Invasion of the Clones: Phragmites Invasion in North America

Presentation to the
Association of State Wetland Managers
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Collaborations with Utah State University and
Smithsonian Environmental Research Center

Introduction

- Drivers of Invasion
- Management Overview
- Case Studies
- Literature Review
- Conclusions

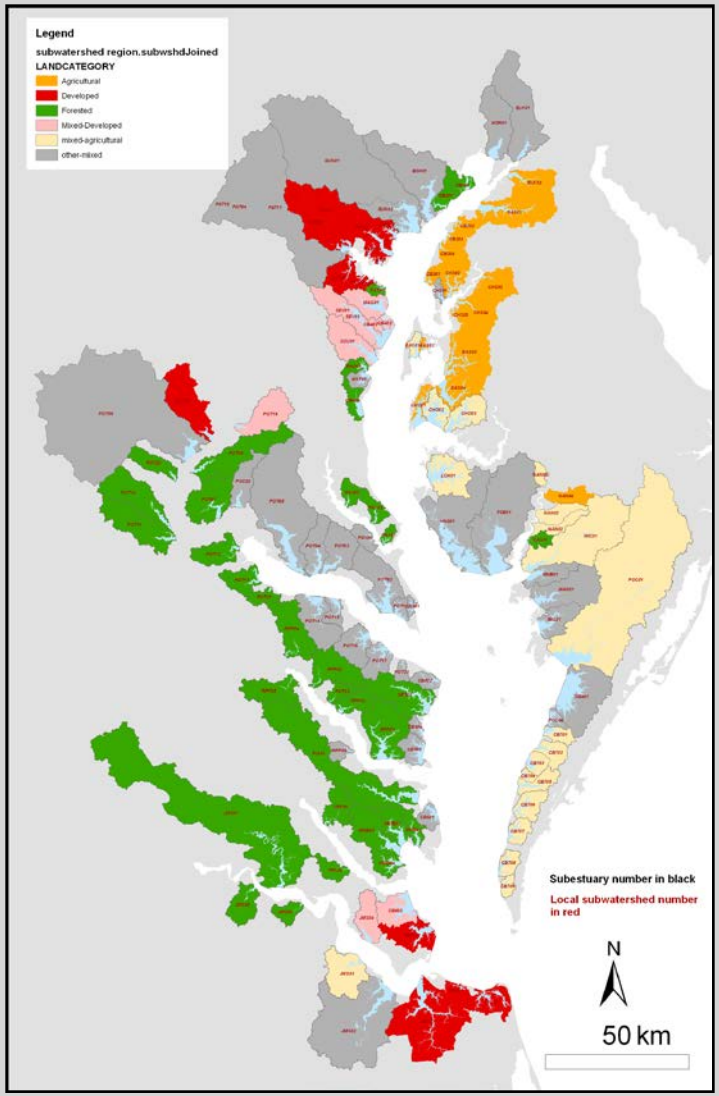
Drivers of Invasion

Phragmites

- Clonal and sexual reproduction
- Found in nearly every state
- Top management concern in wetlands
- Multiple lineages in US
  - European invasive
  - North American native
  - Gulf Coast
  - Hybrids
  - Miscellaneous introductions

Photo R. Meadows

Land Use and Buffers

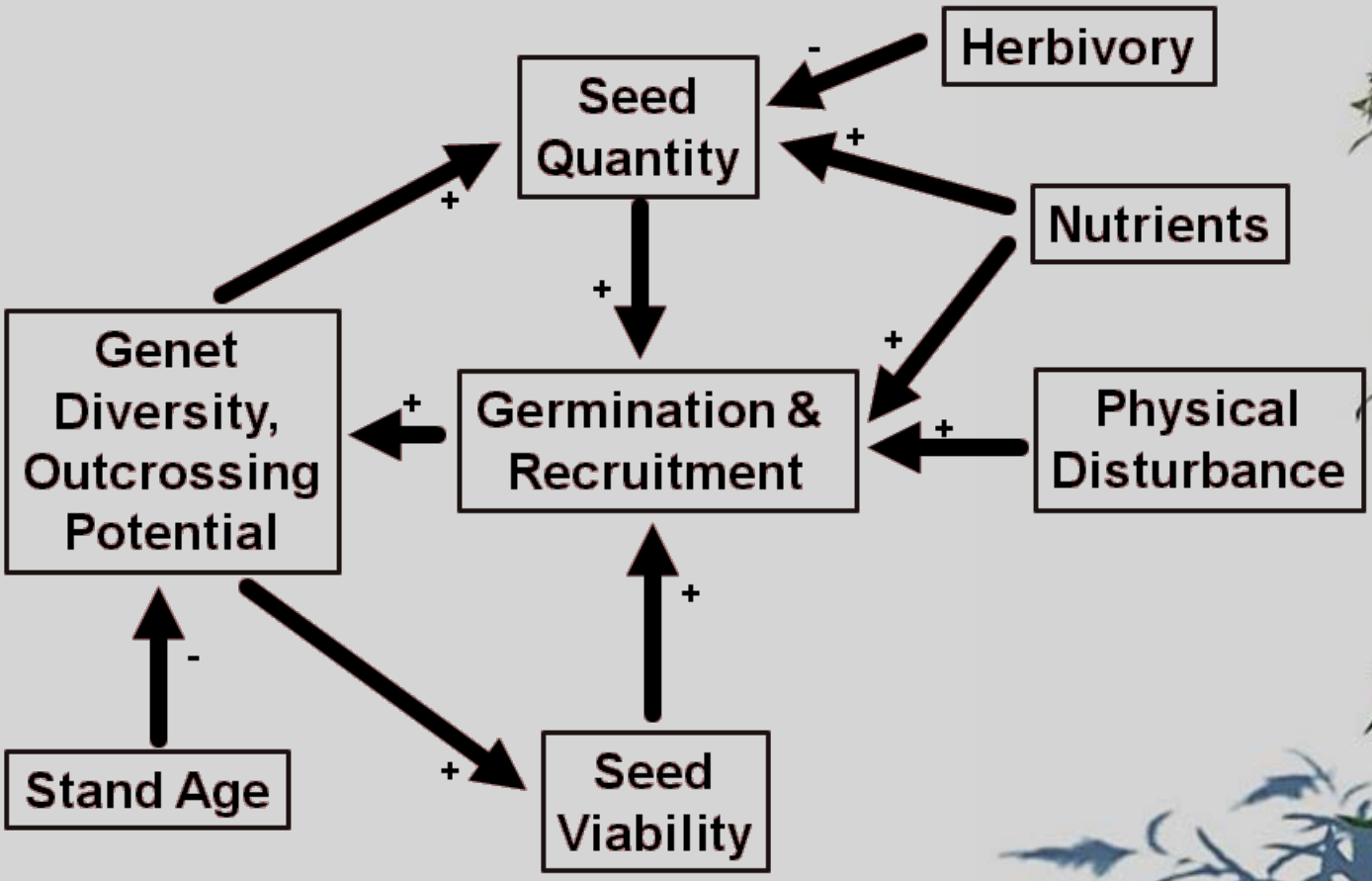


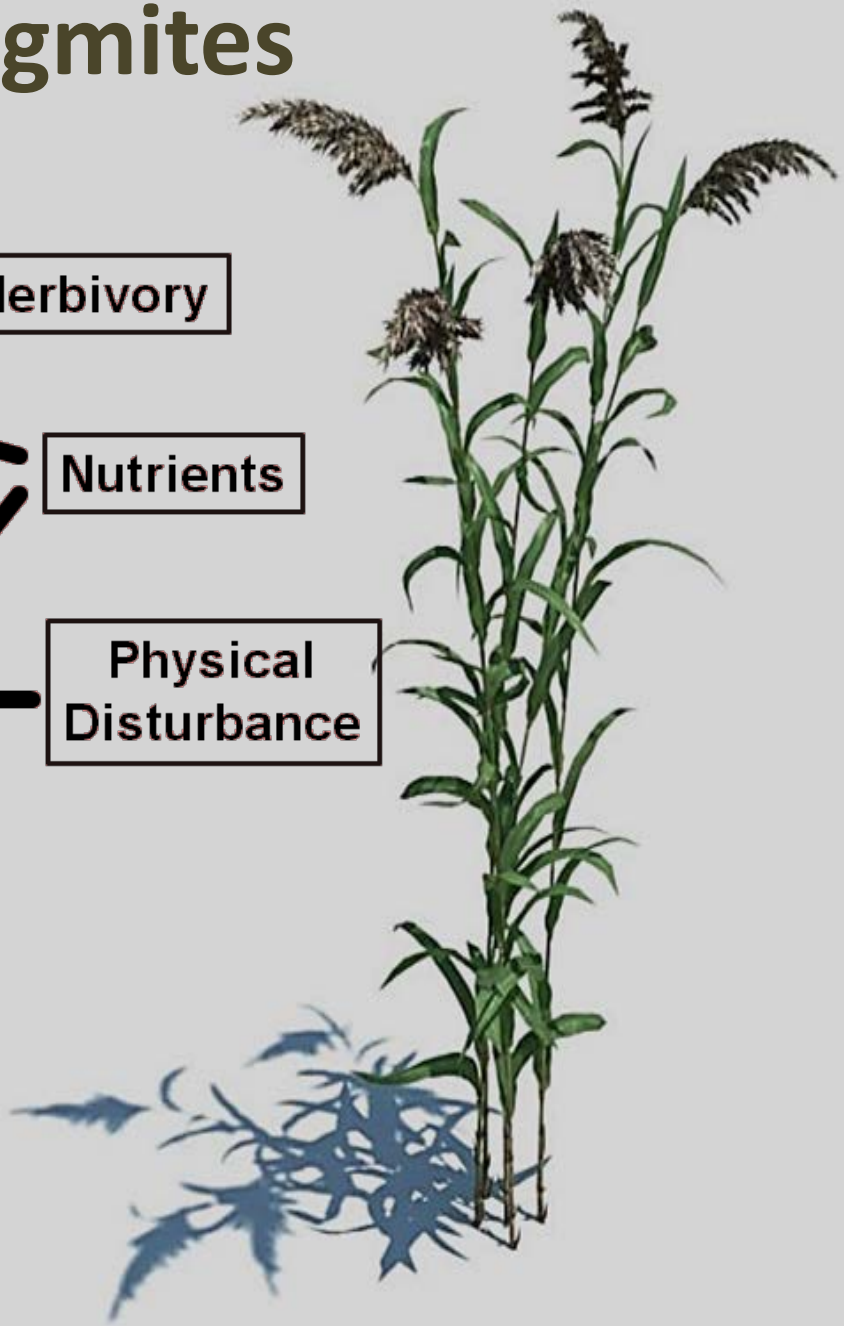
- *Phragmites* associated with lawns that lack forested buffer
  - Bertness *et al.* 2004
- Adjacent land use impacts *Phragmites*
  - Chambers *et al.* 2009
- Agriculture and rip rap most effective predictors. Less common in urban areas
  - Sciance *et al.* 2016
- Nutrient rich watersheds (developed and agriculture) have more *Phragmites*
  - King *et al.* 2007

Disturbance

- Wrack
- Construction
- Storms
- Flood drawdown
- Seeds and Rhizomes

Components of Phragmites Invasion





Management

Mowing

- Tradeoffs:
- Compaction
- Need to manage in perpetuity
- Best in combination with other methods

Spraying

- Tradeoffs:
- Cost
- Subsidence
- Non-target impacts
- Public perception/ health concerns
- Revegetation is slow
- At least 3-5 years required

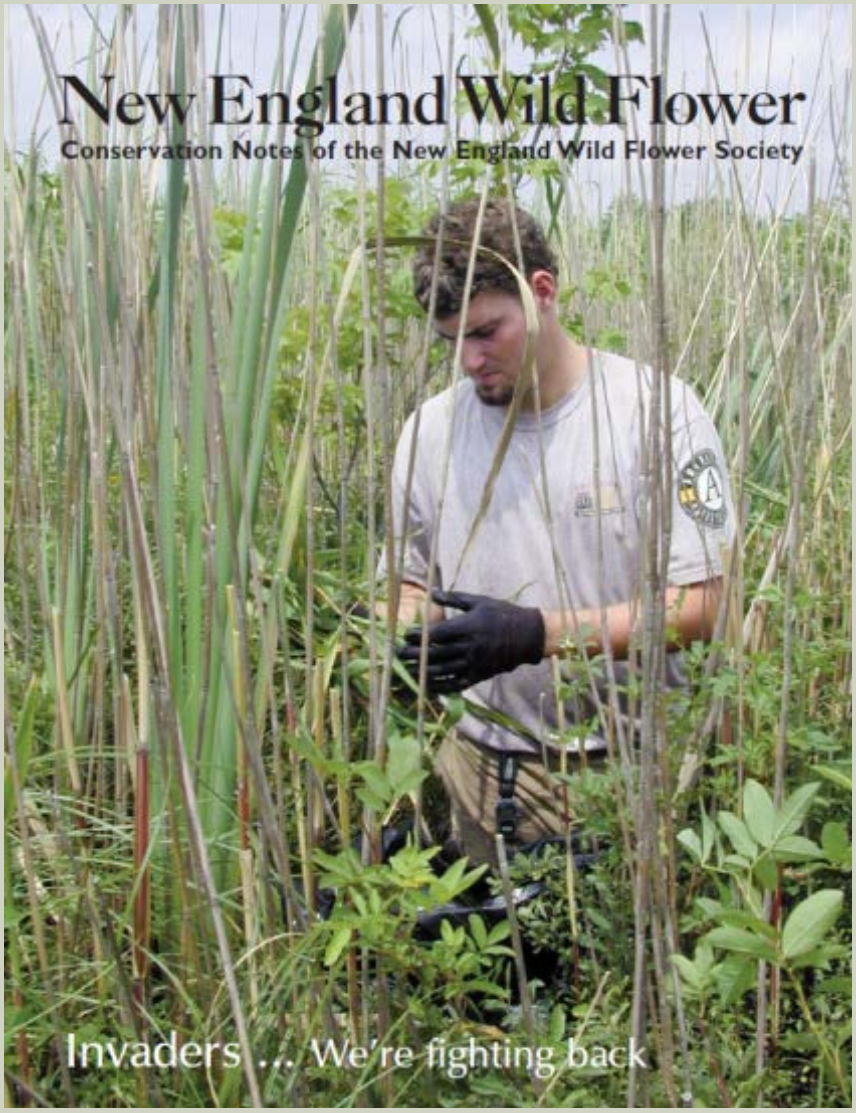
Burning

- Tradeoffs:
- Permitting
- Property hazards
- Air quality concerns

Grazing

- Tradeoffs:
- Compaction
- Nutrient cycling
- Propagule transport
- Need the right animals in right location

Management


New England Wild Flower
Conservation Notes of the New England Wild Flower Society
Invaders ... We're fighting back

Phragmites Removal: Vegetation Recovery Worst Case…Before

Nanjemoy River removal site. Photo: Marine Ecology Lab, SERC

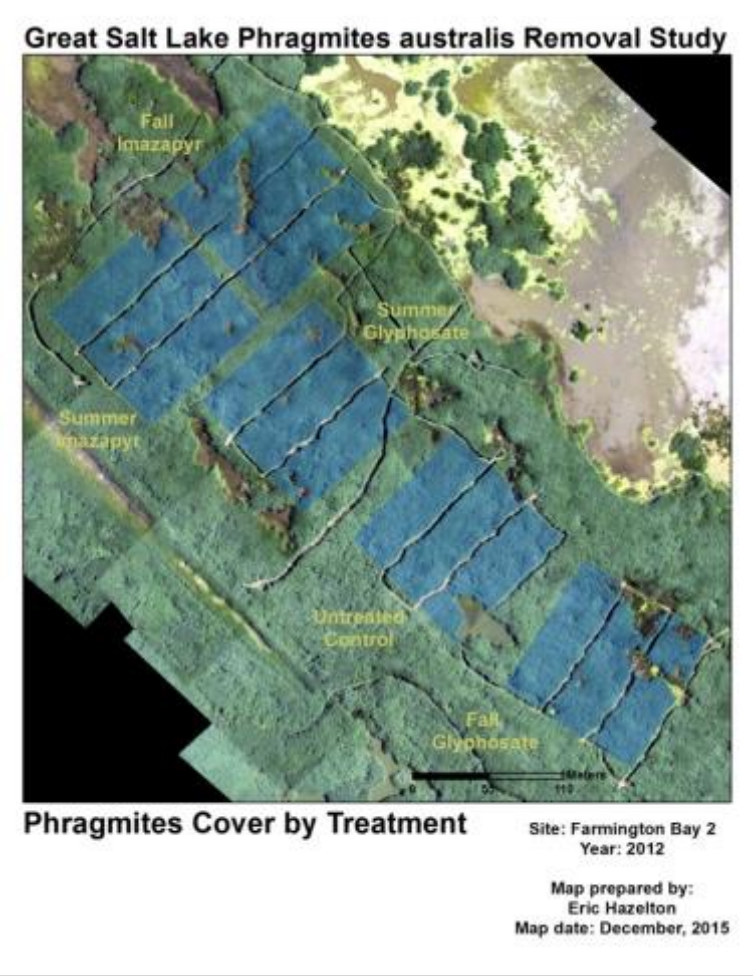
Phragmites Removal: Vegetation Recovery Worst Case….After

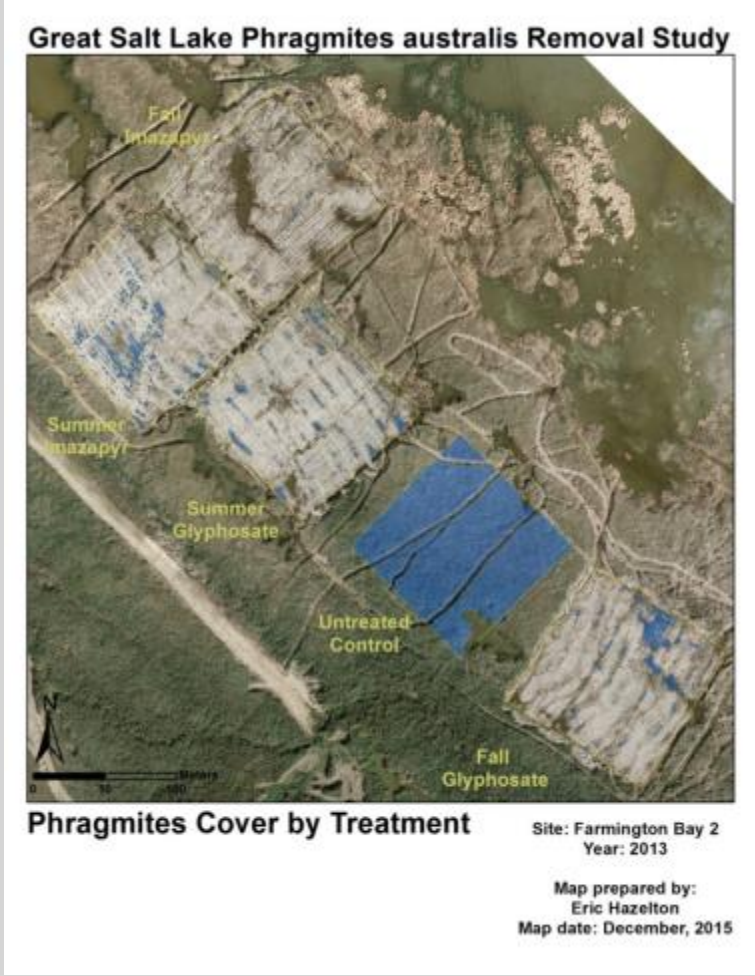
Nanjemoy River Removal site. October 2014

Case Study on Great Salt Lake

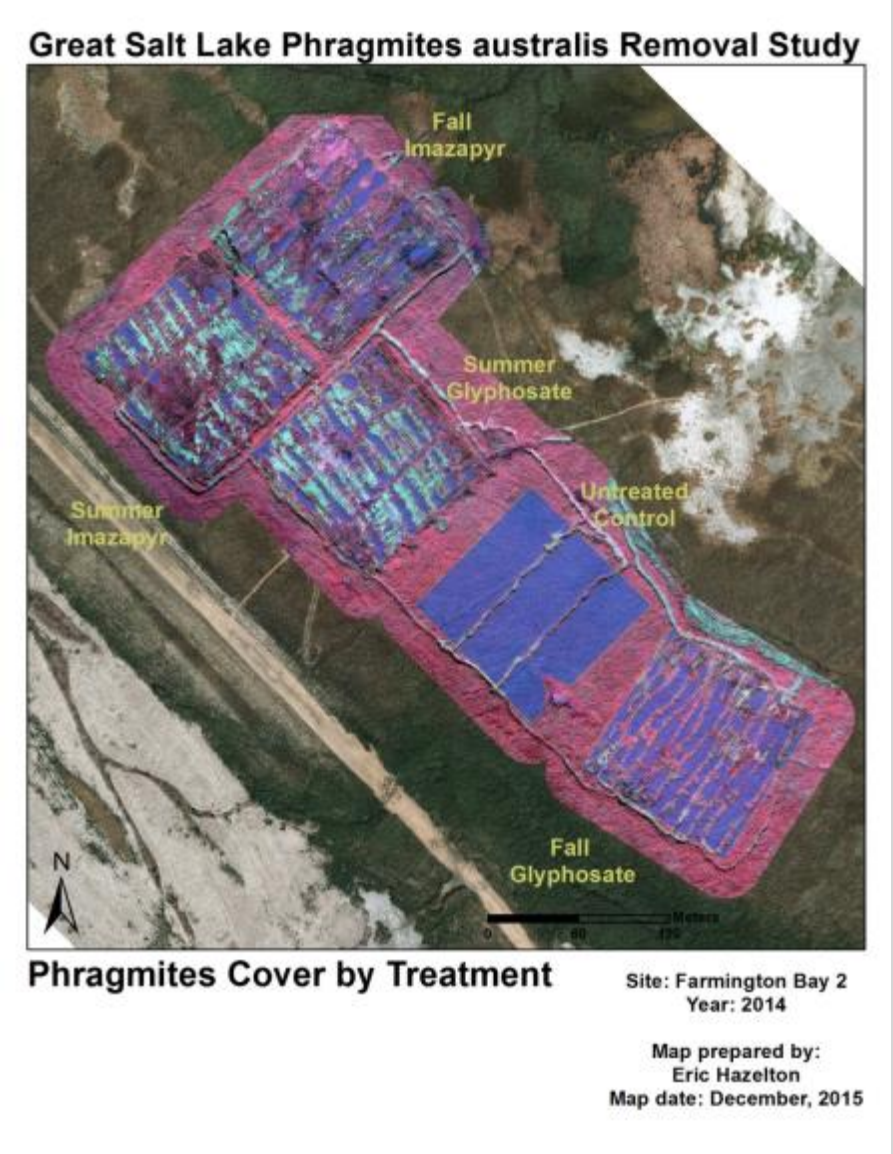
Great Salt Lake Phragmites Removal

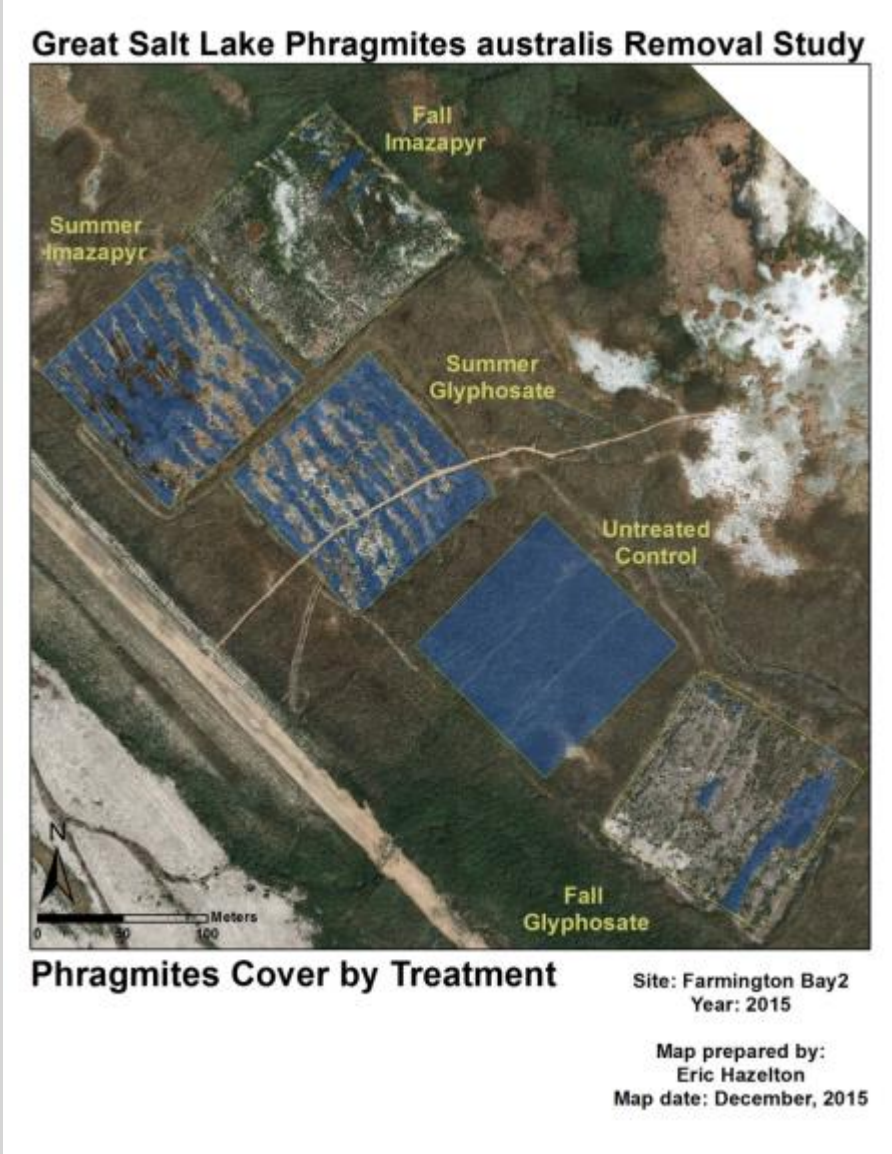
- 5 year study
- 5 acre plots
- Cranney, Rohal, and Kettenring





Great Salt Lake Phragmites Removal





What do we know from Field studies?

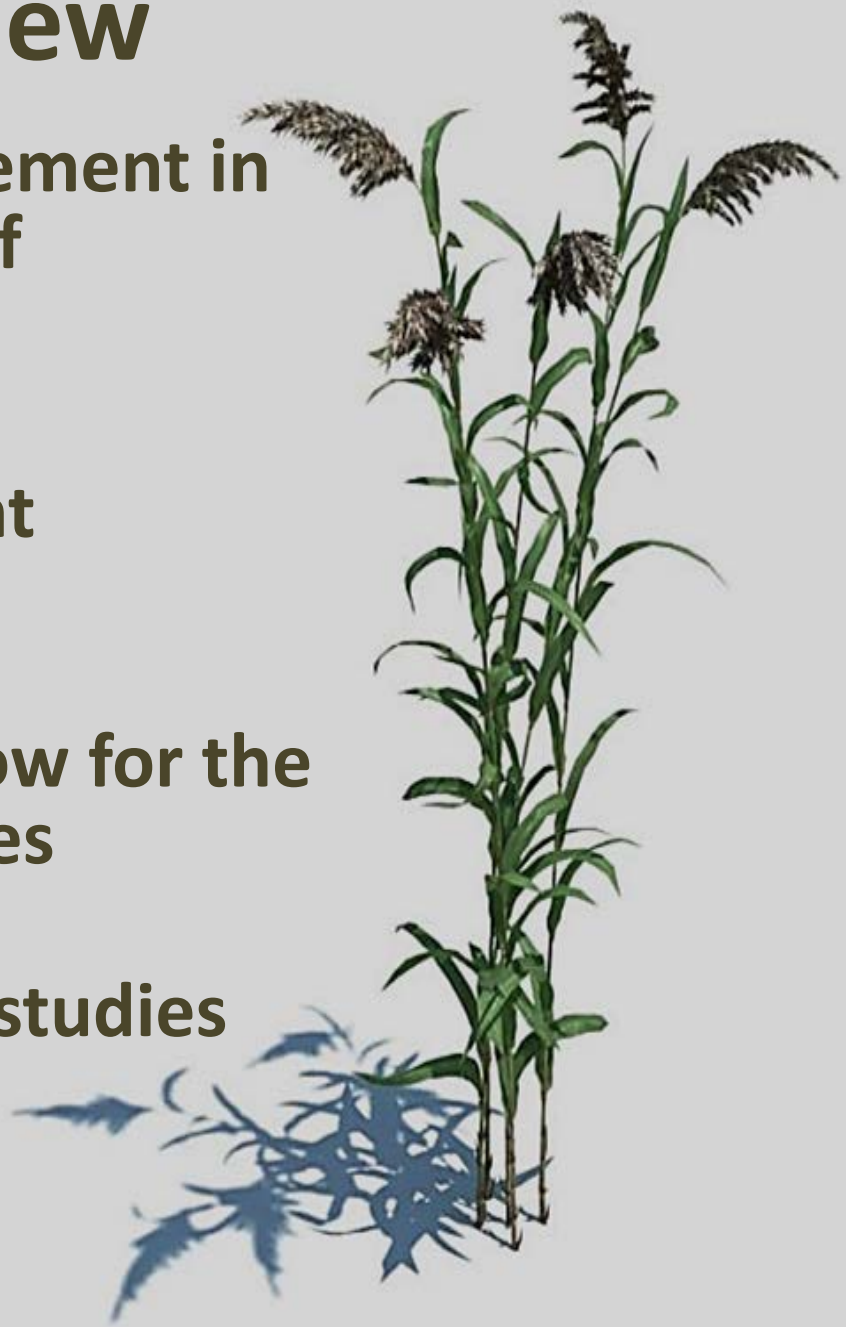
- There are diverse seedbanks under *Phragmites*
- *Phragmites* rebounds after first year
- Small patches within intact native wetlands recover better
- Large monocultures that cover entire wetland will likely not recover
- When rhizomes decompose, you may lose peat height
- Fall application is much more effective (especially with summer mow)
- Imazapyr costs more than Glyphosate with same outcome

Management Literature

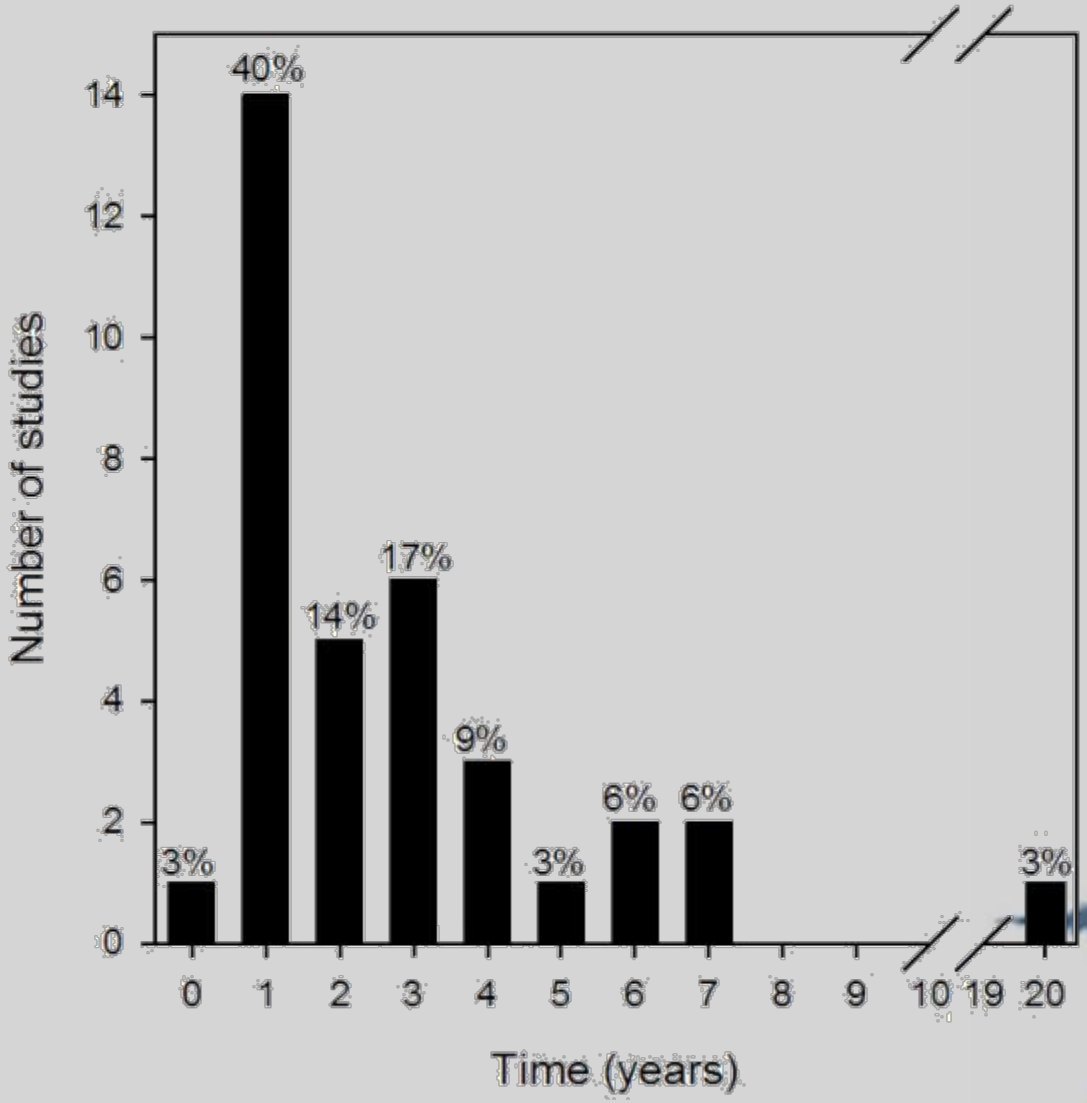
Management Review

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

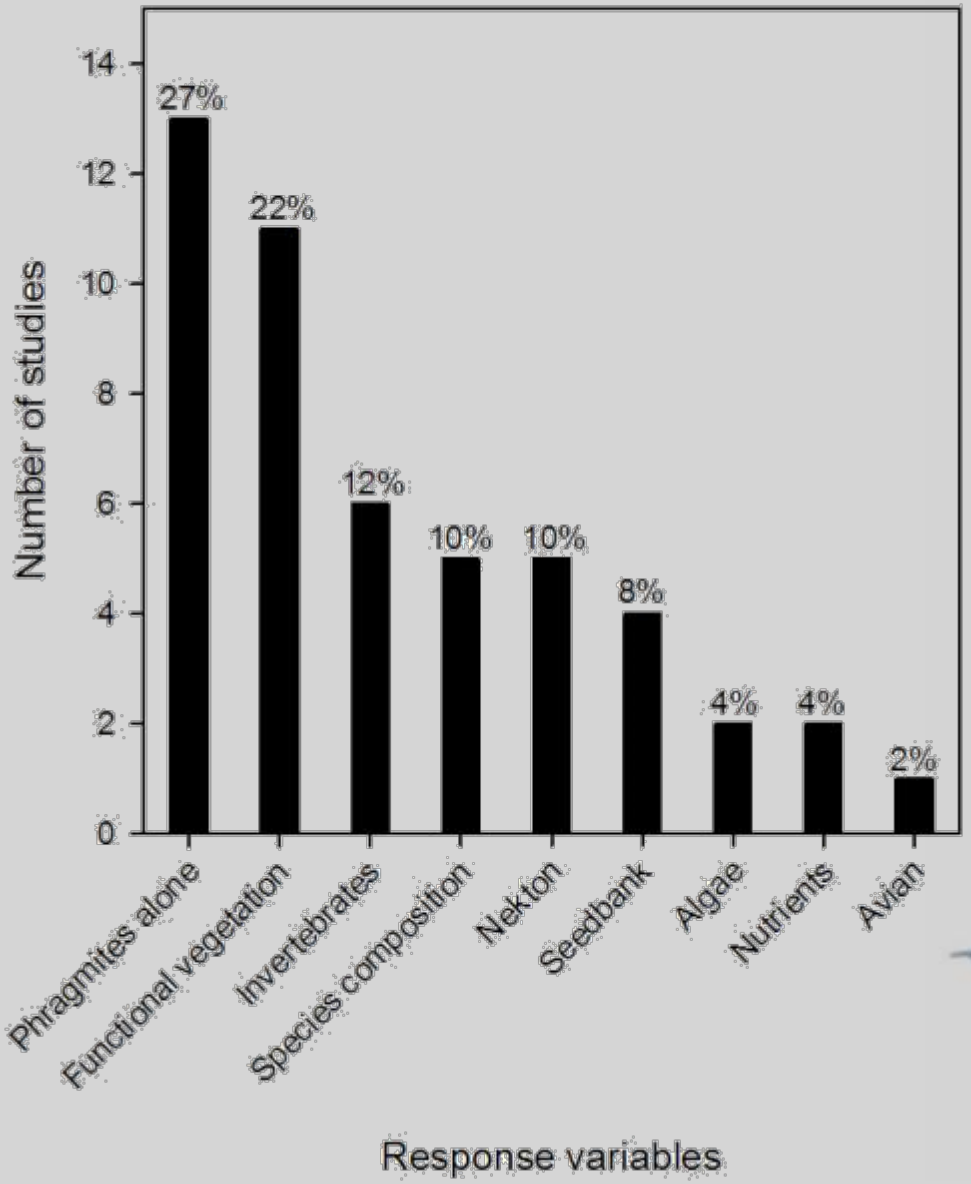
- **Comprehensive review**
- **1) Are current management practices successful?**
- **2) Do current *Phragmites* management practices allow for the restoration of native species assemblages?**
- **Excluded tidal-restoration studies**



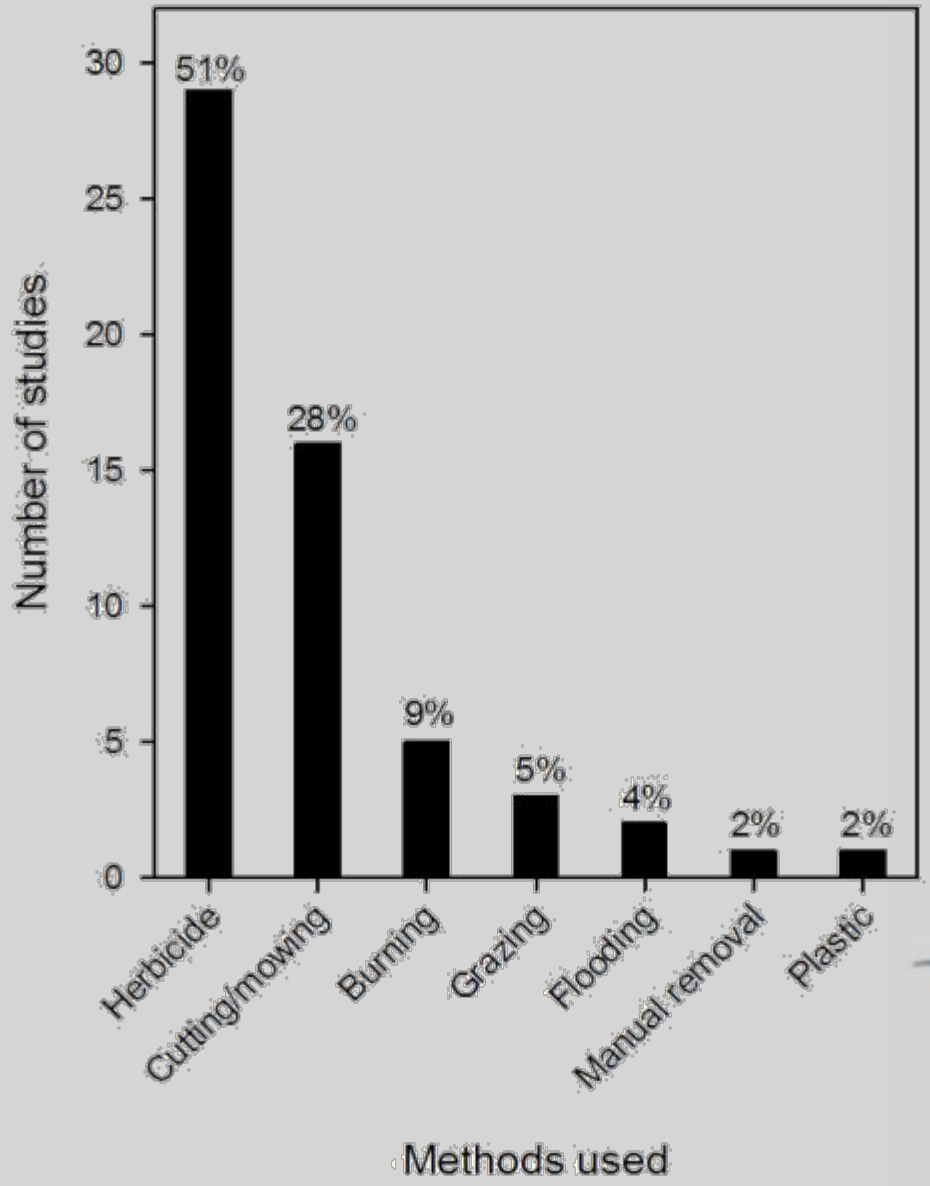
Duration of Studies



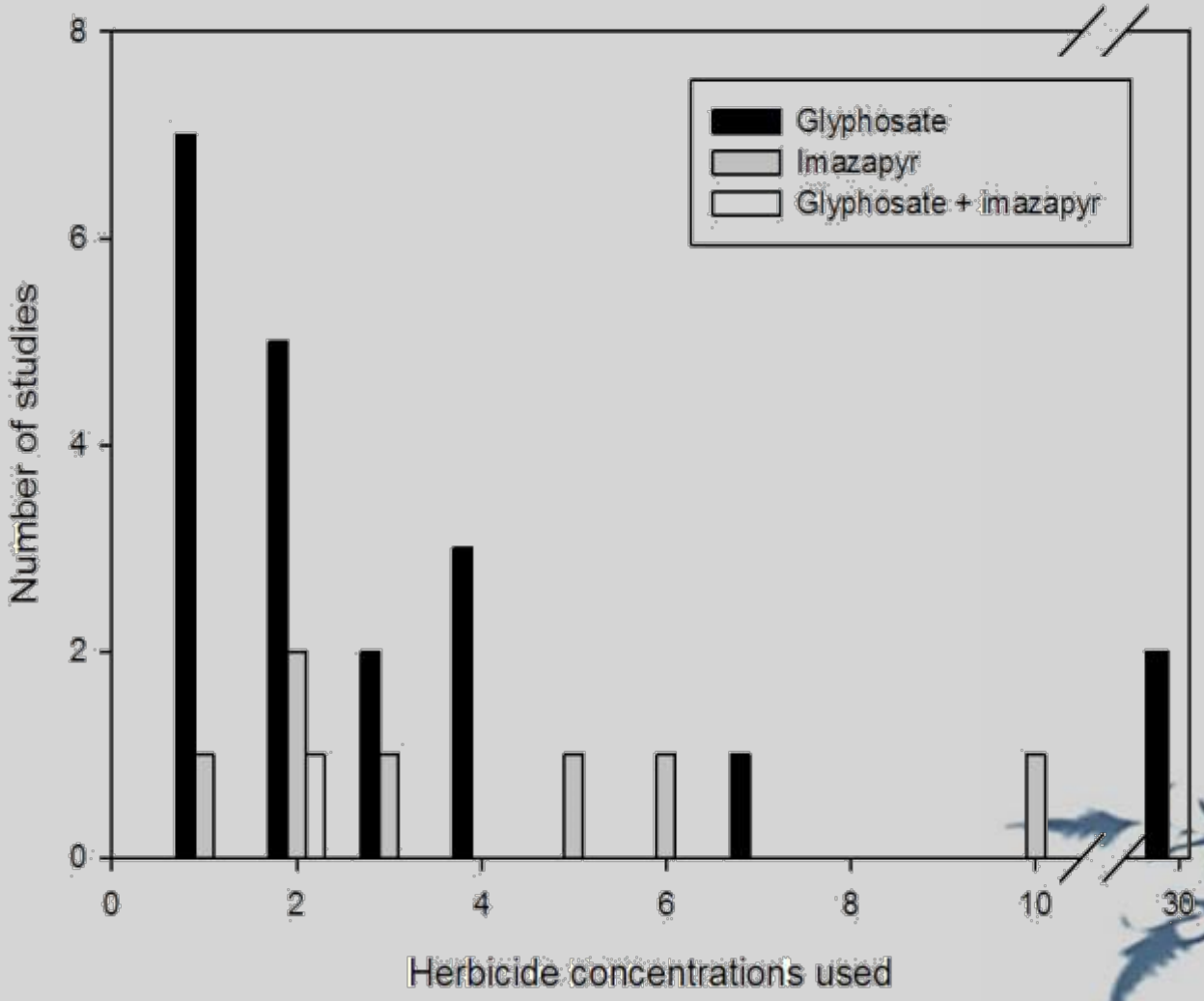
Variables Reported



Methods Tested



Herbicides and Concentrations



Conclusions from Literature Review

- Heavy emphasis on herbicide
- Little known about plant community recovery
- Most studies too short
- Need to determine methods that address nutrients, disturbance, and revegetation

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The open-access journal for plant sciences

Invited Review
SPECIAL ISSUE: *Phragmites australis* in North America and Europe

***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. Burdick[4], Karin M. Kettenring[1,2] and Dennis F. Whigham[2]

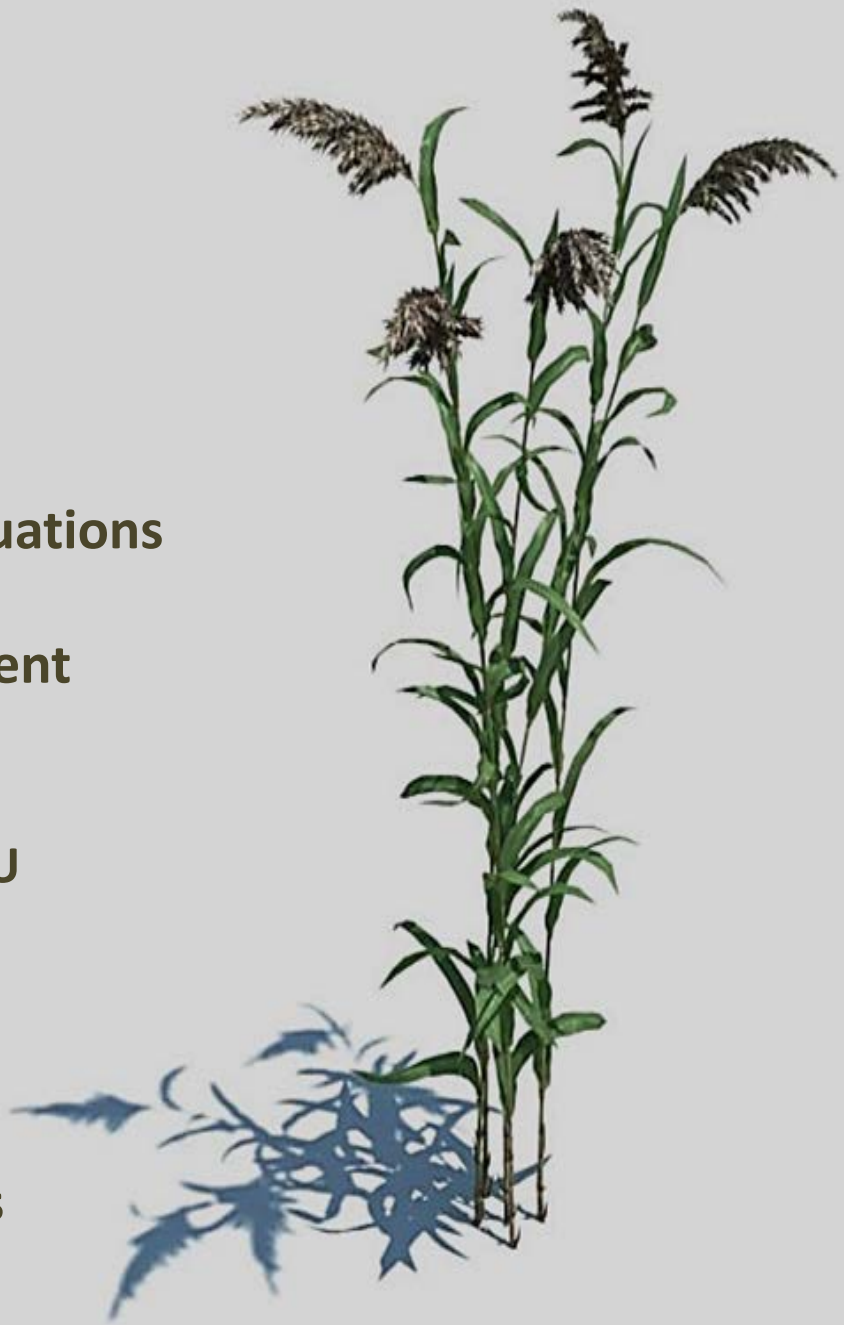
Almost Done!

Overall Conclusions

- Garbage in, garbage out
  - Site choice is critical
  - Focus on sites surrounded by quality wetlands
  - Some sites likely will not recover
- Early Detection, Rapid Response
- Holistic management needed
- Resilience against reinvasion
- Adaptive framework is a must!
- Best practice is likely to manage at the watershed scale, otherwise reinvasion risk is very high.

The Next Steps from: Whigham Lab (SERC) Kettenring Lab (USU)

- Long term management on CB
  - Me, DW, KK
- Long term management method evaluations
  - Rohal, Cranney, Kettenring USU
- Impact of cattle grazing for management
  - Duncan, Kettenring USU
- Novel revegetation techniques
  - Marty, England, Hager, Kettenring USU
- New drone monitoring method
  - Downard, Duncan, Kettenring USU
- Using allometry for rapid monitoring
  - Hazelton, Poole, Kettenring USU
- Impact of herbicide on clonal richness
  - Hazelton and McCormick SERC



Thank you!!!

And, please help us help management!
Feedback is always welcome.

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