A misty landscape with a body of water, reeds, and distant hills. The scene is serene and atmospheric, with soft light filtering through the fog. The water is calm, reflecting the surrounding environment. Reeds are visible in the foreground, and hills are visible in the distance.

**A paradigm shift:
Rethinking *Phragmites* in the context of
potential positive ecosystem services now and
in the near future**

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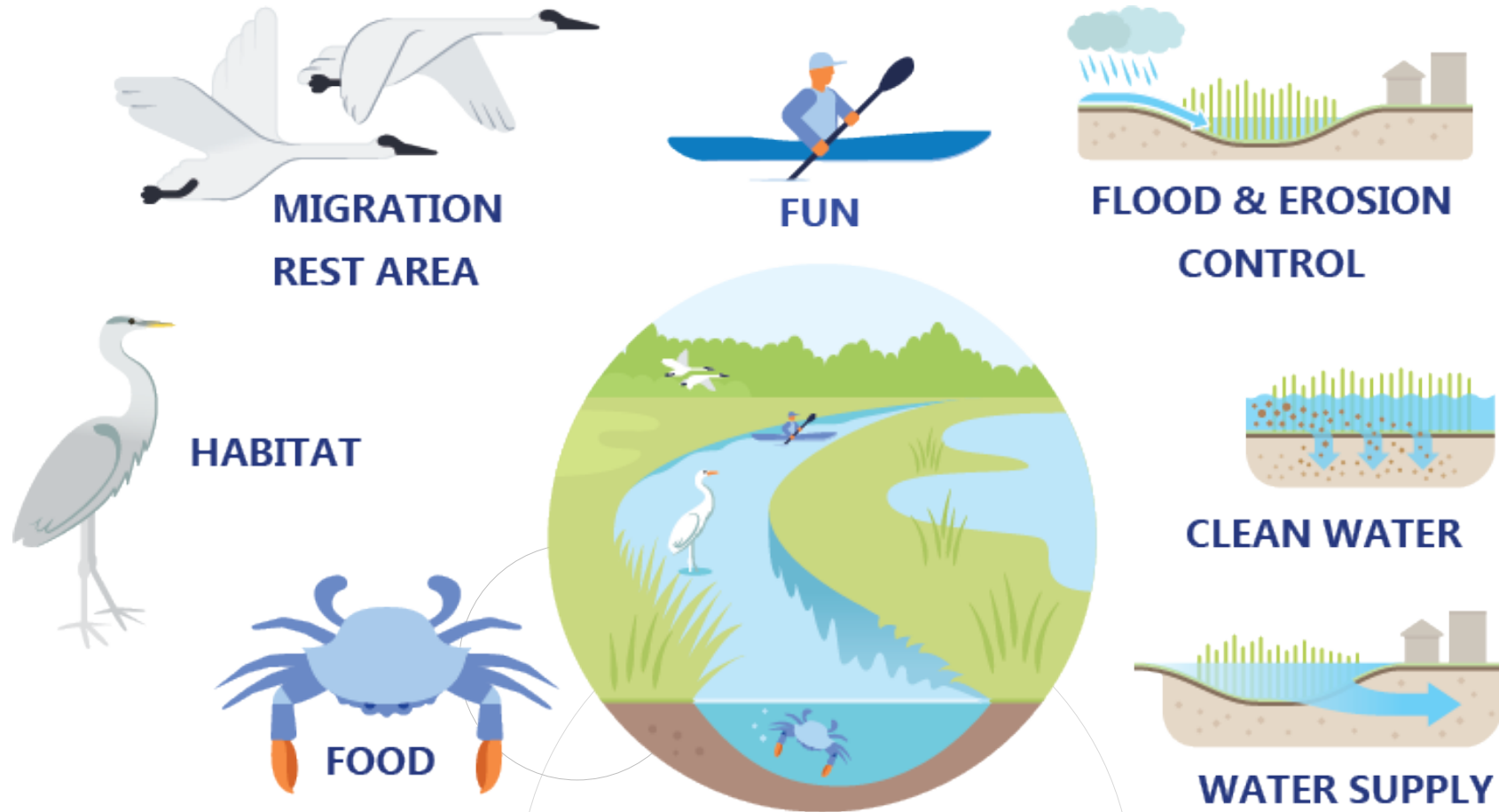
Hudsonia







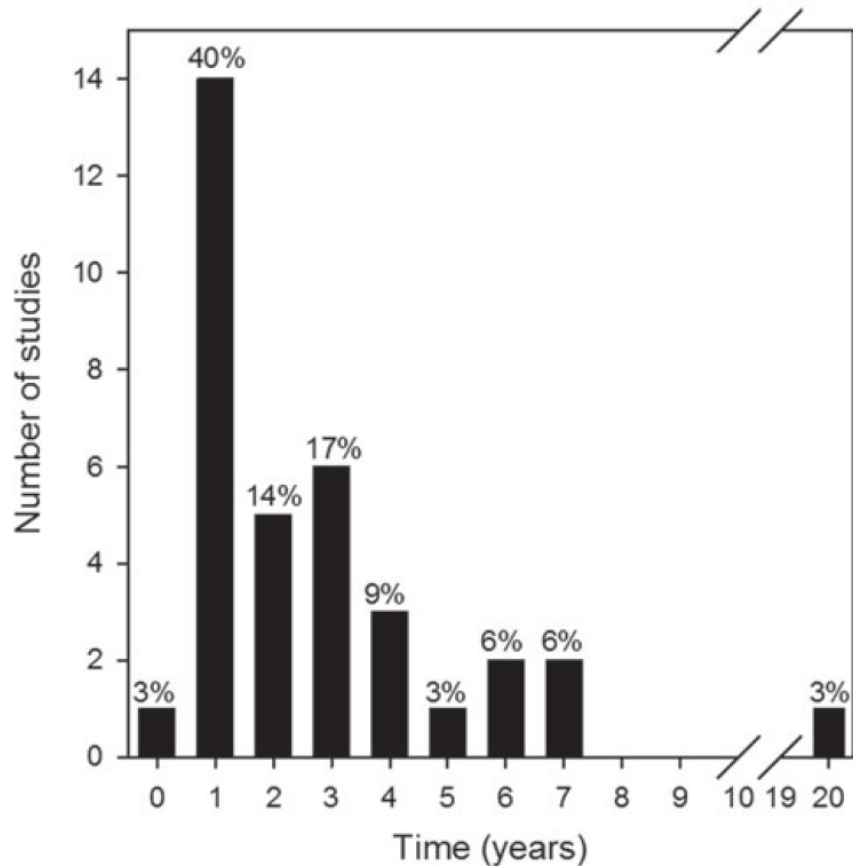
Coastal wetlands provide many ecosystem services



Lessons learned from 50 years of *Phragmites* management

Phragmites australis management in the United States: 40 years of methods and outcomes

Eric L. G. Hazelton^{1,2*}, Thomas J. Mozdzer^{2,3†}, David M. Burdick⁴, Karin M. Kettinger^{1,2} and Dennis F. Whigham²



- Studies do not last long enough

Figure 1. Duration of studies included in review. One study conducted a single survey and is denoted with the time = 0 bar.

Lessons learned from 50 years of *Phragmites* management

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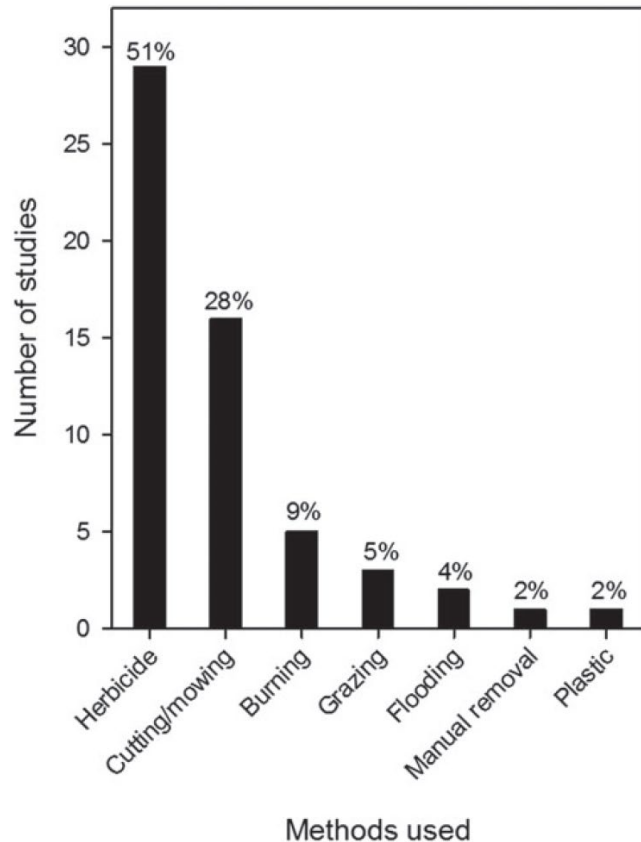


Figure 2. Management methods used in reviewed articles. Methods used in combination are counted individually.






- Studies do not last long enough
- Herbicides are most common approach & are effective at removing *Phragmites*
- Little information on “restored” plant communities

ARTICLE

Coastal and Marine Ecology

ECOSPHERE
AN ESA OPEN ACCESS JOURNAL

Landscape and site factors drive invasive *Phragmites* management and native plant recovery across Chesapeake Bay wetlands

Christine B. Rohal¹  | Eric L. G. Hazelton^{1,2}  | Eliza K. McFarland² |
Rebekah Downard¹ | Melissa K. McCormick²  | Dennis F. Whigham²  |
Karin M. Kettenring¹ 

ORIGINAL RESEARCH

Ecology and Evolution  WILEY

Invasive *Phragmites australis* management outcomes and native plant recovery are context dependent

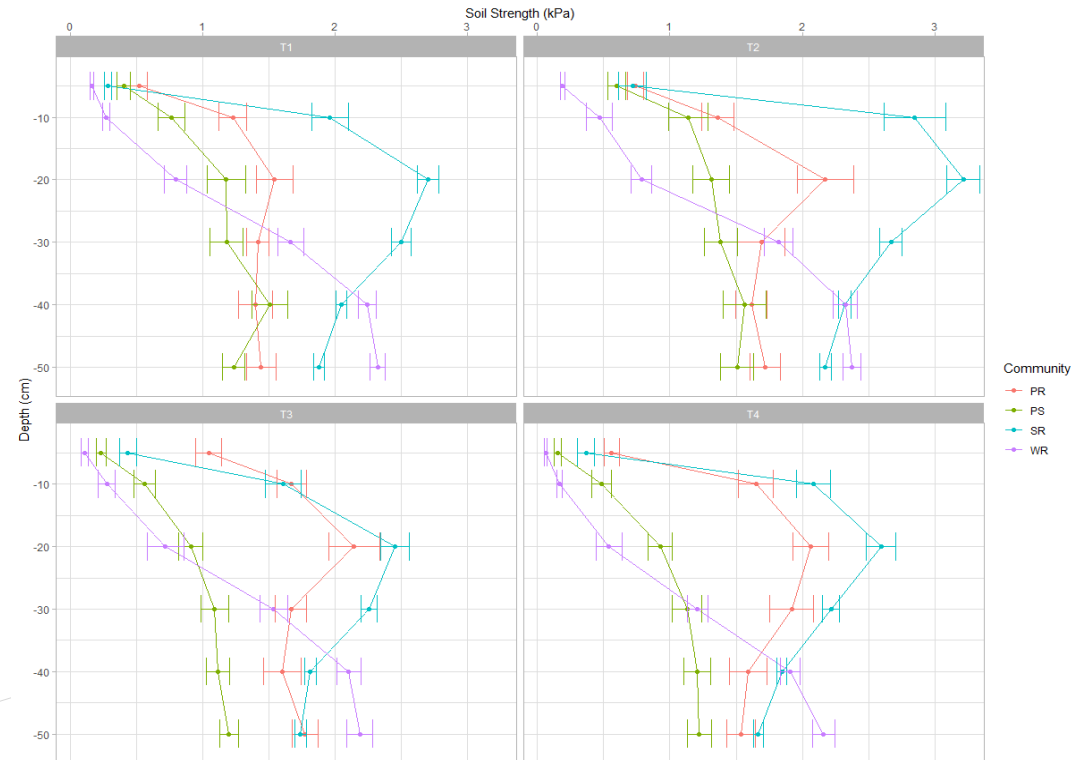
Christine B. Rohal^{1,2}  | Chad Cranney^{1,3} | Eric L. G. Hazelton¹  | Karin M. Kettenring¹ 

Restored plant communities do not resemble reference sites after 5 years of management



In my own recent research at Heinz NWR

- Management lowered soil shear strength & accelerated decomposition rates
- Management reduced ecosystem resilience to RSLR



Soil shear strength (kPa) at the Heinz NWR across two years. Note that native vegetation communities exhibit contrasting depth profiles of soil strength, with a substantial decrease in shear strength after herbicide treatment in times T2-T4 in the PS (*Phragmites* sprayed) community.

Overarching Question

Does *Phragmites* provide similar ecosystem services when compared to native coastal marsh species in North America?

Hypothesis

***Phragmites* provides similar ecosystem services as native plant communities in tidal ecosystems**

Summary

Does *Phragmites* provide similar ecosystem services when compared to native tidal coastal marsh species in North America?

YES!

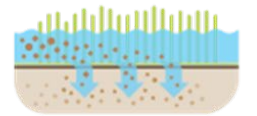
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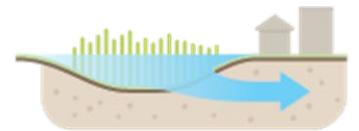
HABITAT



FOOD



CLEAN WATER



WATER SUPPLY



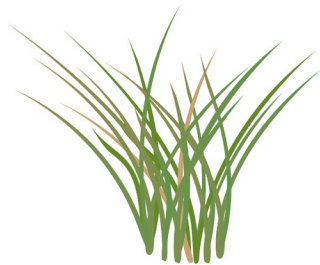
FLOOD & EROSION
CONTROL

Summary

Does *Phragmites* provide similar ecosystem services when compared to native coastal marsh species in North America?

YES!

=



Are there any differences in ecosystem services between Native and *Phragmites* communities?

YES – But *Phragmites* provides many ecosystem services contrary to what is often reported in the literature when comparing “individual” variables



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Smithsonian Global Change Research Wetland



SWS
**WETLANDS OF
DISTINCTION**

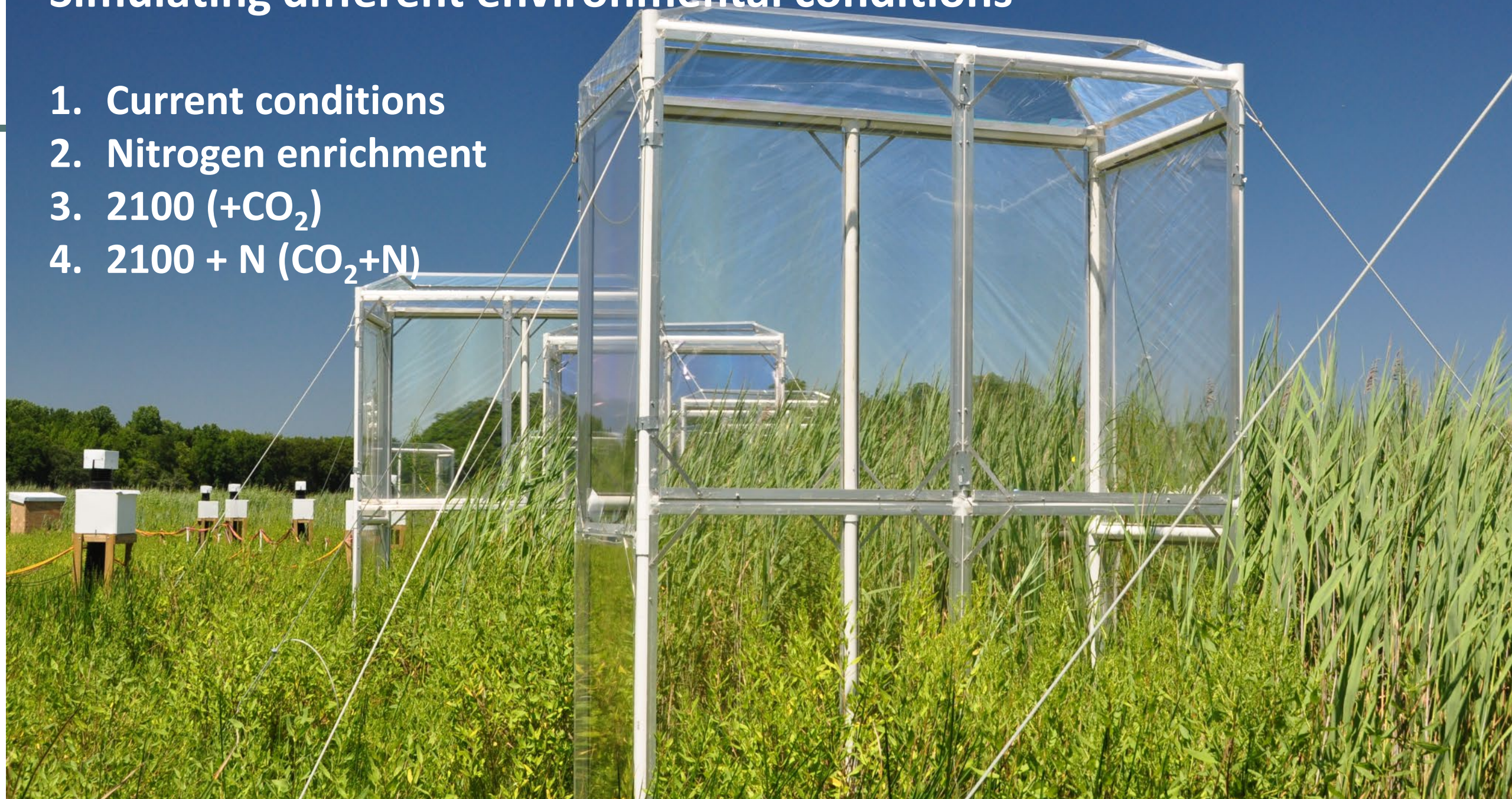
Recognizing the world's most valuable wetland ecosystems.



Photo: Chuck Gallegos, aerial support by LightHawk

Simulating different environmental conditions

1. Current conditions
2. Nitrogen enrichment
3. 2100 (+CO₂)
4. 2100 + N (CO₂+N)



Phragmites is more productive and fixes up to 3 times more carbon than native plants under current & near-future conditions

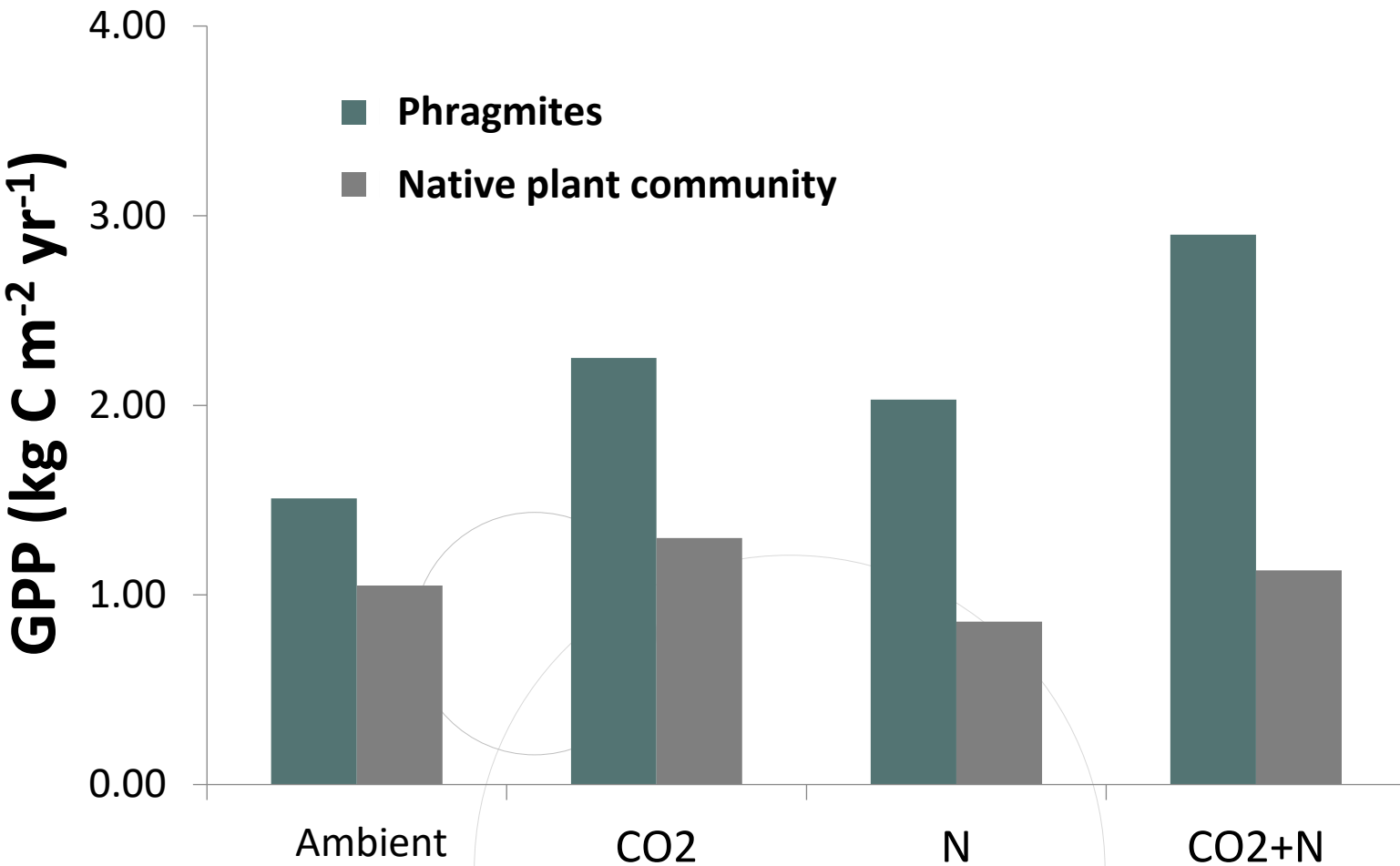




Photo courtesy of Bob Meadows

Implications

- NOT advocating for a cessation of *Phragmites* management, but a re-evaluation of where and when we manage with respect to maintaining ecosystem resilience.
 - Scale matters with herbicide treatment (Rohal et al. 2019)
 - Small (5m²) to medium scale restoration <1,000 m² can be effective
 - Large scale eradication efforts (>12,000 m²) are typically not effective
 - Restored sites are not similar to reference sites in terms of plant community or function after 5 years (Rohal et al. 2023)
- Acknowledge that management may be destabilize tidal wetlands lowering ecosystem resilience
- Suggest we carefully re-evaluate how we prioritize restoration dollars

Implications

- Because *Phragmites* is superior in terms of keeping pace with RSLR, is there a scenario when management should prioritize maintaining marsh integrity over maintaining native species?
- Can *Phragmites*-dominated wetlands be considered a viable alternate stable state in terms of management & policy goals?
- *I am very interested in developing partnerships with managers and policy makers to evaluate how management practices influence ecosystem resilience – please contact me!*

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