



# Establishing a Protective Phosphorus Target for the WERP Region of Big Cypress National Preserve: Experiment

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# Outline

1. Project background and objective
2. Experimental design
3. Hypotheses
4. Experiment site selection
5. Project timeline

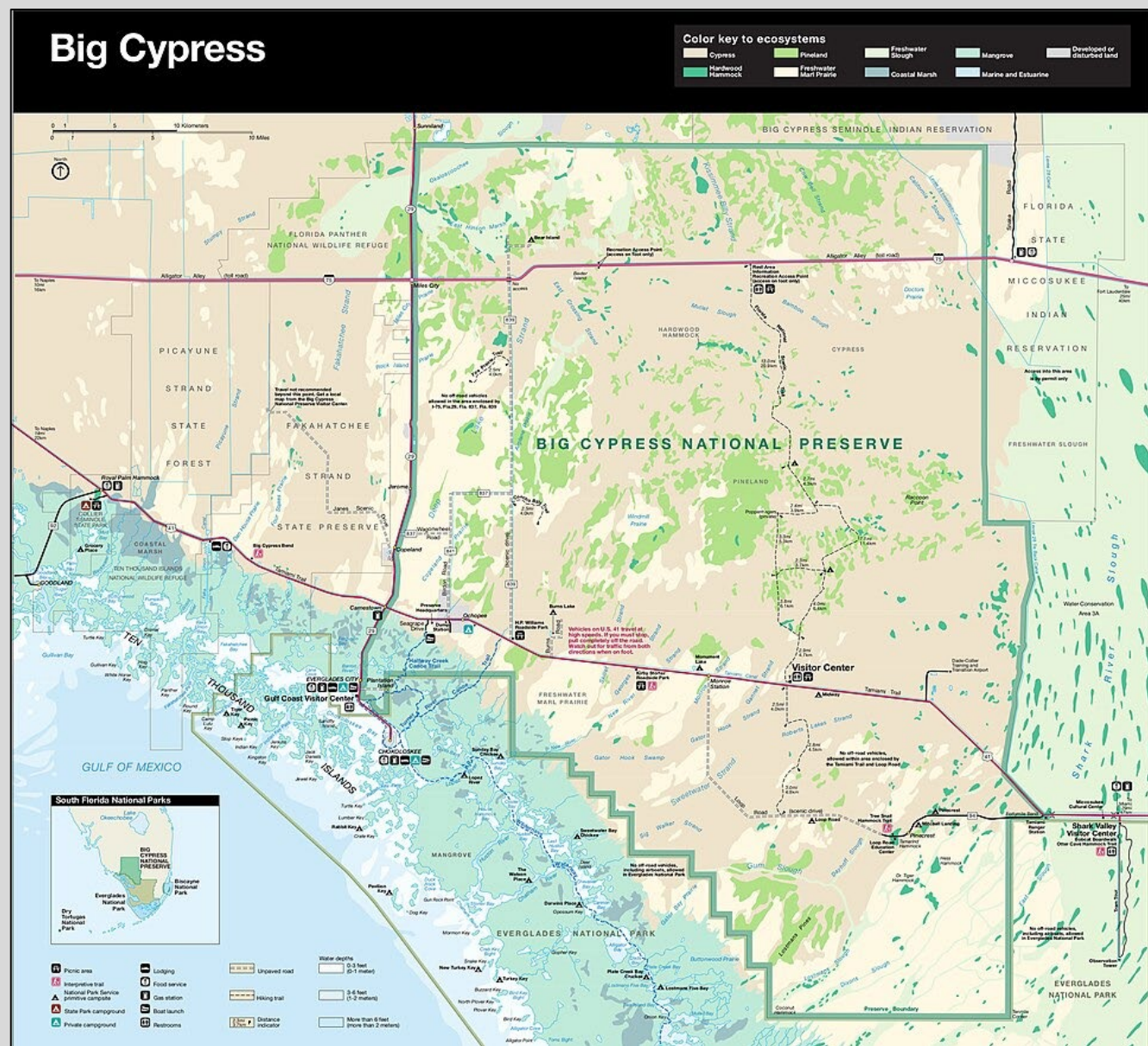


Image: U.S. National Park Service, restoration/cleanup by National Park Maps (<https://npmaps.com>), Public domain, via Wikimedia Commons



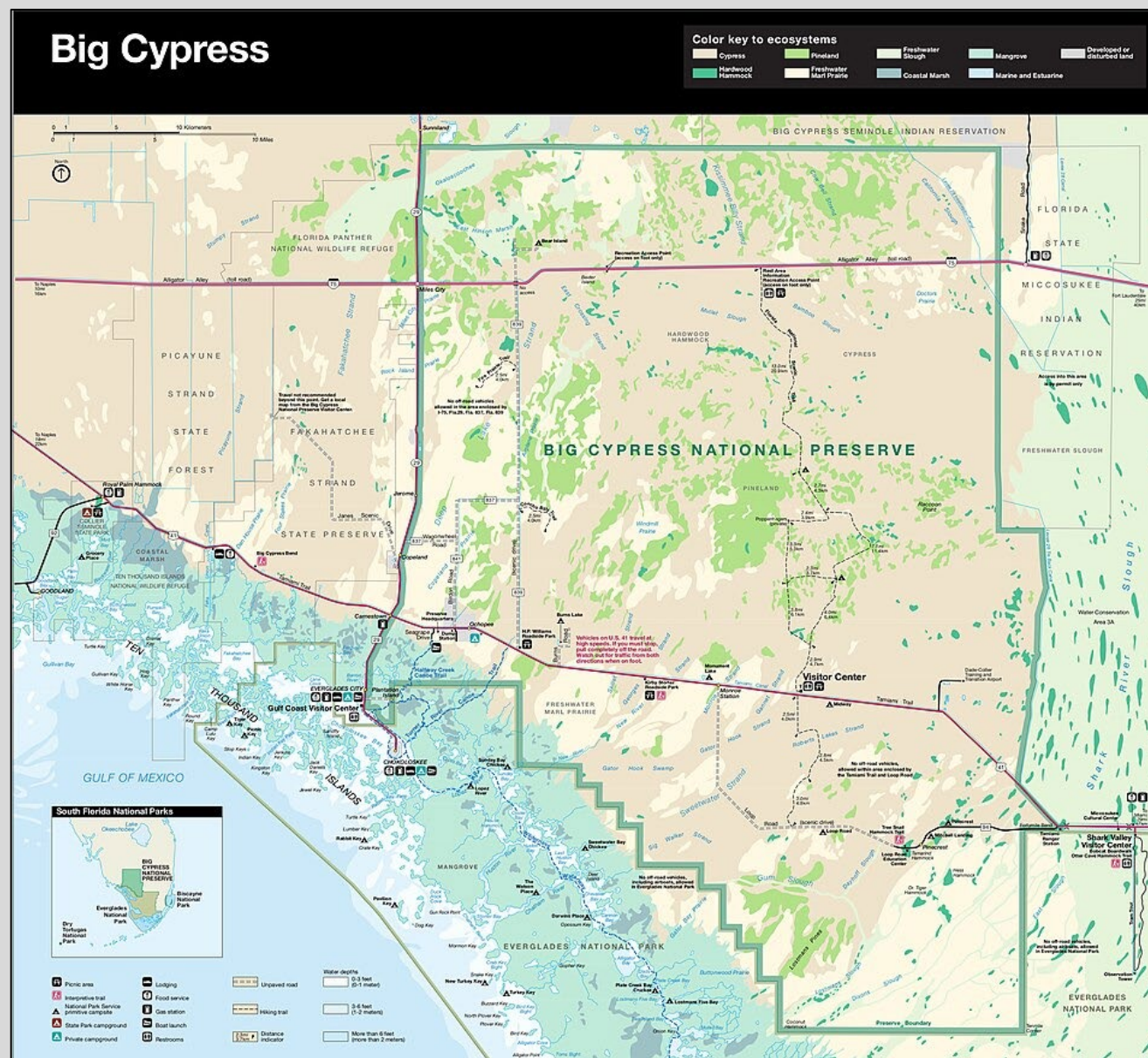


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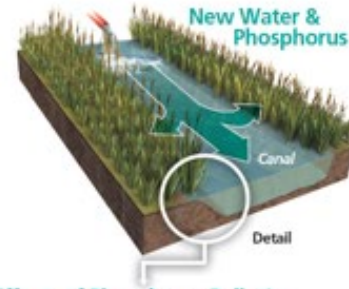
P

P

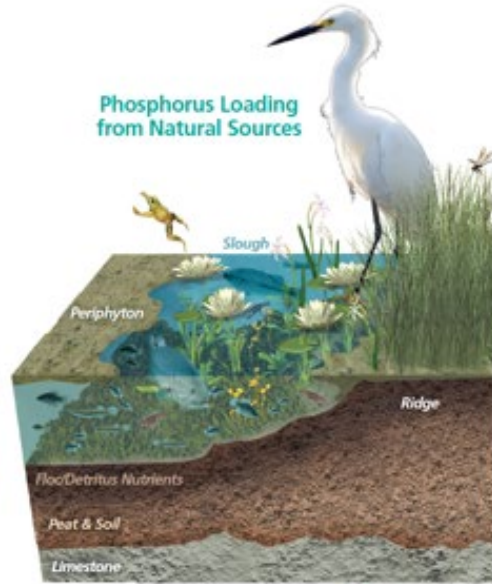


# Water Quality

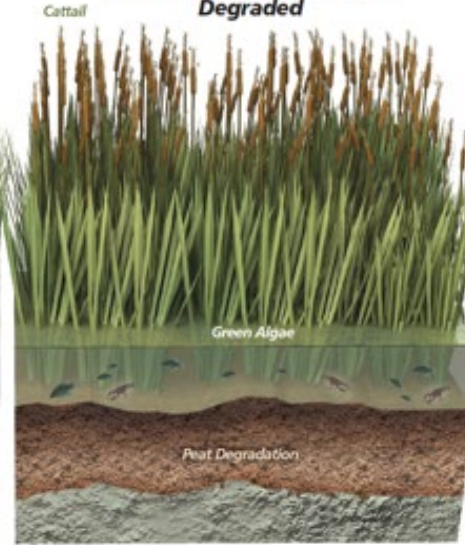
## Cascading Effects of Phosphorus Pollution



Phosphorus Loading  
from Natural Sources



Effects of Phosphorus Pollution  
**Degraded**



**Difference From  
Natural State**

Phosphorus Loading

High/Near Source

Low/Distant Source

TIME

Same Outcome

OUTCOME

Periphyton

Blue-Green Algae

Green Algae

Dense Cattail

Large Fish

Small Fish

Landscape Pattern





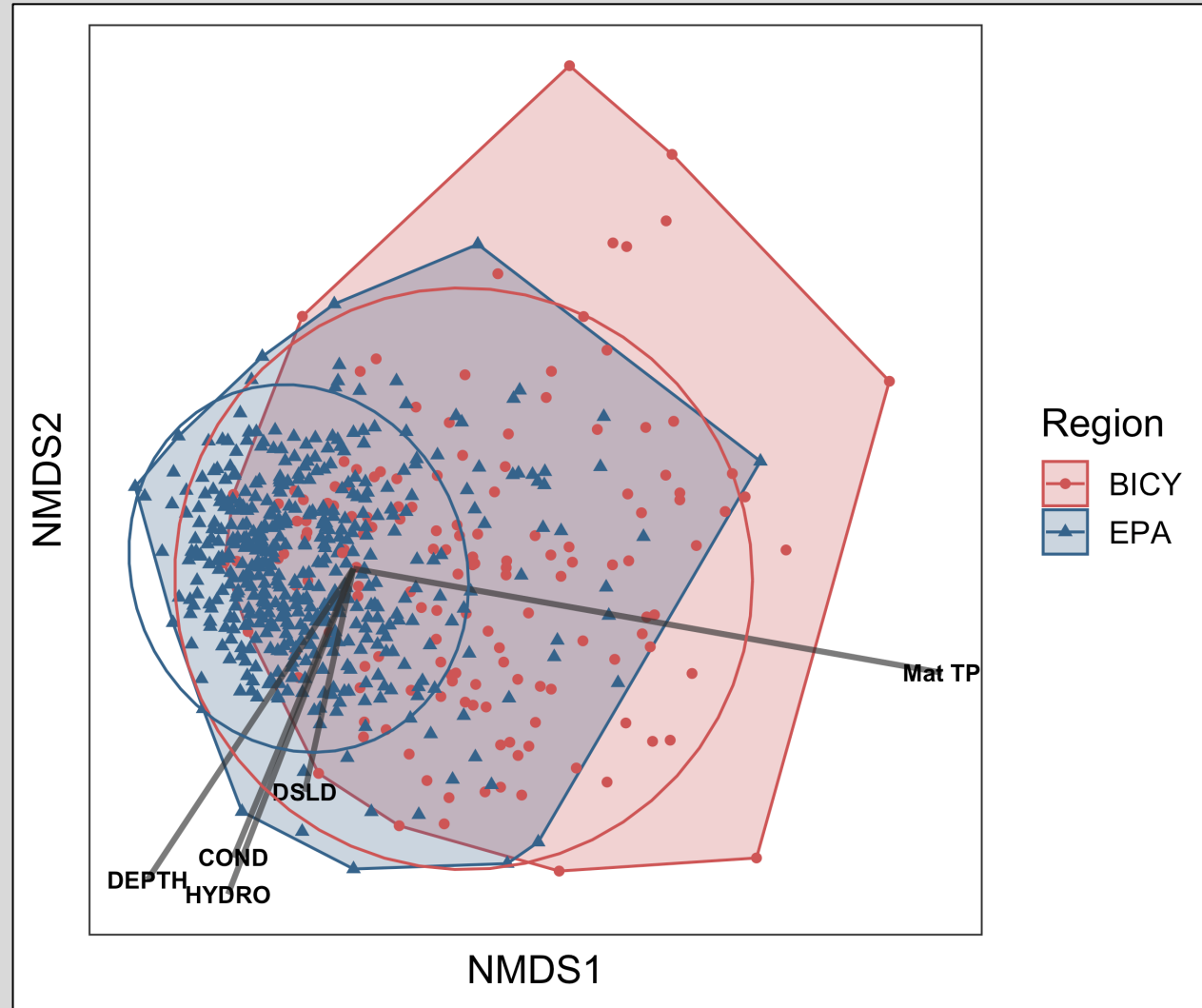
Periphyton communities are a better indicator of P enrichment than water column P (Gaiser et al. 2004)



Periphyton  
“sweaters” in  
BICY



# BICY and EVER algal periphyton assemblages are similar and strongly influenced by P gradients





Currently, there is no protective P target for BICY

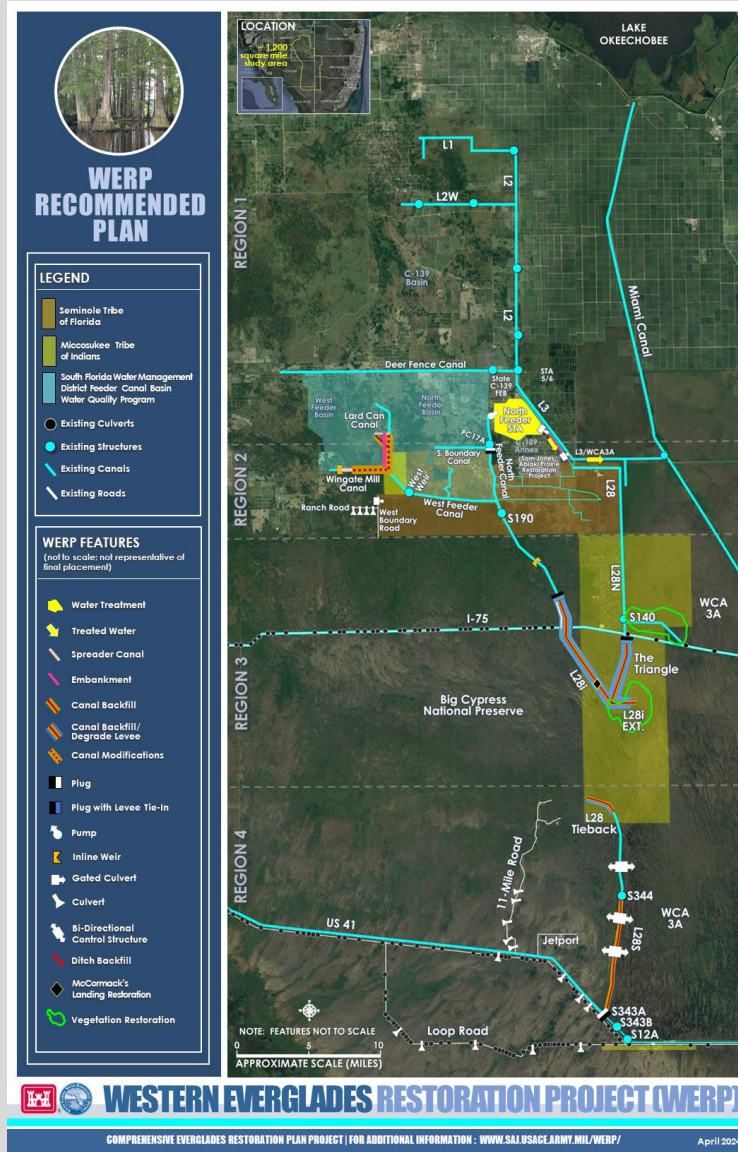
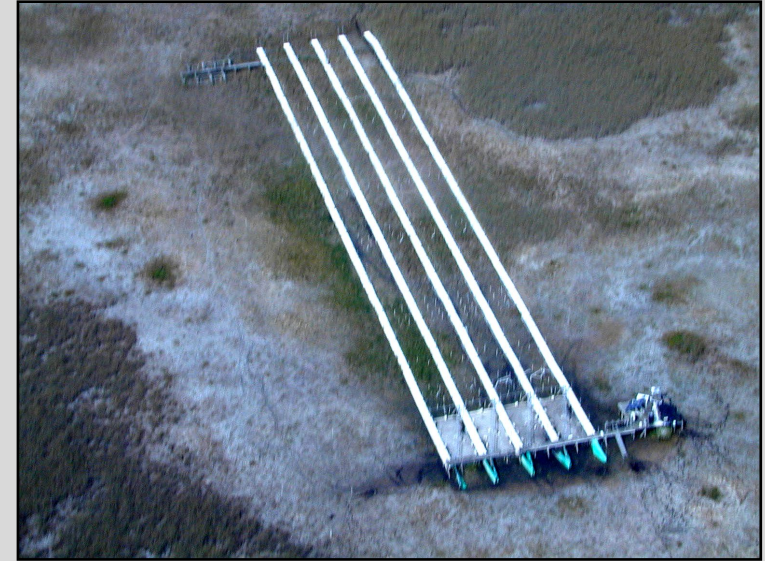


Image: <https://www.saj.usace.army.mil/WERP/>

# Objective

Quantify a protective phosphorus target for the WERP zone of BICY by using an *in situ* flow-through flume design to assess periphyton and other ecosystem responses to phosphorus additions.

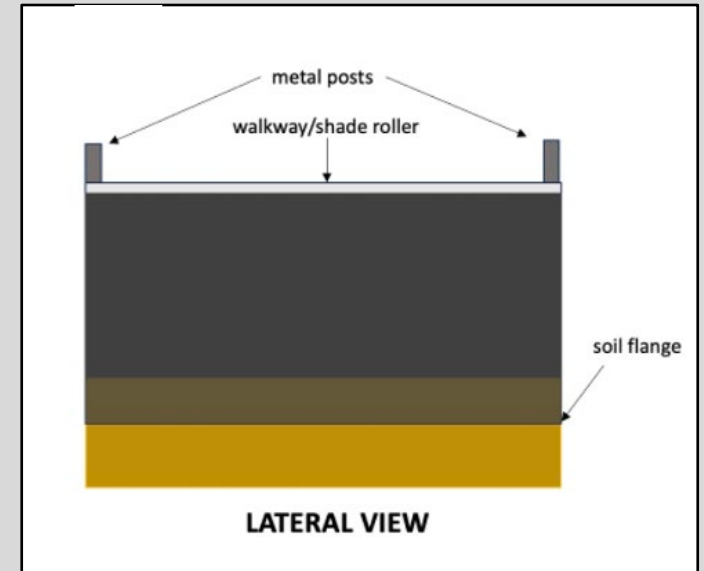




## 10

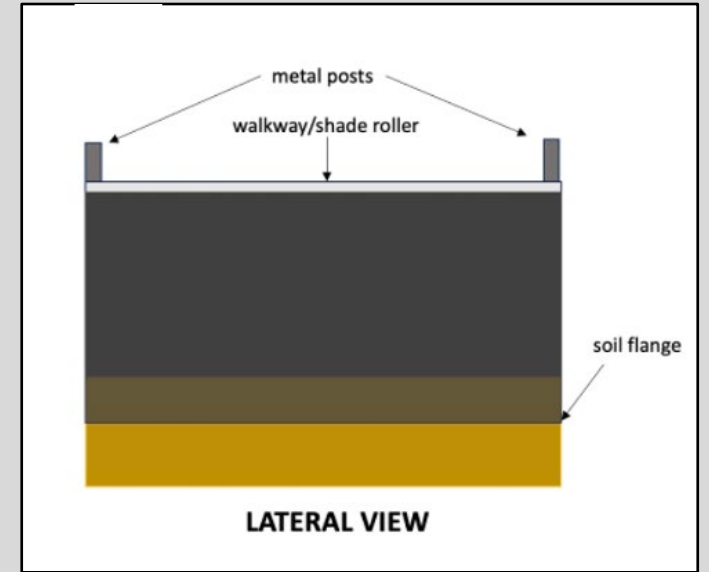
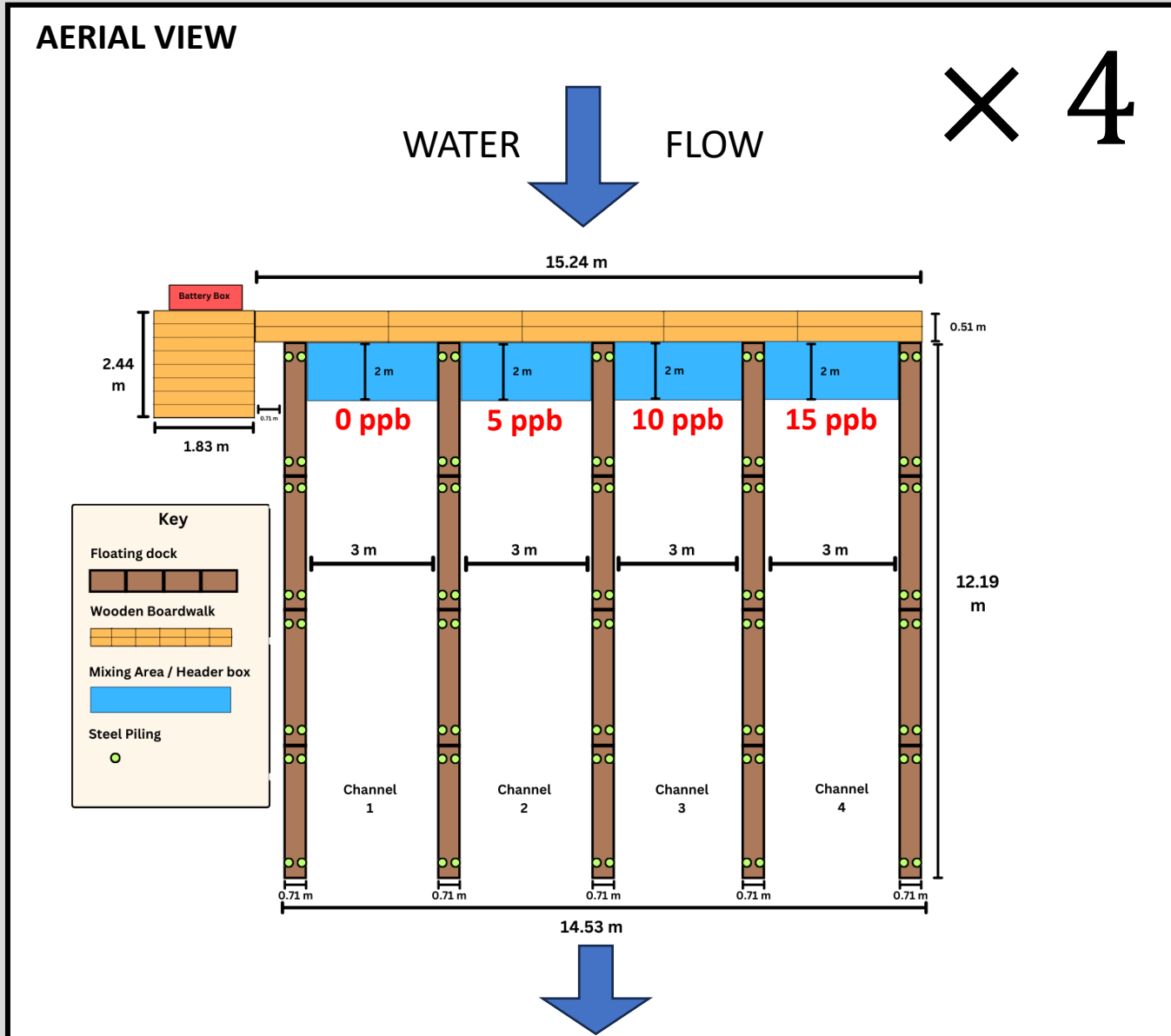


## 11





# Flume design



# Response variables



Estimating periphyton cover



# Response variables

- Meteorological
  - Wind speed and direction, rainfall, temperature, humidity, solar radiation, barometric pressure, lightning



Estimating periphyton cover

# Response variables

- Meteorological
  - Wind speed and direction, rainfall, temperature, humidity, solar radiation, barometric pressure, lightning
- Water physical and chemical
  - Water column nutrients
  - DO, pH, conductivity, temperature
  - Depth and velocity



Estimating periphyton cover



# Response variables

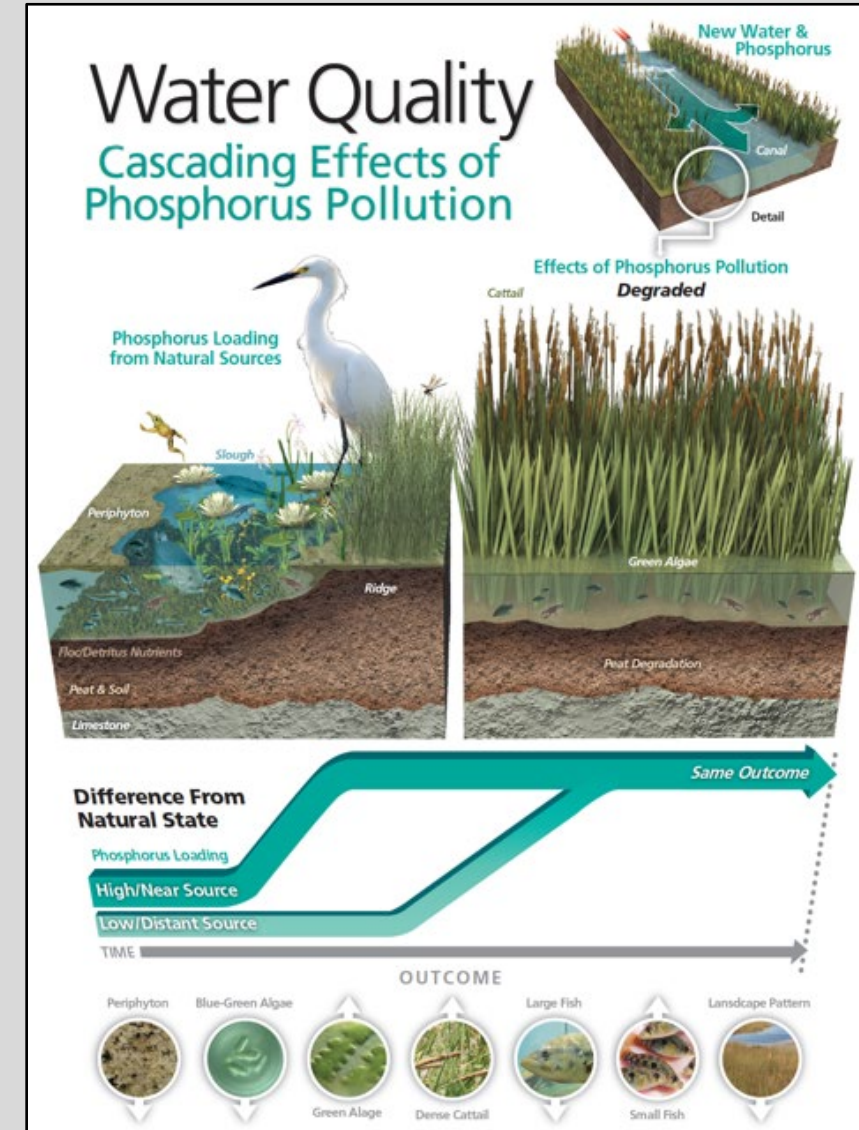
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- Water physical and chemical
  - Water column nutrients
  - DO, pH, conductivity, temperature
  - Depth and velocity
- Biological
  - Periphyton – *every 8 weeks*
    - Cover, nutrients, biomass, species, accumulation
  - Floc– *every 8 weeks*
    - Composition, nutrients
  - Macrophytes – *every three months*
    - Composition, biomass, nutrients
  - Consumers -- *biannually*
    - Composition, biomass
  - Soils – *annually*
    - Composition, nutrients



Estimating periphyton cover

# Hypotheses

1. Rate of change will depend on input concentration.
2. Rate of change will vary with response parameter.

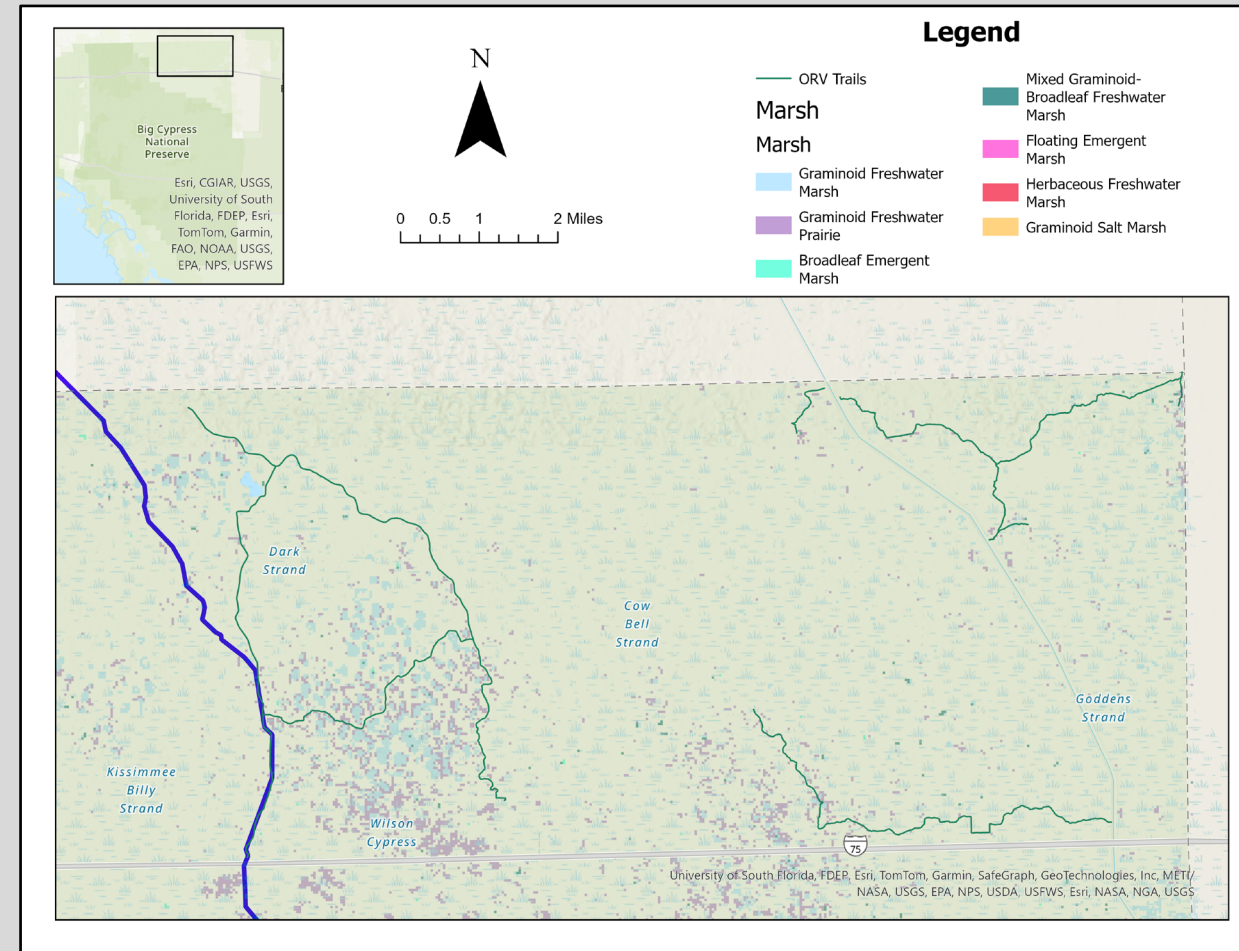




# Flume experiment site selection

## Site selection criteria

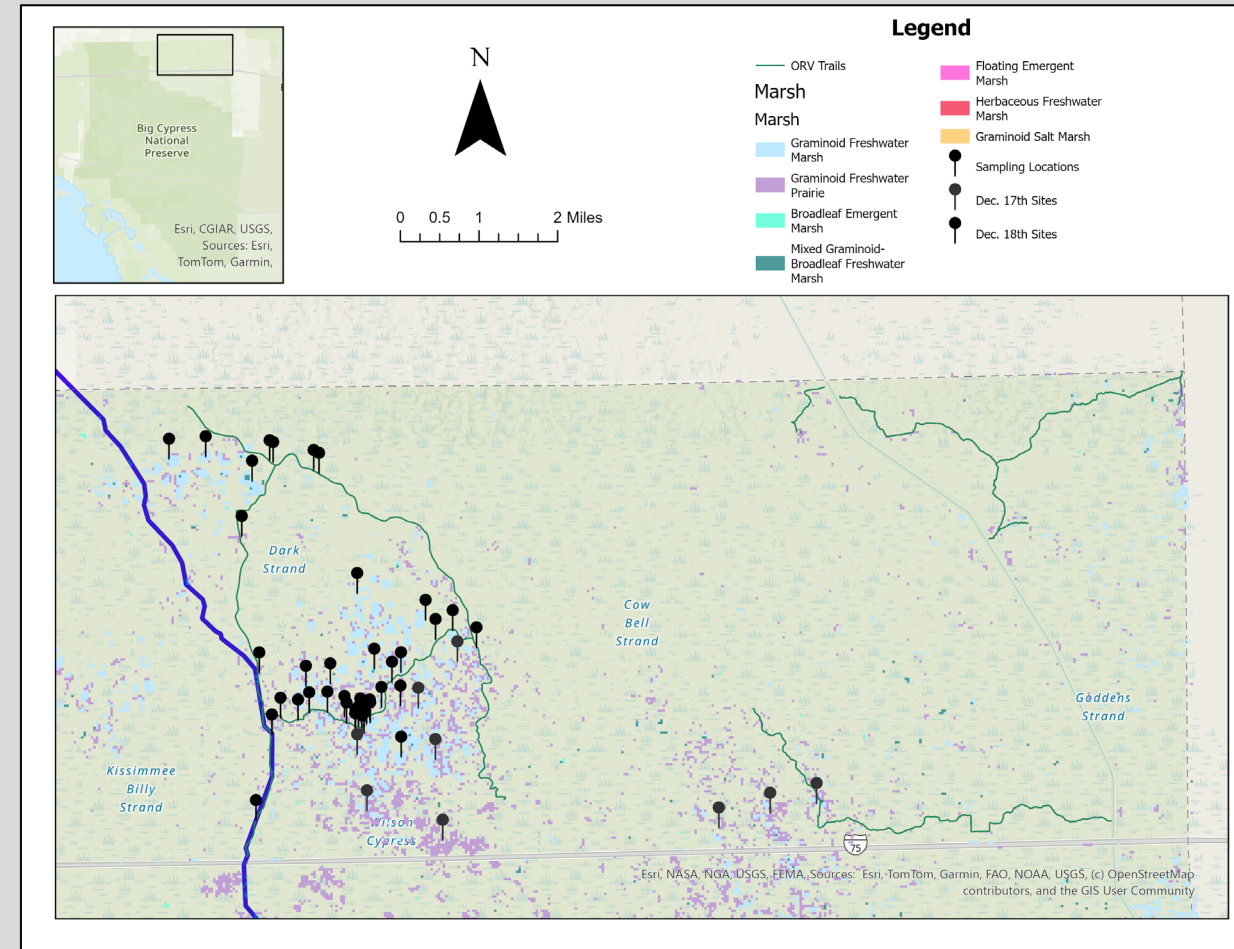
1. Within WERP footprint of BICY & north of I-75
2. Marsh habitat
3. Calcareous periphyton presence
4. Does not show evidence of nutrient enrichment
5. Demonstrates water flow during wet season
6. Sufficient water depths (relative to the area)
7. Accessible by swamp buggy/UTV



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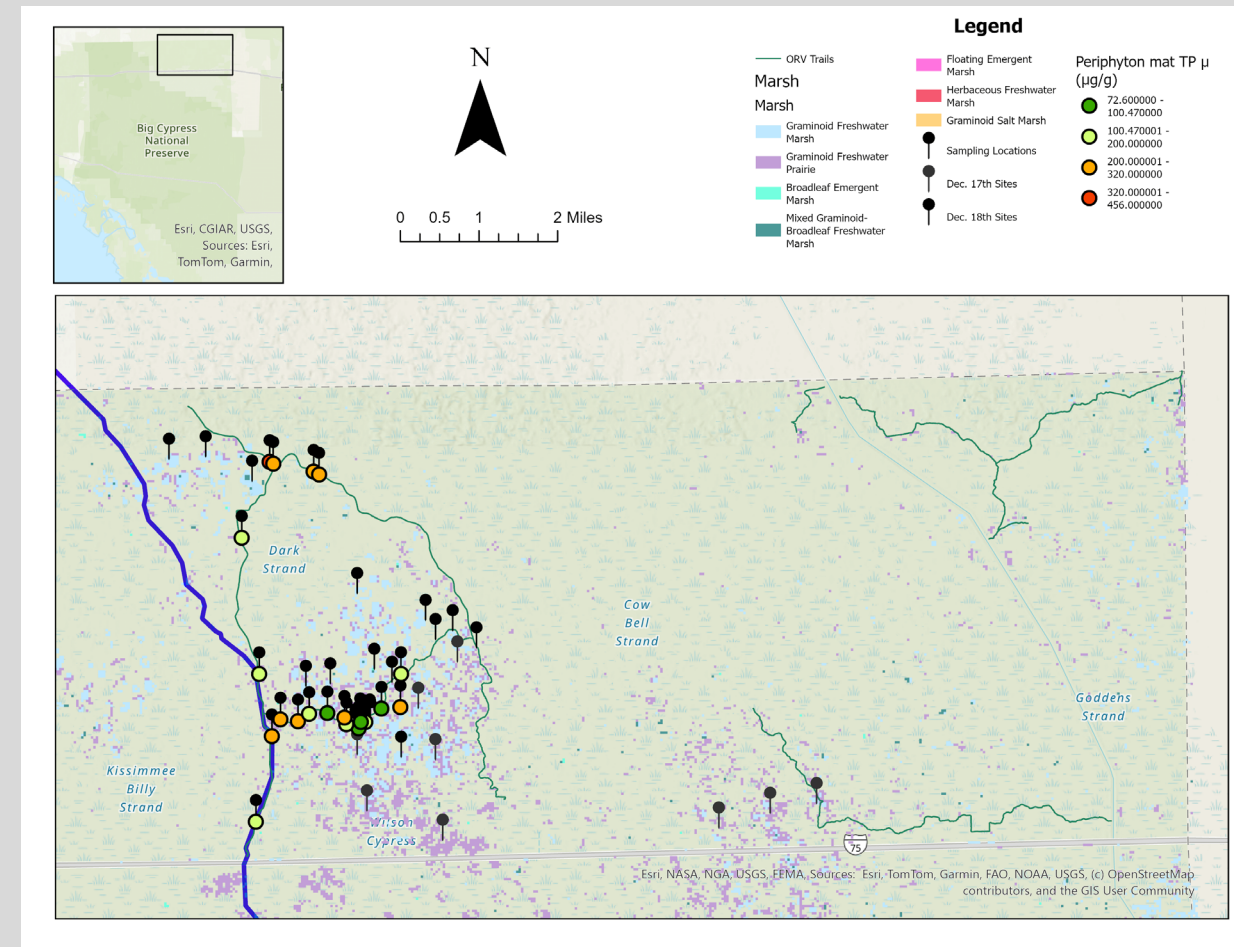
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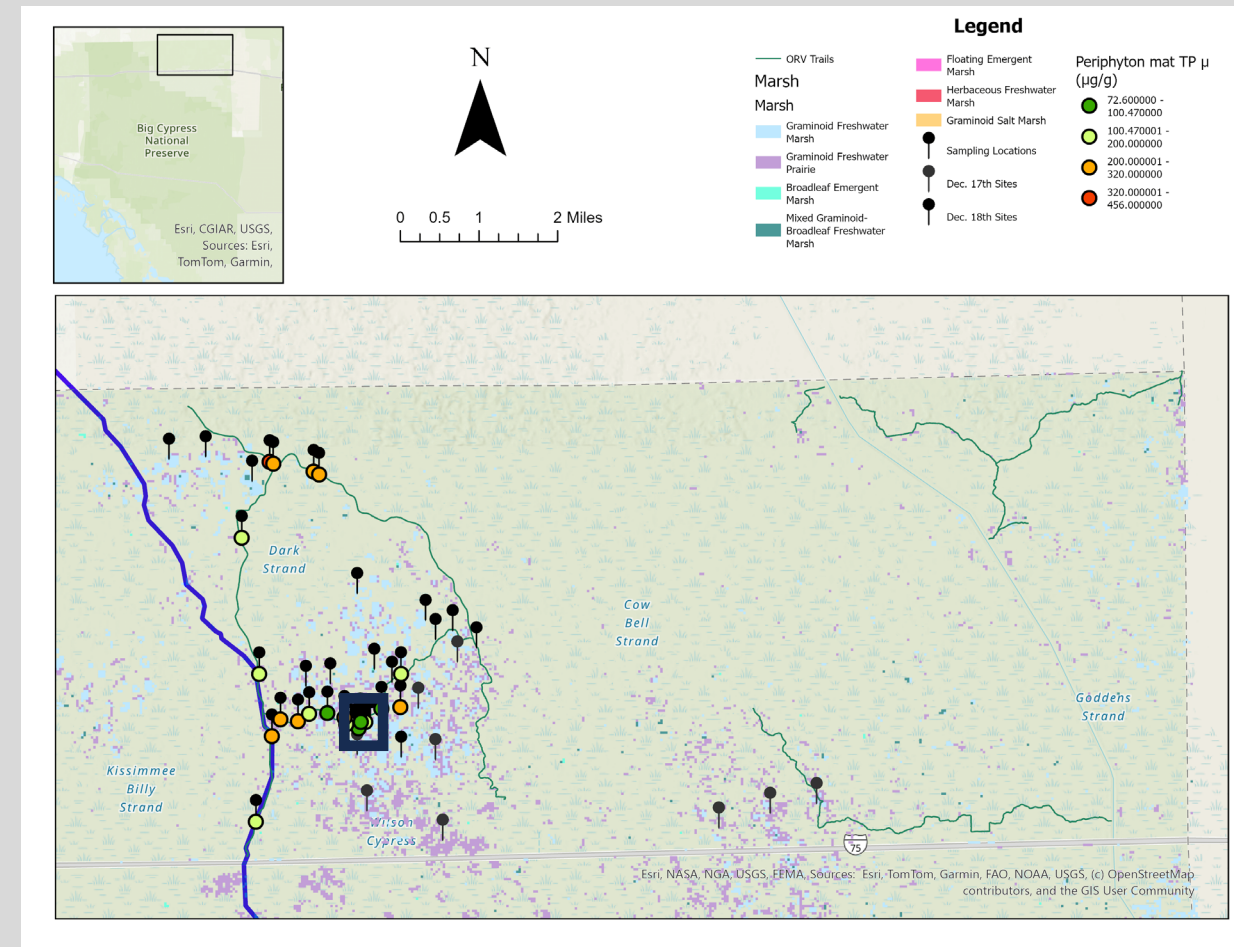




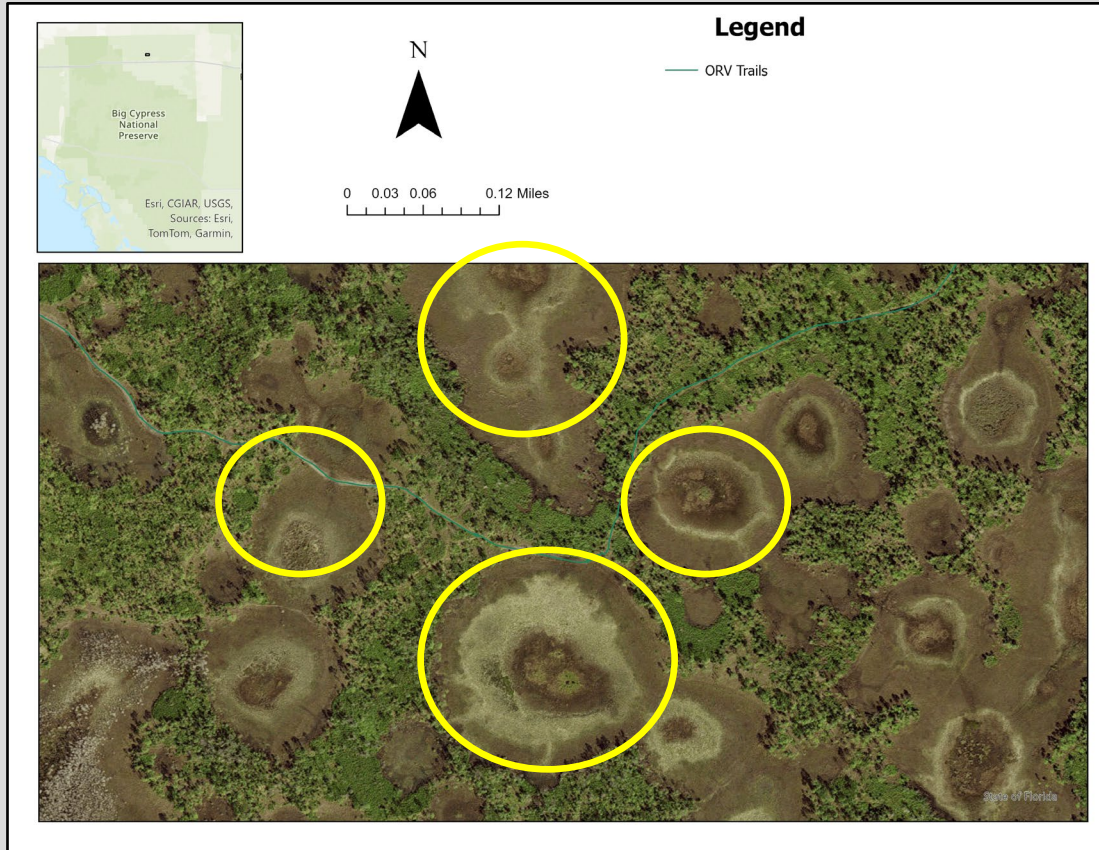
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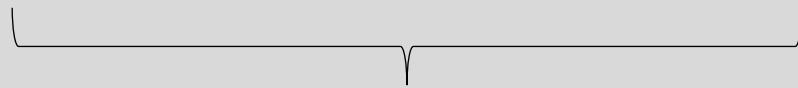
# Flume experiment site selection



# Experiment timeline

2025

JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
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- Finalizing flume site selections
- Purchasing equipment
- Dock and boardwalk construction
- Securing permits



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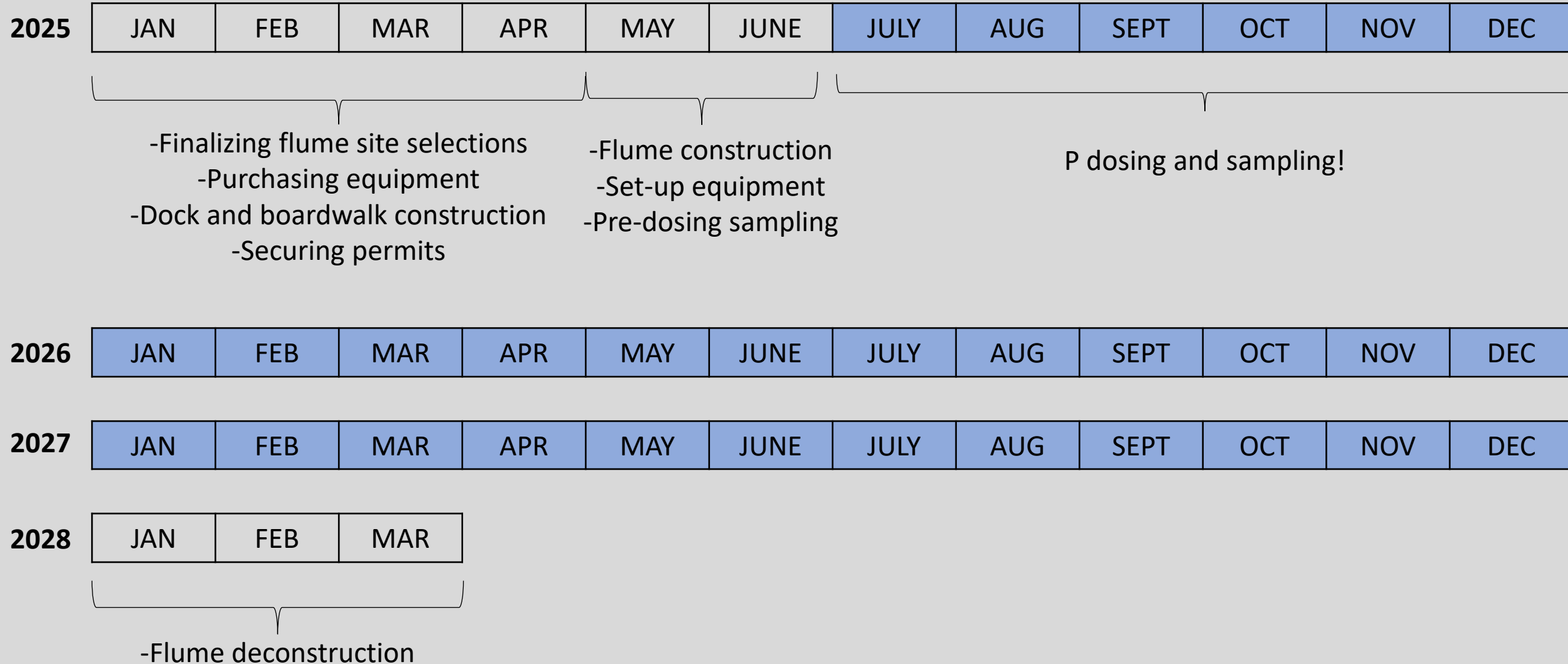
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-Pre-dosing sampling

P dosing and sampling!





# Experiment timeline









# Acknowledgements



## Funding for Experiment Planning and Recon.

- Department of Interior/National Park Service
- George M. Barley Jr. Eminent Scholars Chair Endowment at FIU



## Funding for Experiment

- Department of Interior/National Park Service
- Miccosukee Tribe of Indians of Florida
- Florida Department of Environmental Protection
- Everglades Foundation



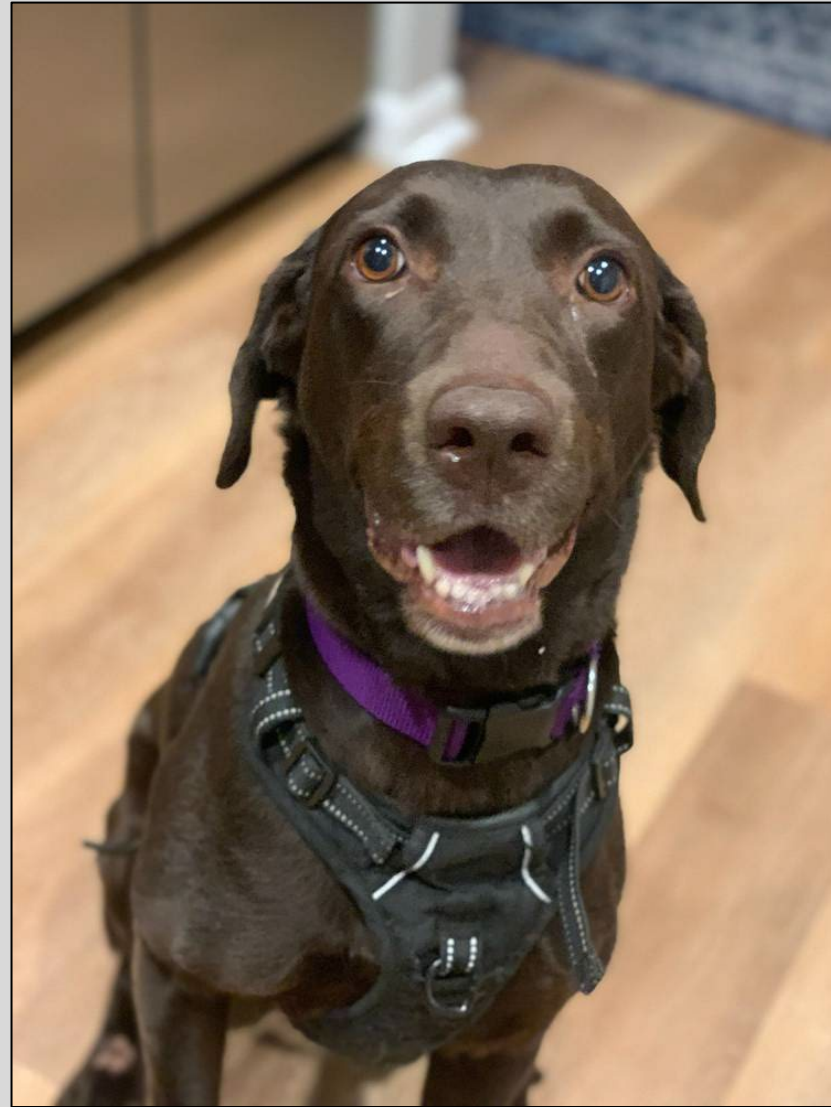
## Other

- NPS South Florida/Caribbean Inventory & Monitoring Network
- Periphyton Lab at FIU
- Developed in collaboration with the Florida Coastal Everglades LTER





Questions?  
ksolomon@fiu.edu



Perla  
(named after *Tallaperla maria*)