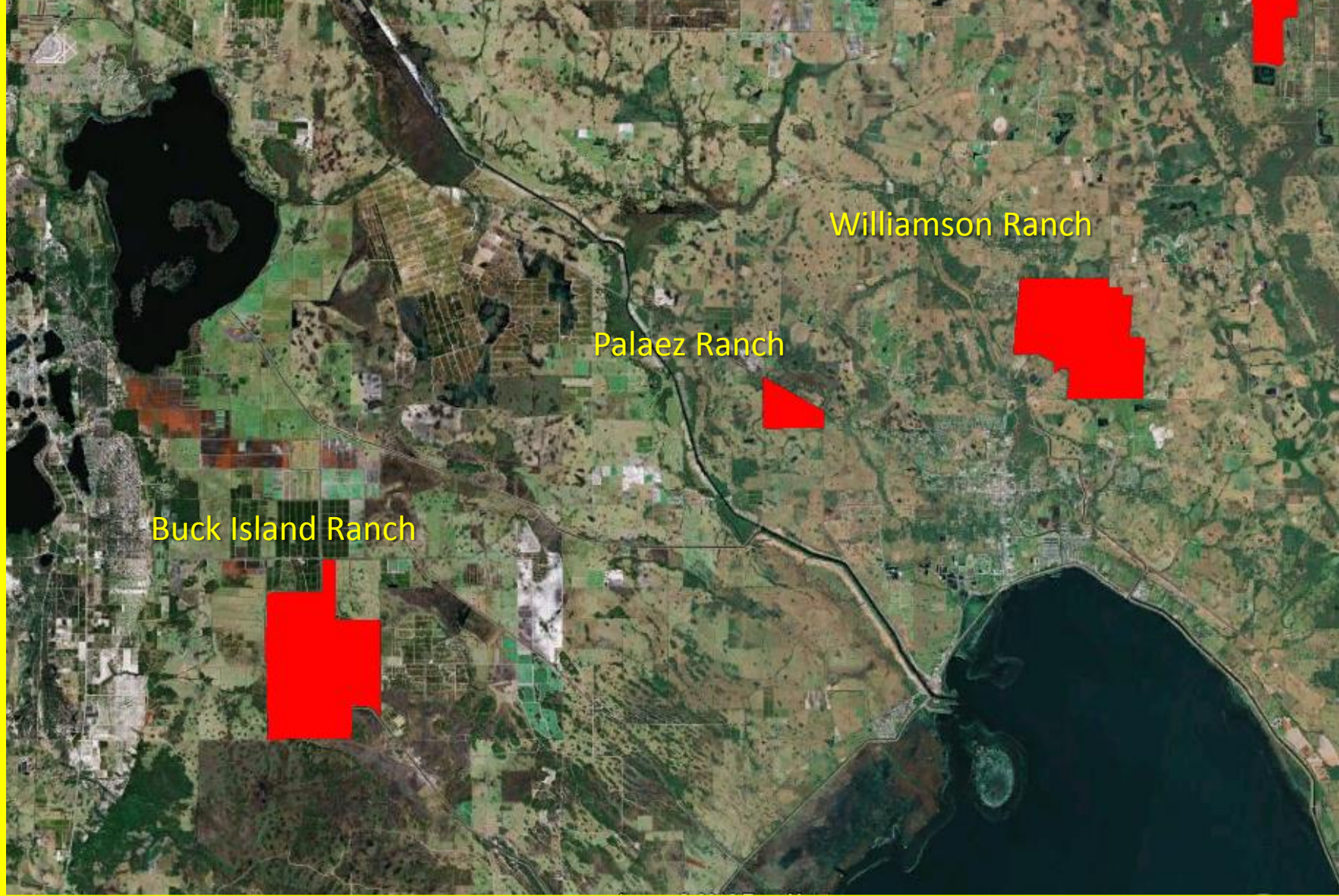
**Ecosystem Services:  
Preserving Biodiversity & Crop Production**



**Secondary Stressor:  
Pests, Weeds & Invasive Species**







Buck Island Ranch

Palaez Ranch

Williamson Ranch



Improved pasture wetlands

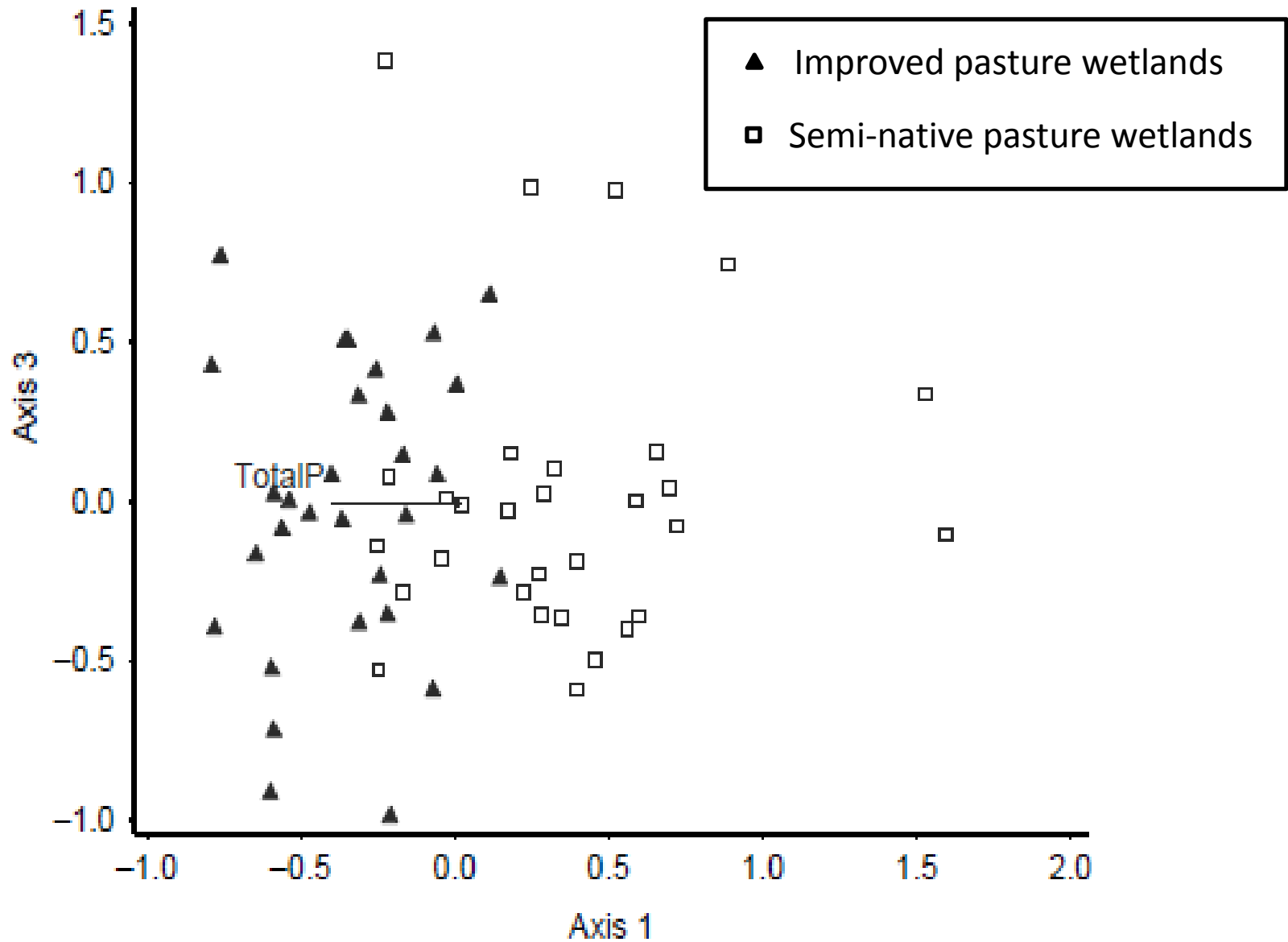


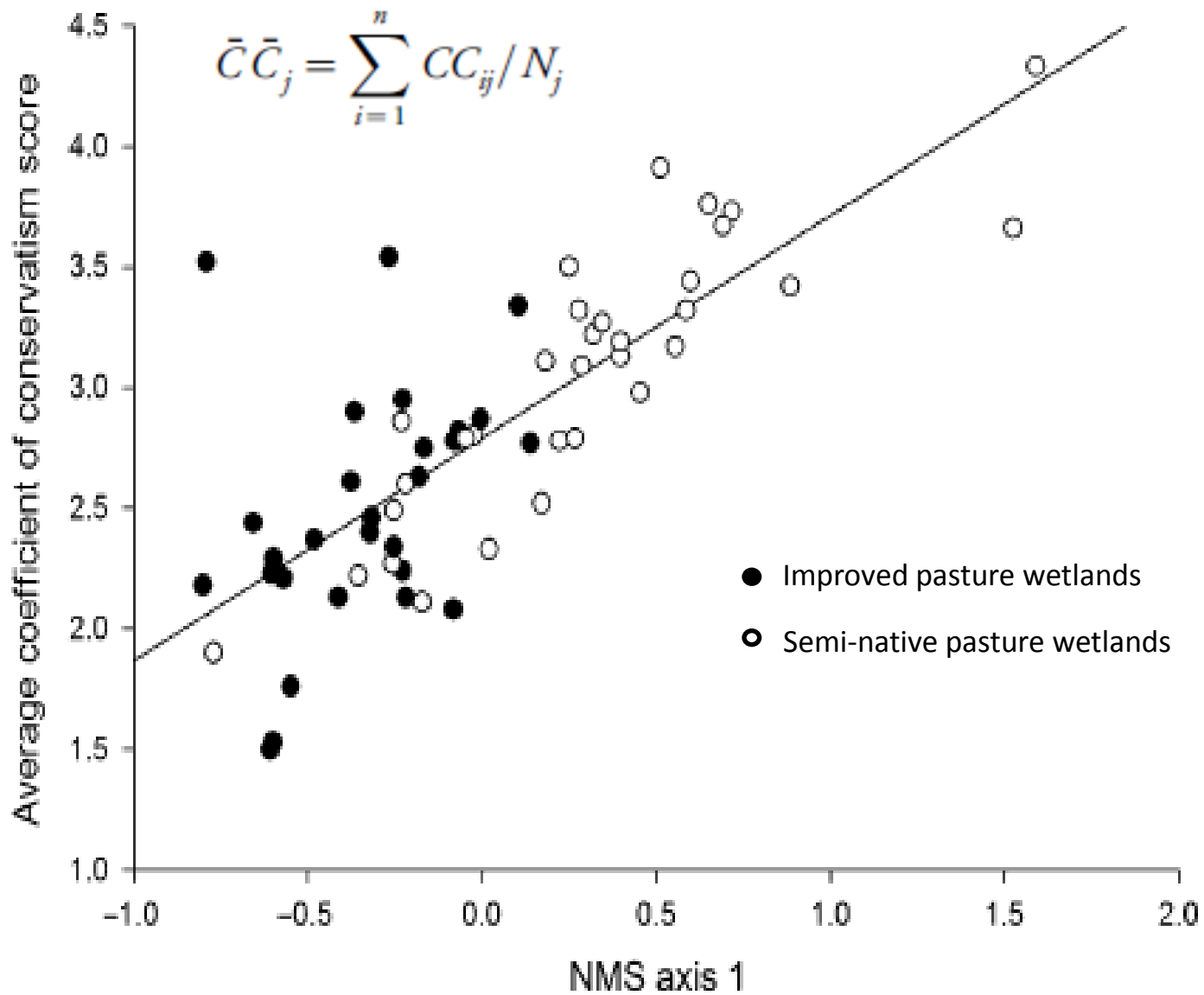
Semi-native pasture wetlands





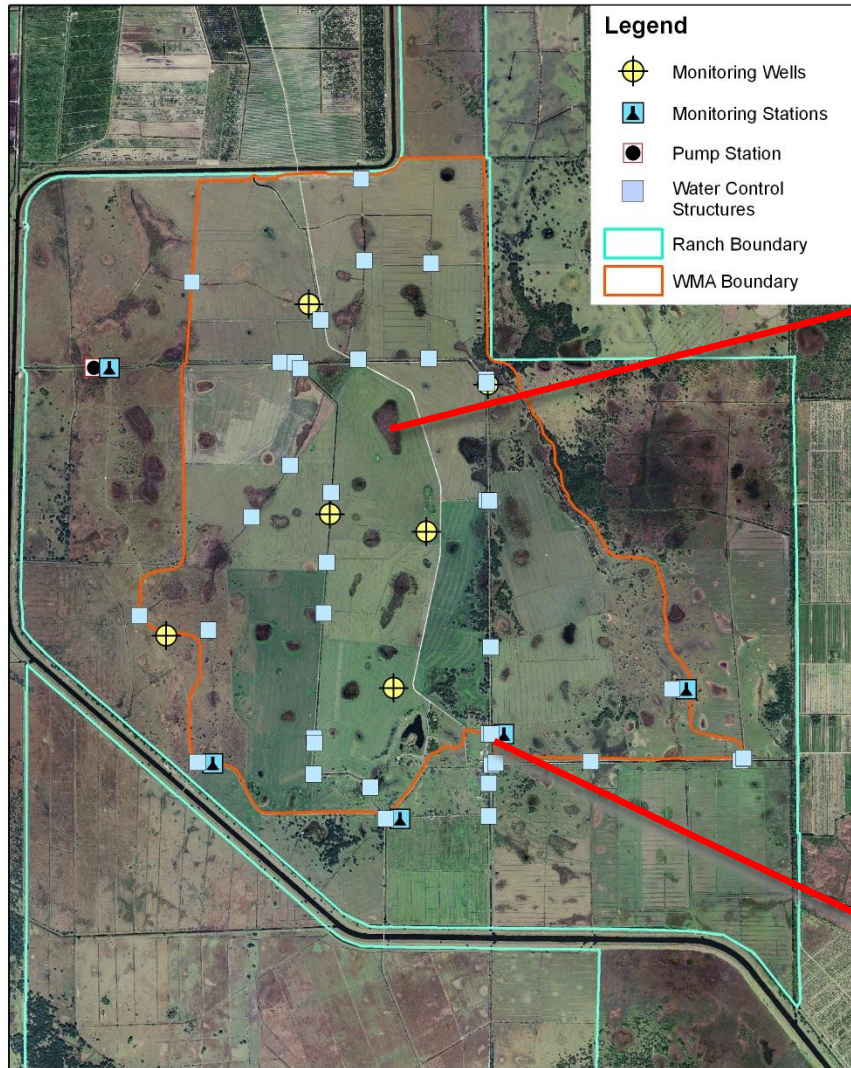
# Wetland Plant Communities







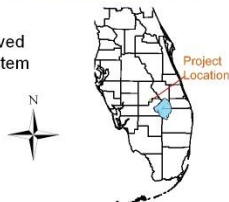
# Buck Island Ranch Florida Ranchlands Environmental Service Project



Buck Island Ranch's Water Management Alternative (WMA) consists of installing 37 water control structures (culverts and risers) over roughly 2800 acres of improved pasture and 900 acres of adjacent native pasture to create a cascading water system that uses existing canals and drainage ditches to retain ranch storm water runoff.

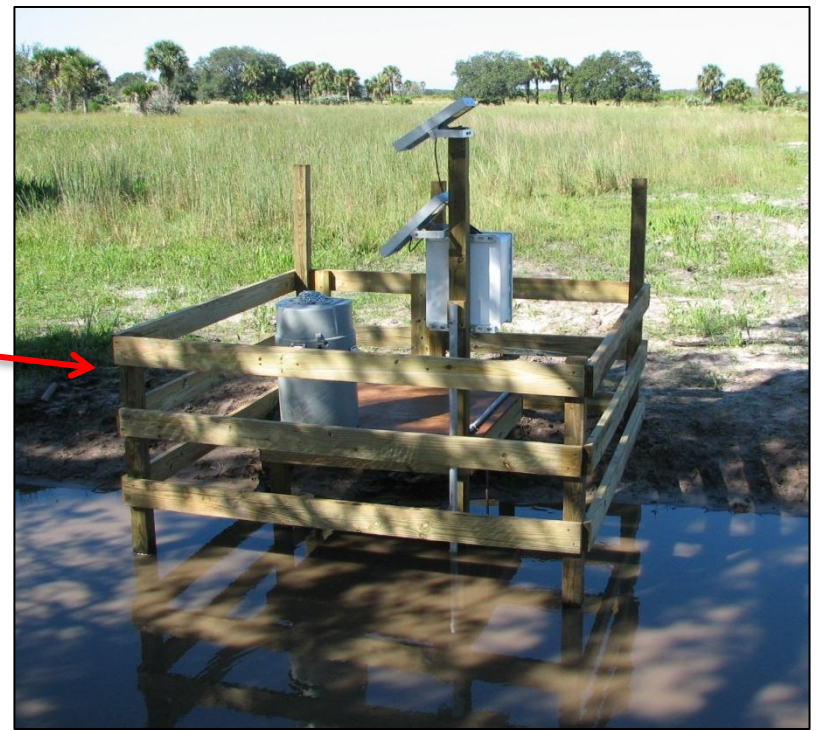


DOQQ, 2004 1m resolution.





# Alderman-Deloney Ranch Florida Ranchlands Environmental Service Project



Alderman Deloney Ranch's Water Management Alternative (WMA) consists of rehydrating two existing wetlands (18 and 30 acres) within a 340-acre improved pasture by installing a water control structures (culverts and risers) in the drainage ditches at the north end of each wetland.

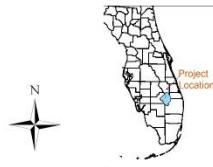




# Williamson Cattle Company Florida Ranchlands Environmental Service Project

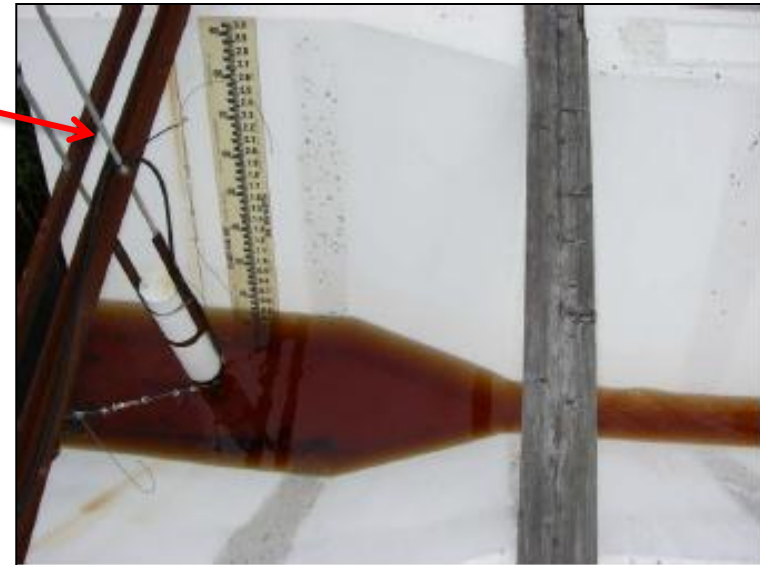
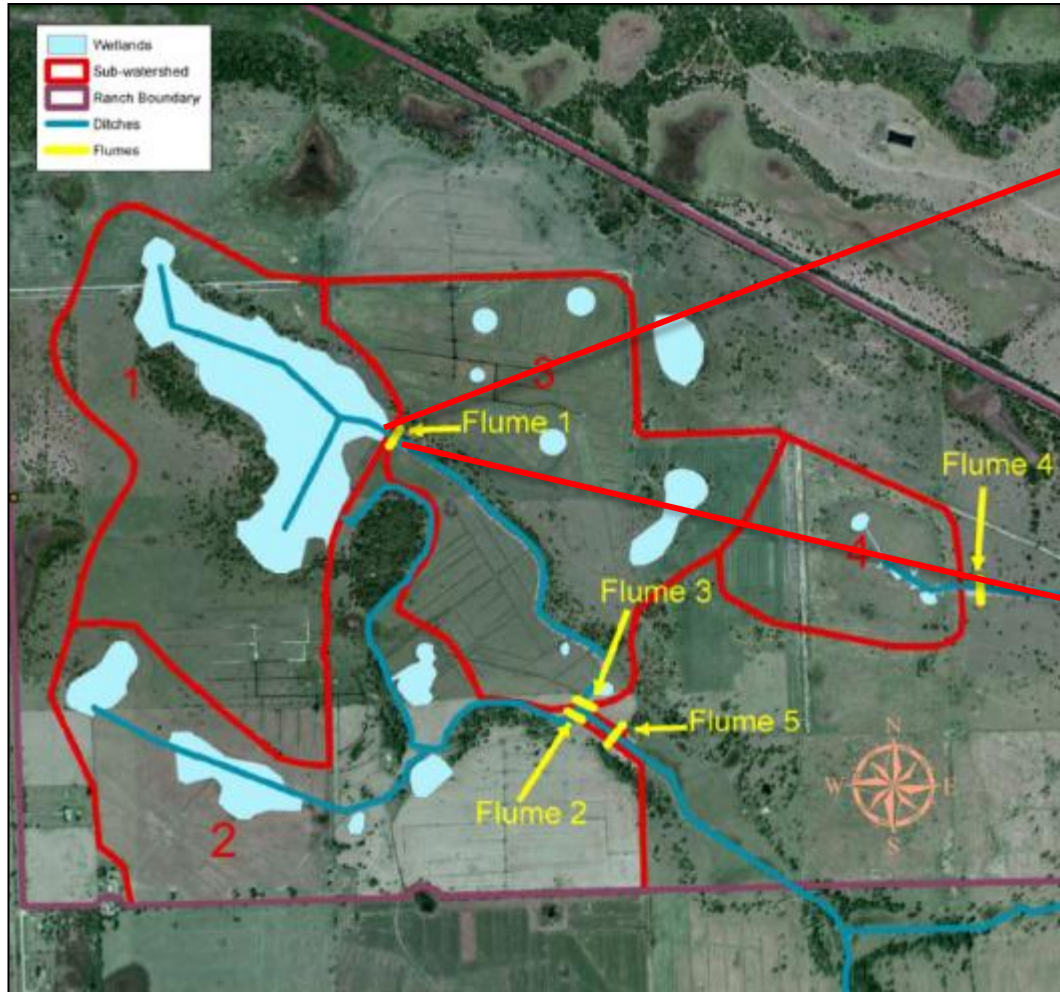


Williamson Cattle Company's Water Management Alternative (WMA) consists of rehydration of a 250-acre previously drained wetland within a 900-acre drainage area through installation of a water control structure (culvert and riser) in a drainage ditch at the outfall.





# Palaez Ranch Wetland Water Retention



# Hydro-ecological relationships

S  
c  
a  
l  
e

Space, depth

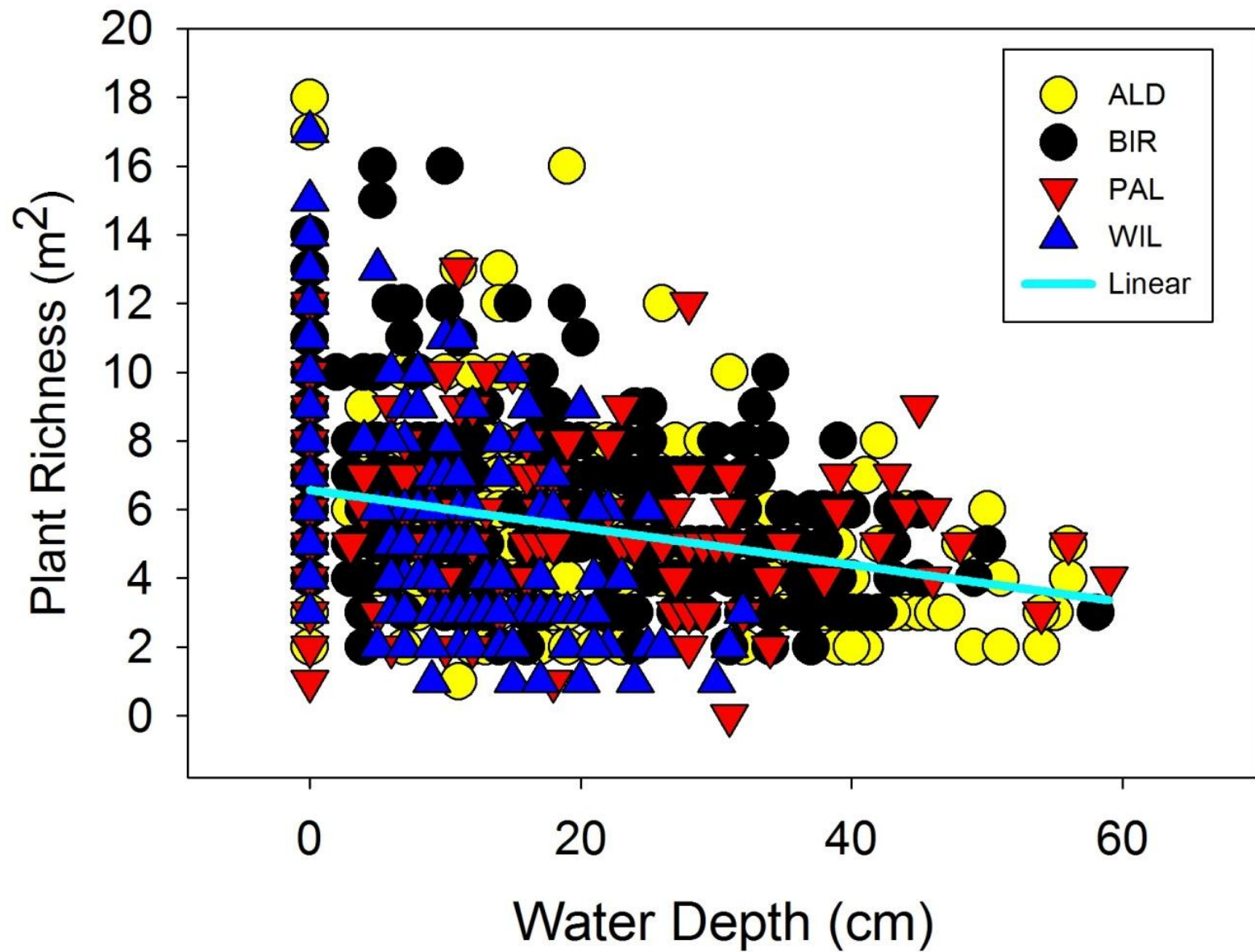
Time

Covariates

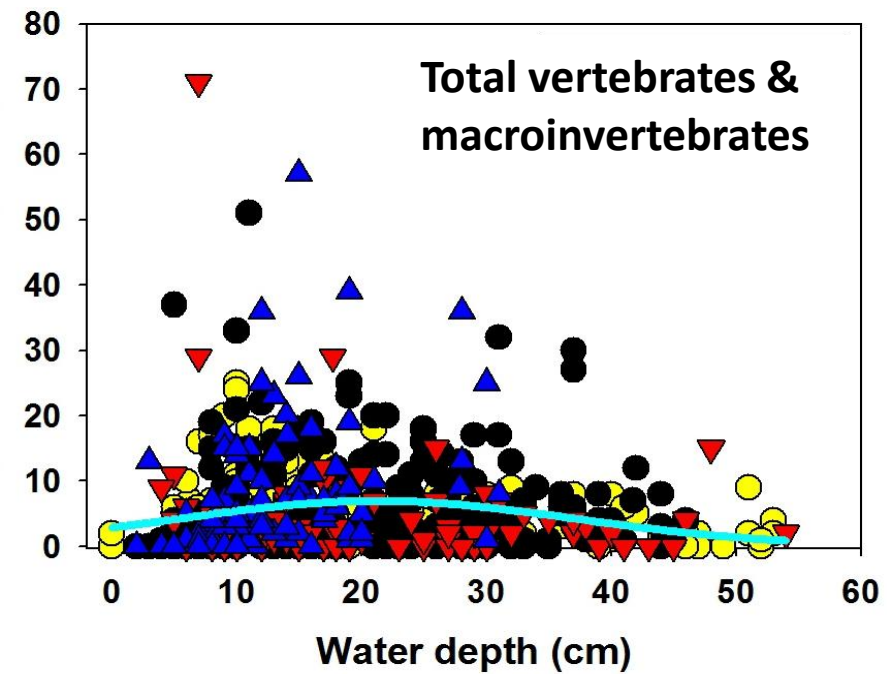
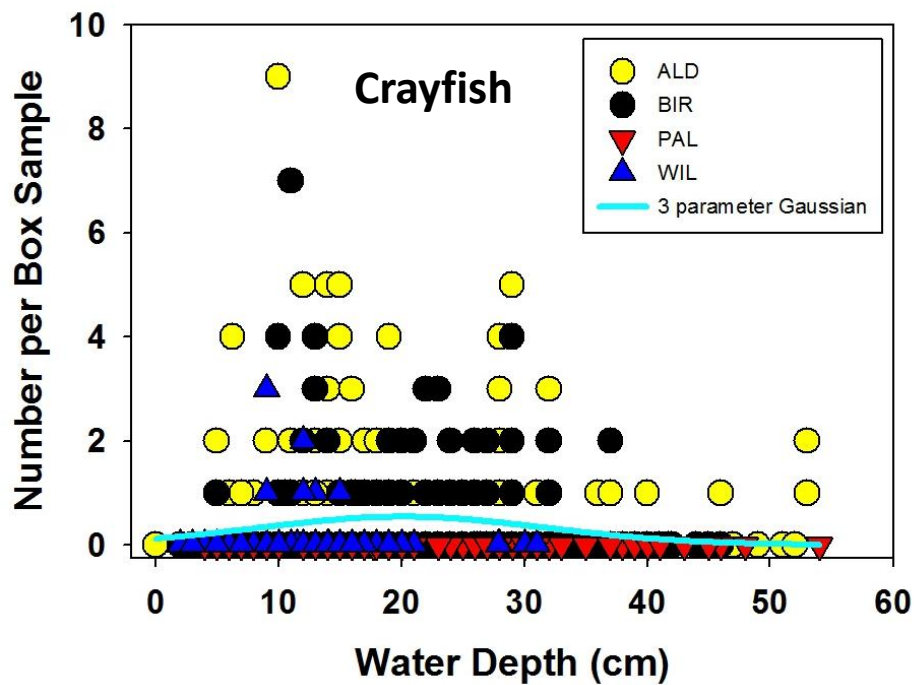
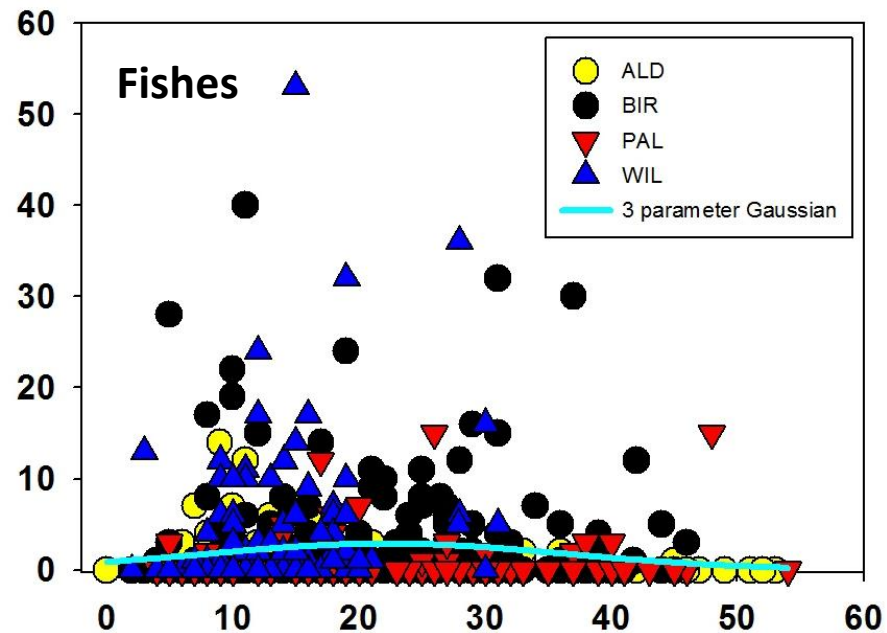
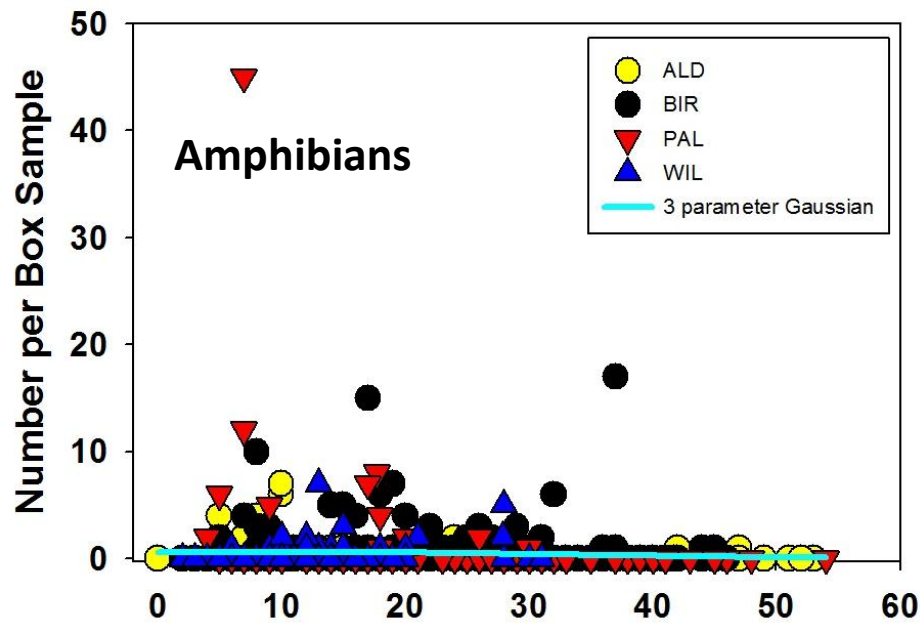
scale	Volume	Inun Area	SA/V	Stage/volume	Depth	Rel depth	Hydraulic gradient	External connectivity	Δ depth (index of flashiness)	Time since filling	Days wet/yr	Date	Preceding length dry	Rainfall	Drought	Temp	Mgmt type
Ranch	x	x	x				x		x	x	x	x	x	x	x	x	
Wetland	x	x	x	x		x	x	x	5 wetlands	x	x	x	x				x
Point					x	x				x	x	x	x				



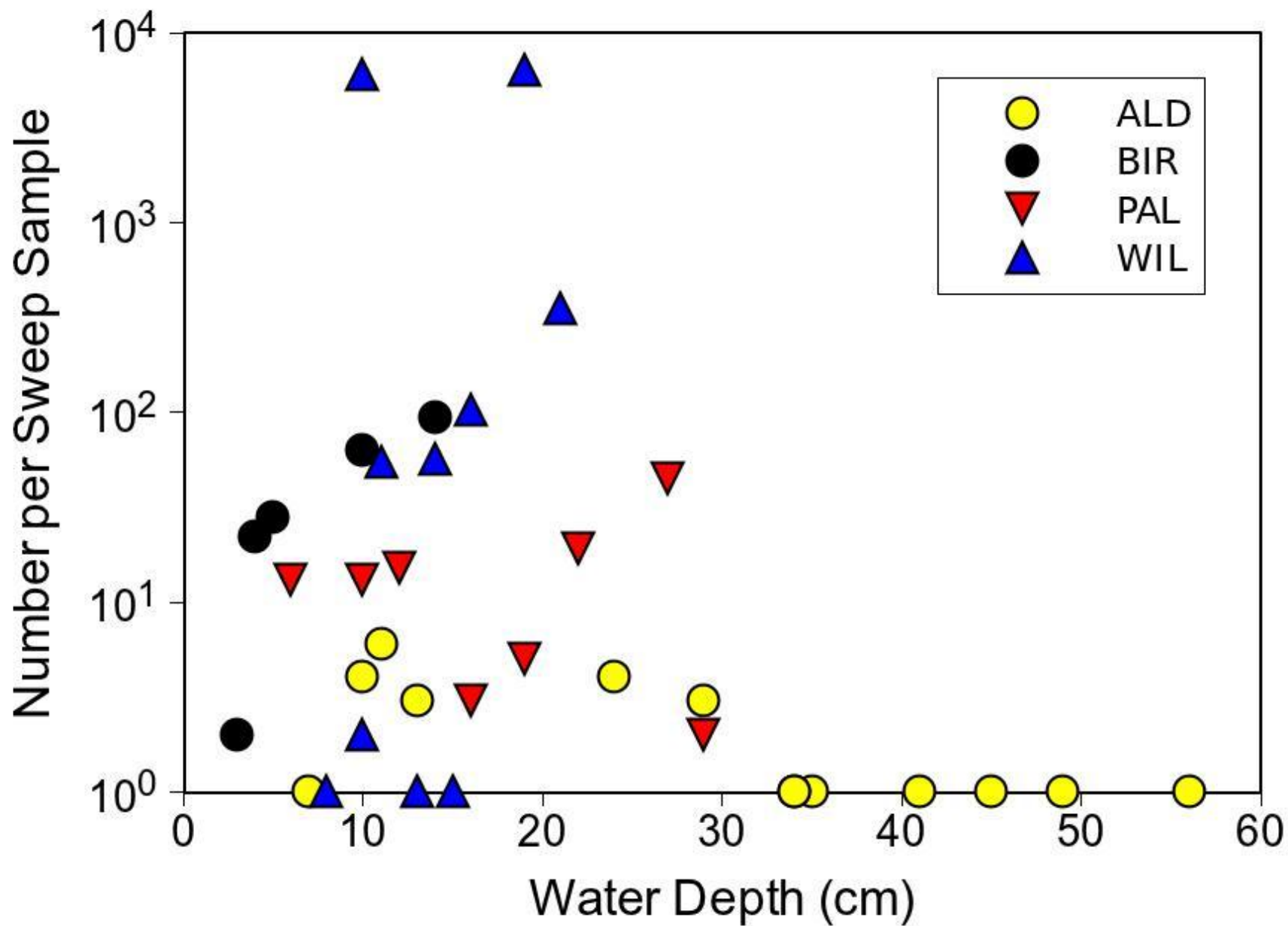
Abundance, Diversity, Structure







# Mosquitoes



# Future Directions

- Hydrologic modeling (next talk)
- Relate ecological communities to hydrology (both space and time)
- Multivariate analysis
- Assess community differences among sites (ranch-level effects)
- Trade-off analysis and decision support



# Thank you!

谢谢, शुक्रिया, Tak, Dank u, Děkuji, Salammat, Kiitos, Merci,  
Danke, σας ευχαριστώ, Grazie, ありがとう, 감사합니다,  
Obrigado, спасибо, Gracias, Asante, תודה, شكرا !



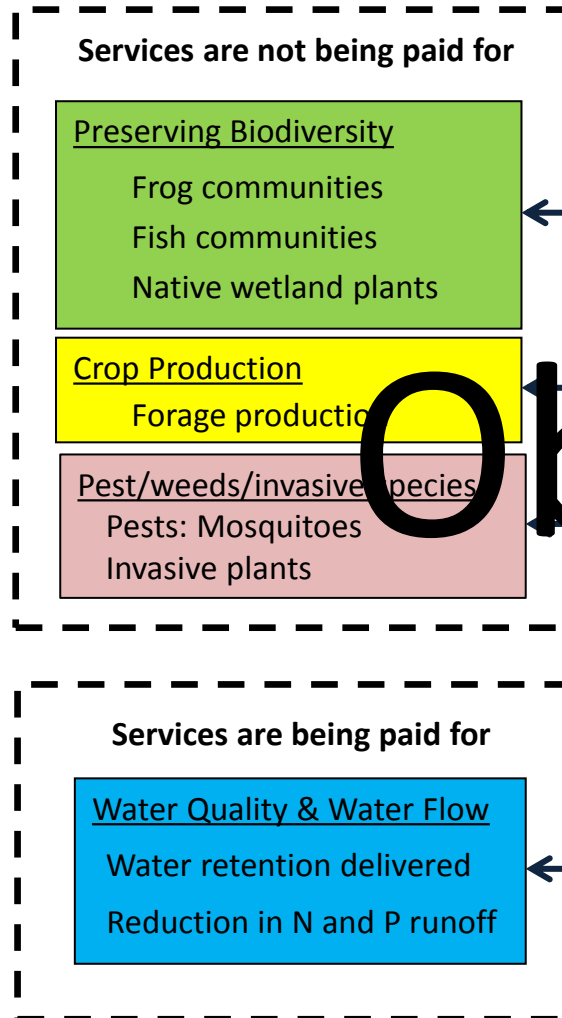




Objective 1:  
Quantify the services

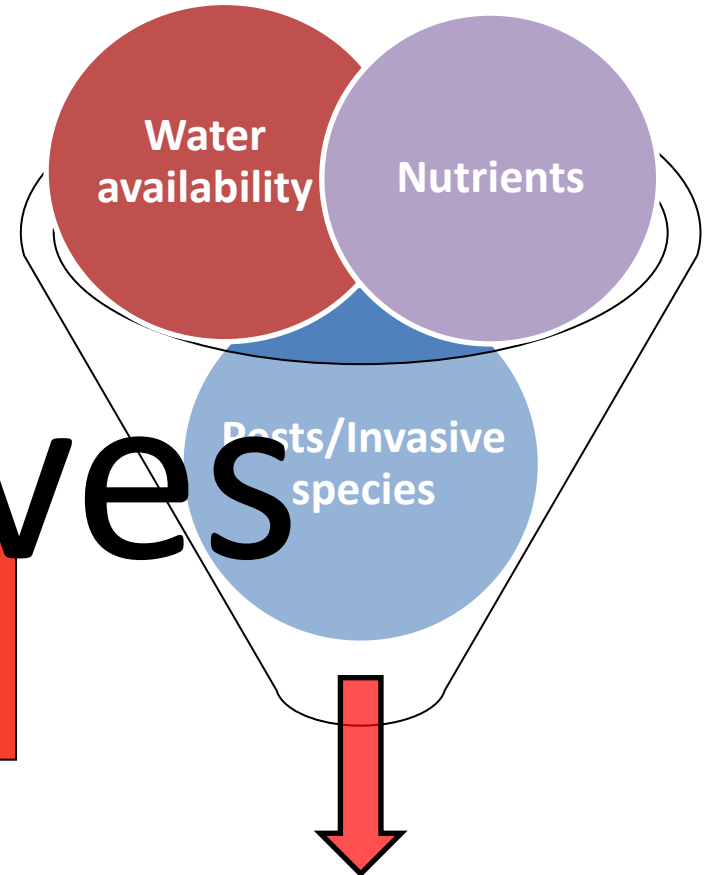
Objective 2:  
Assess tradeoffs

Objective 3:  
Evaluate stressors



# Objectives

**Tradeoff  
Analysis**



Ecosystem services