Co-benefits and trade-offs of water retention projects in ranchlands

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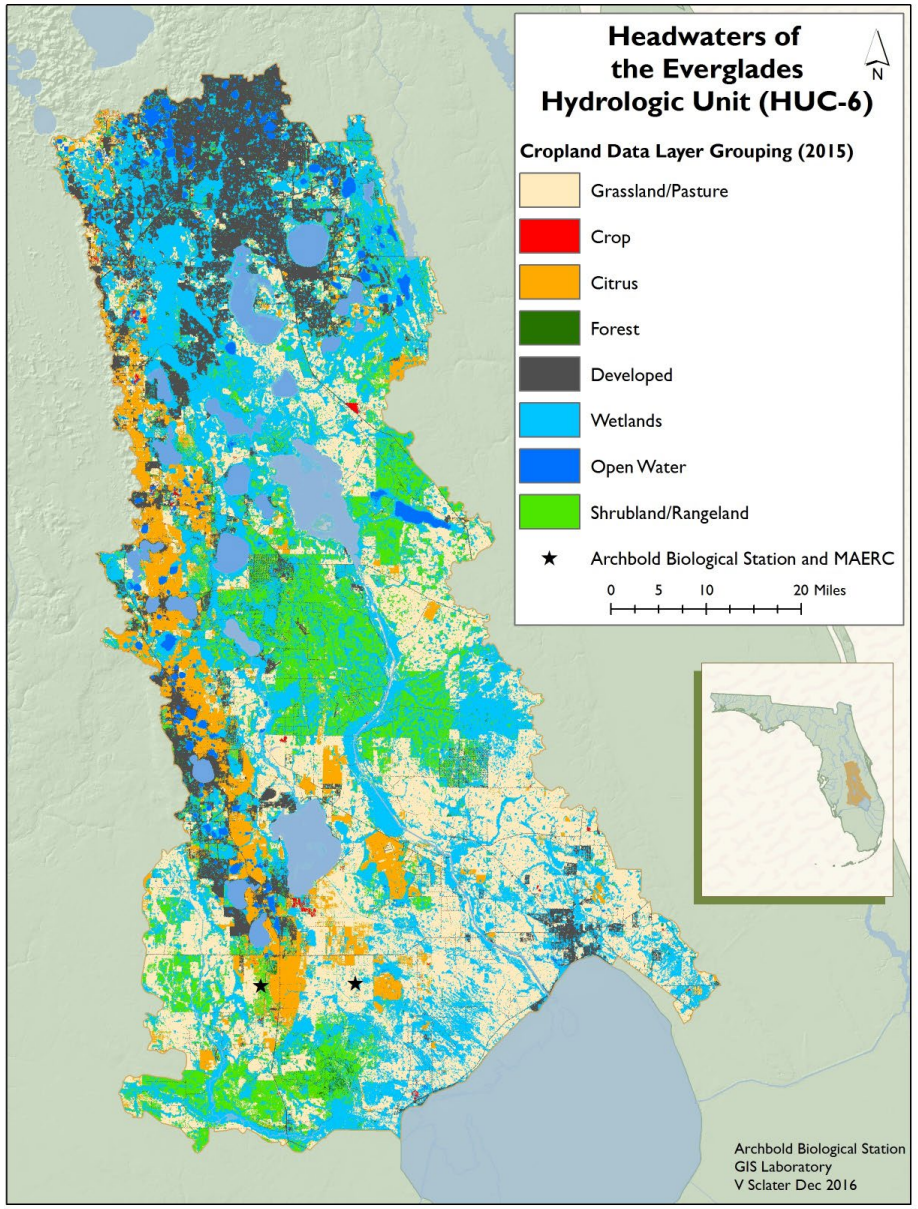
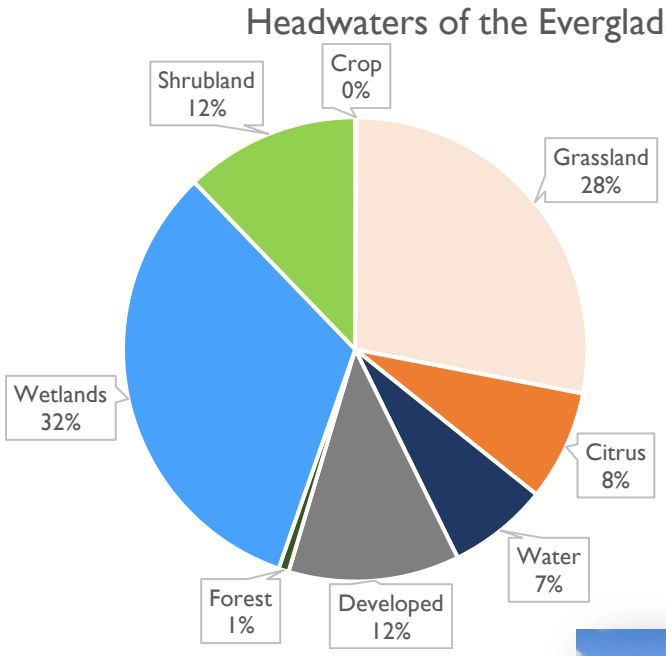
SOUTH FLORIDA WATER MANAGEMENT DISTRICT

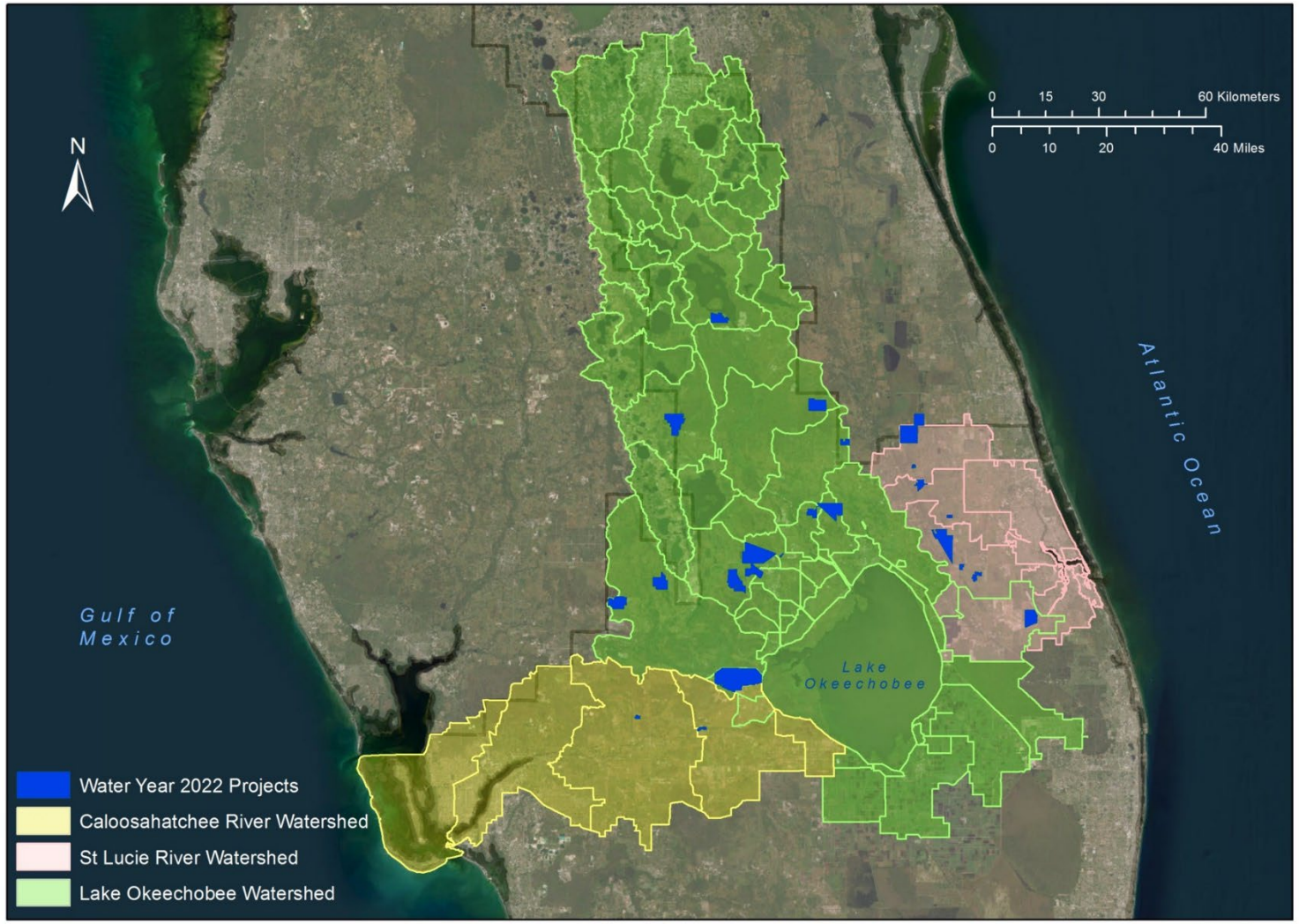
The Headwaters of the Everglades



~ 1/3 of the Headwaters is ranchland
~1/6 of the state of FL is ranchlands



Dispersed Water Management (DWM) in the Northern Everglades



Need 1M acre-feet of water north of Lake to reduce excessive discharges

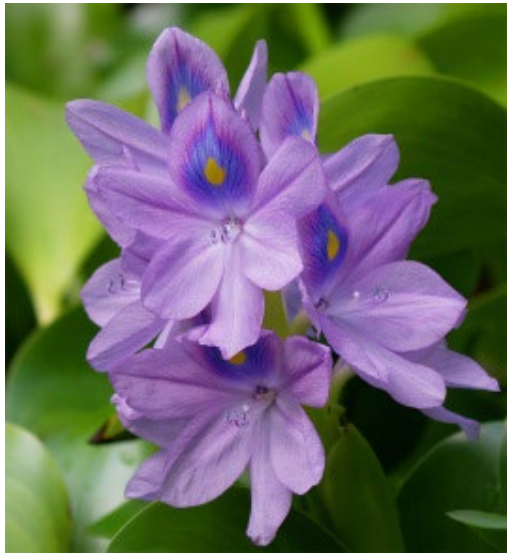
PES solutions complement other initiatives

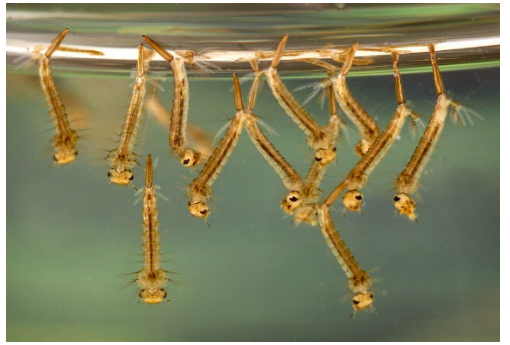
DWM projects also provide multiple co-benefits:

- Wetland hydroperiod enhancement
- Benefits to aquatic organisms
- May reduce undesirable land use change

Biodiversity benefits are a desirable co-benefit of Dispersed Water Management.

But there are potential trade-offs





The Focus of this Talk:

- 1) Examine biodiversity co-benefits of enhanced water retention on ranchlands;
- 2) Assess potential tradeoffs for ranchers including loss of forage or increased mosquitoes;
- 3) Develop a decision support system to integrate hydrology, biodiversity, user defined preferences and implementation cost.

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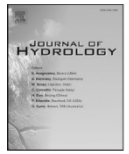


Research papers

Using biodiversity response for prioritizing participants and service provisions in a payment-for-water-storage program in the Everglades basin

A. Lomeu [a], A. Shukla [b], S. Shukla [a,*], G. Kiker [a], C.-L. Wu [c], G.S. Hendricks [a], E.H. Boughton [d], R. Sishodia [e], A.C. Guzha [f], H.M. Swain [d], P.J. Bohlen [g], D.G. Jenkins [g], J.E. Fauth [g]

esa

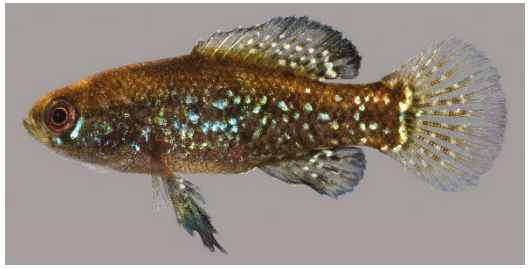
ECOSPHERE

Trade-offs and synergies in a payment-for-ecosystem services program on ranchlands in the Everglades headwaters

Elizabeth H. Boughton [1,†], Pedro F. Quintana-Ascencio [2], David G. Jenkins [2], Patrick J. Bohlen [2], John E. Fauth [2], Angelica Engel [3], Sanjay Shukla [3], Greg Kiker [3], Greg Hendricks [3], and Hilary M. Swain [1]

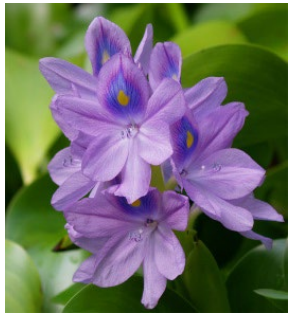
Quantifying biodiversity ecosystem services

Abundance of palatable forage, upland and wetland species

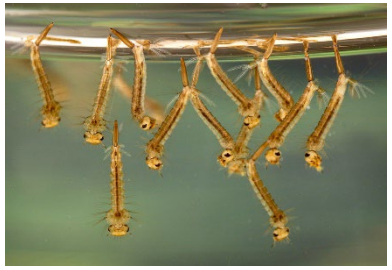


Abundance fish, amphibians, and macroinverts

Richness and abundance of native species

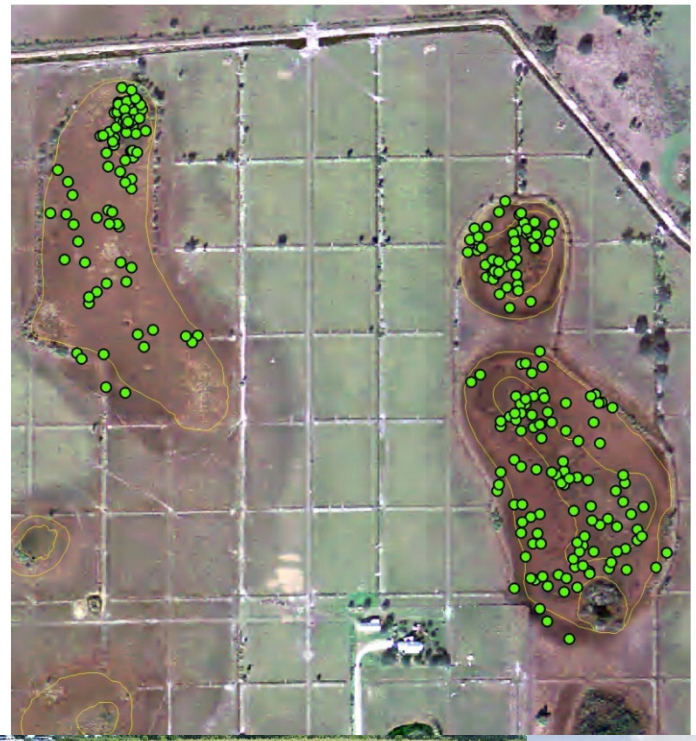


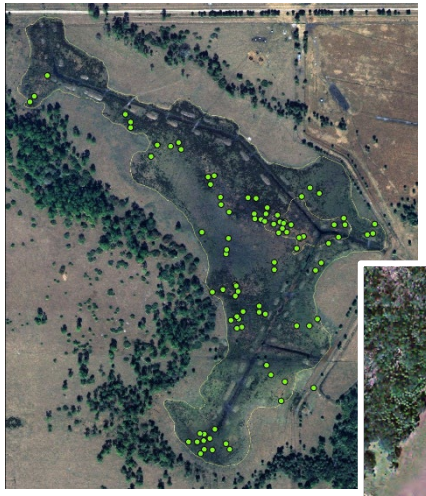
Richness and abundance of exotic species

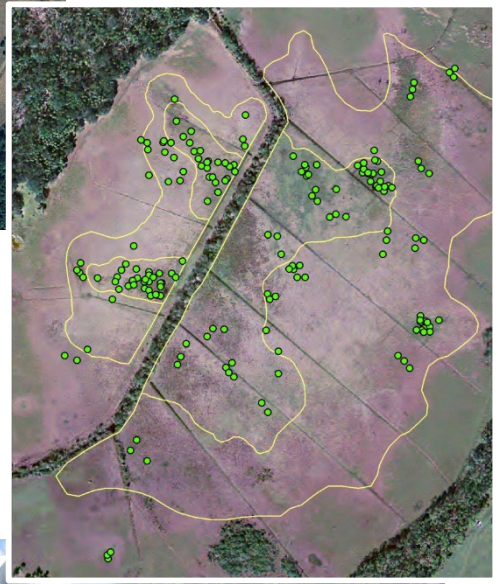


Richness and abundance of mosquitoes

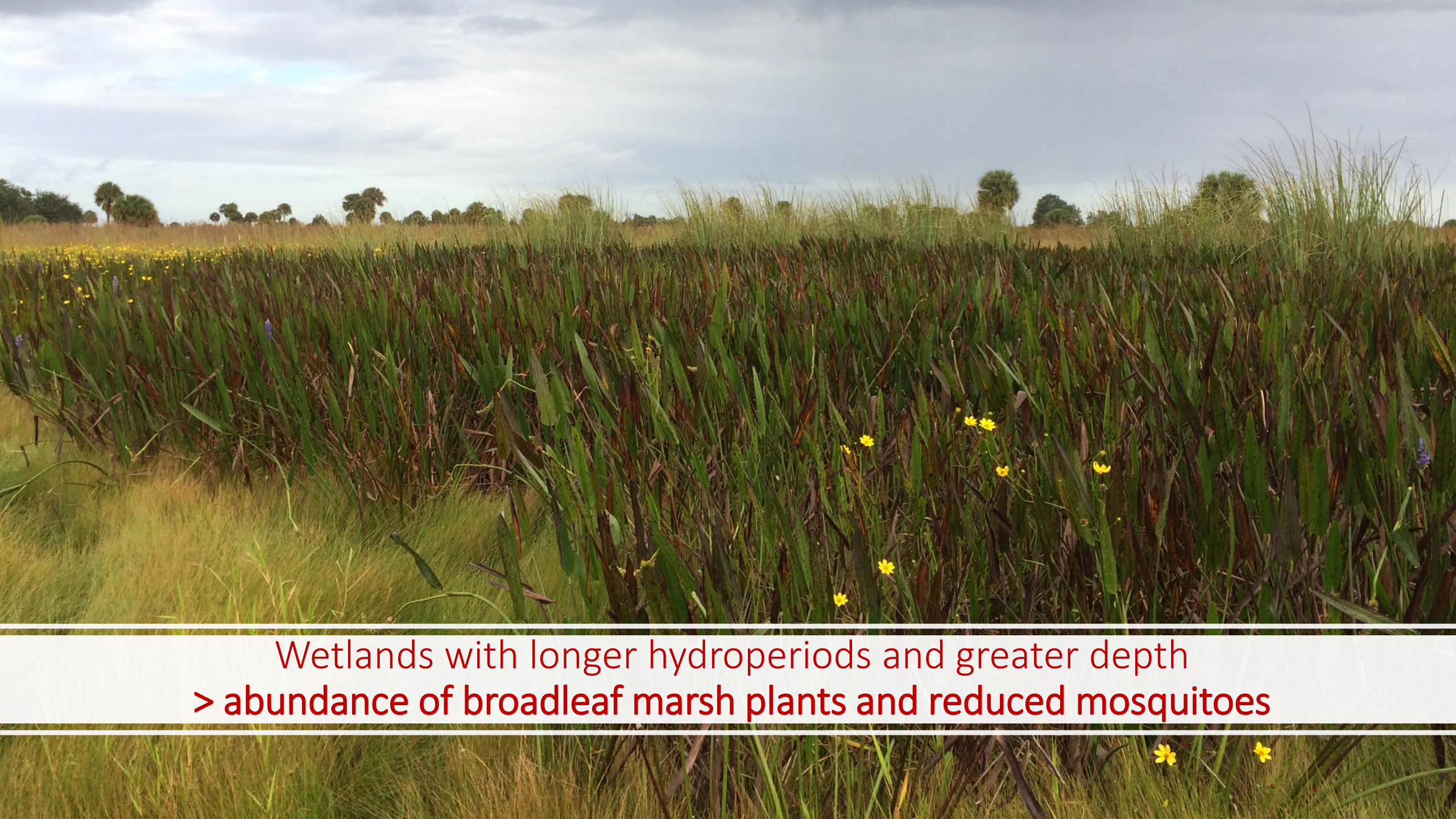
Natural gradients and wetland zones







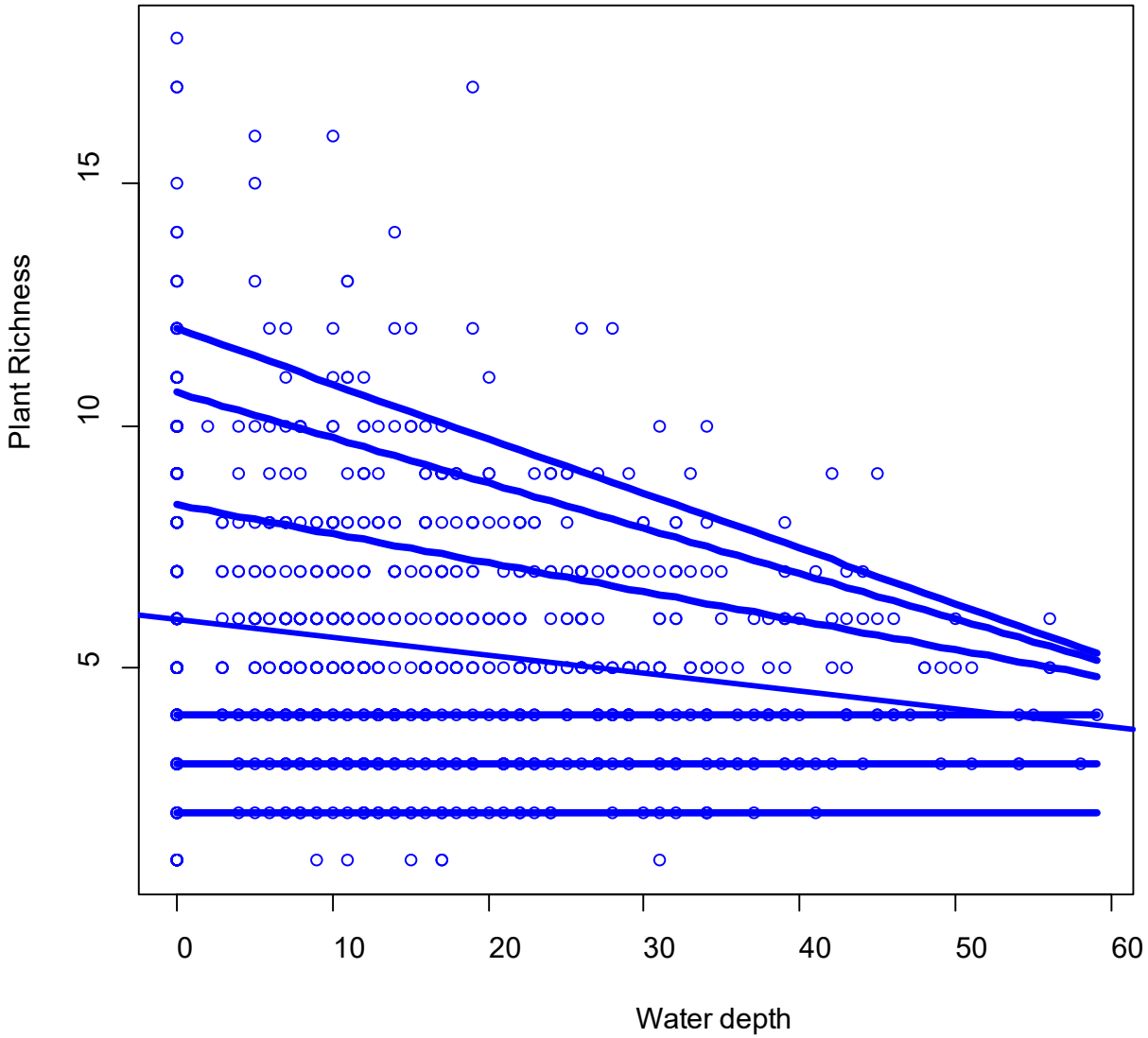
	Points	Wetlands
Depth	x	
Maximum depth	x	
Days full		x
Inundation Area		x
Volume		x
Days connected		x
Days since connected		x
Wetland maximum depth		x
Growing degree days	x	x
Ranch	x	x



Wetlands with longer hydroperiods and greater depth

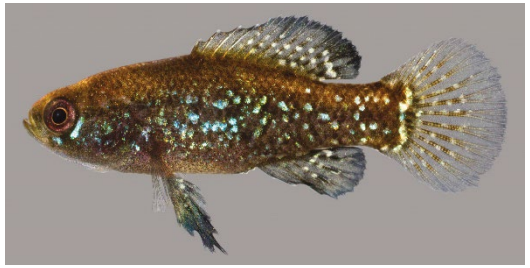
> abundance of broadleaf marsh plants and reduced mosquitoes

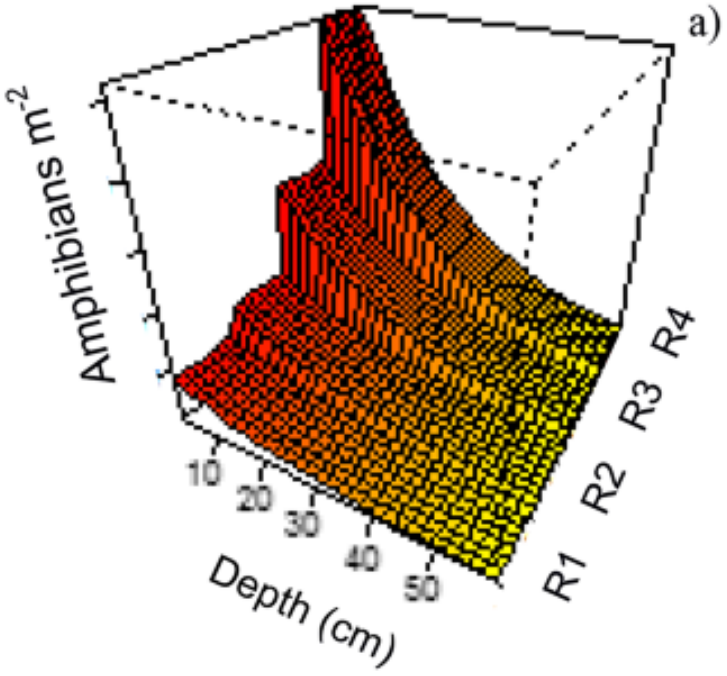
Plant richness and Forage declines with water depth

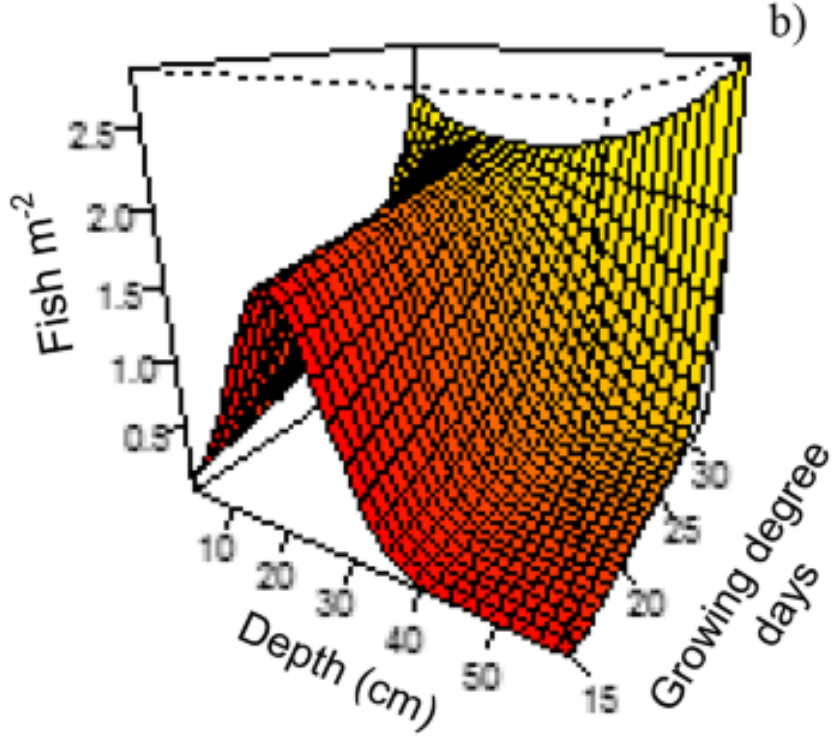


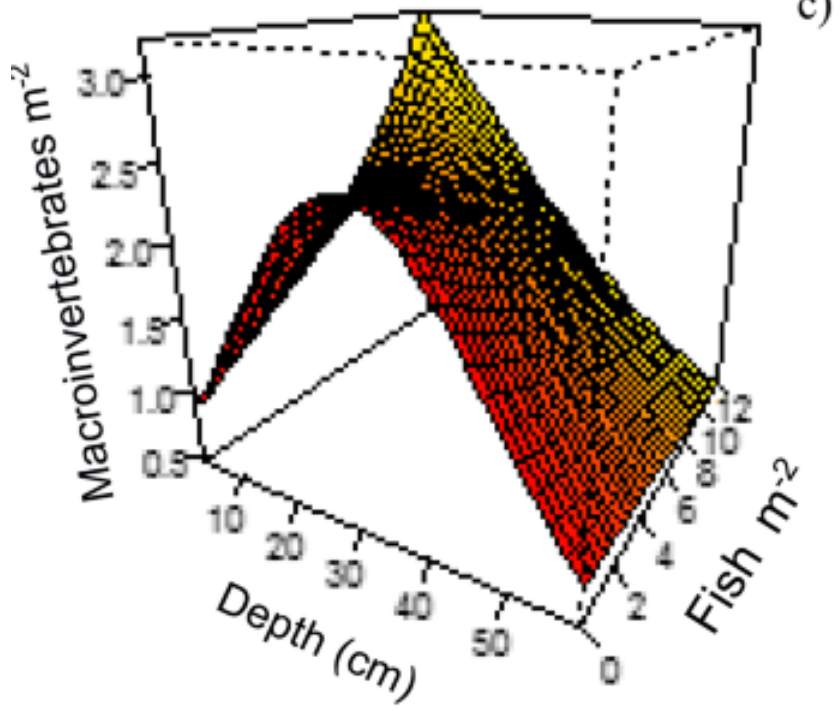
- Depth is a strong filter on plant richness
- Increasing depth reduces forage
- Palatable wetland grasses increase with depth, but do not offset the loss of upland forage

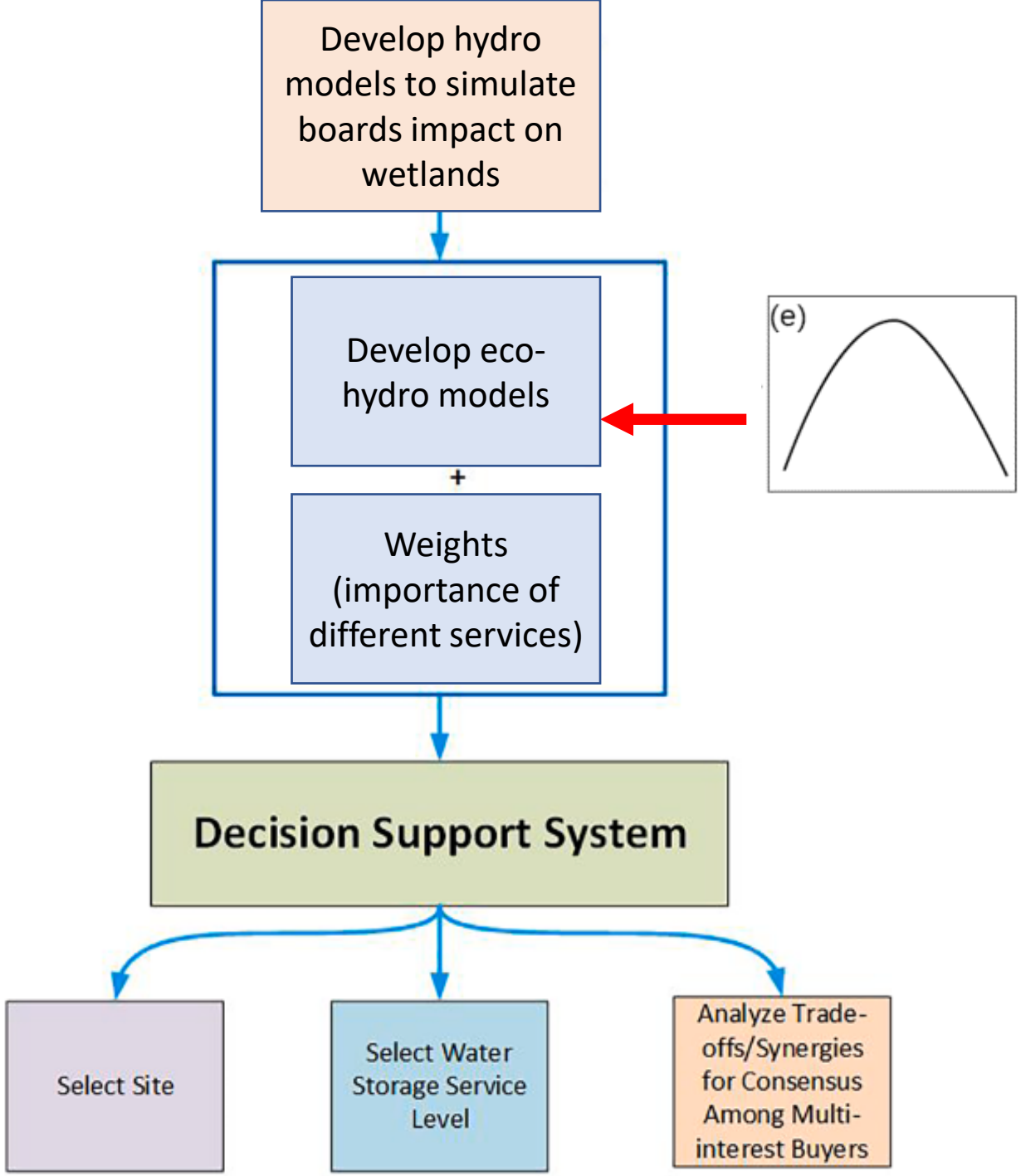
Shallow water habitat is important for fish, amphibians, and macroinvertebrates











Water storage projects may have variable impacts on biodiversity

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Decision Support Tool

Summary of co-benefits and trade-offs

- Synergies – greater depth and time inundated led to increases in wetland plants and reduced mosquitoes

- Potential tradeoffs –
  - Upland forage grasses decline, and wetland forages don't fully offset the loss
  - Plant diversity greater at shallow depths
  - Amphibians and macroinvertebrates greatest in abundance at shallow or intermediate depths
  - Amphibians decrease with longer time of inundation
  - Exotic plants increase with storage volume, but exotic plants were found in both shallow and flooded areas
  - PES program likely to increase most taxa if it increases shallow flooded areas, but not deep flooded areas
- Tradeoffs were more prevalent in wetlands surrounded by improved pasture

- Local trade-offs – but these projects at a watershed level benefit downstream estuaries

Florida Cattlemen's Association

Resources for the Future

Florida Department of Environmental Protection

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