

Wetland Restoration for Multiple Benefits: harvesting cattail for biodiversity, nutrient removal, and habitat

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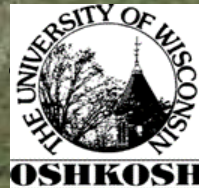


Team *Typha*: where are we?

Who are we?



Sault Ste. Marie Tribe of Chippewa Indians



Wetlands: purveyors of valuable ecosystem services



Wetland Function

- Biodiversity
 - Plants
 - Birds
 - Pollinators
 - Fish
- Habitat
 - Access for fish
 - Nesting for birds
- Nutrient cycling
 - Uptake
 - Removal via denitrification
- Recreation



Cattails are invasive?

Typha latifolia

(broad-leaved cattail)

Native to U.S. / Great Lakes

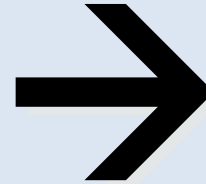
X

Typha angustifolia

(narrow-leaved cattail)

Introduced to Great Lakes region

invasive



Typha x glauca

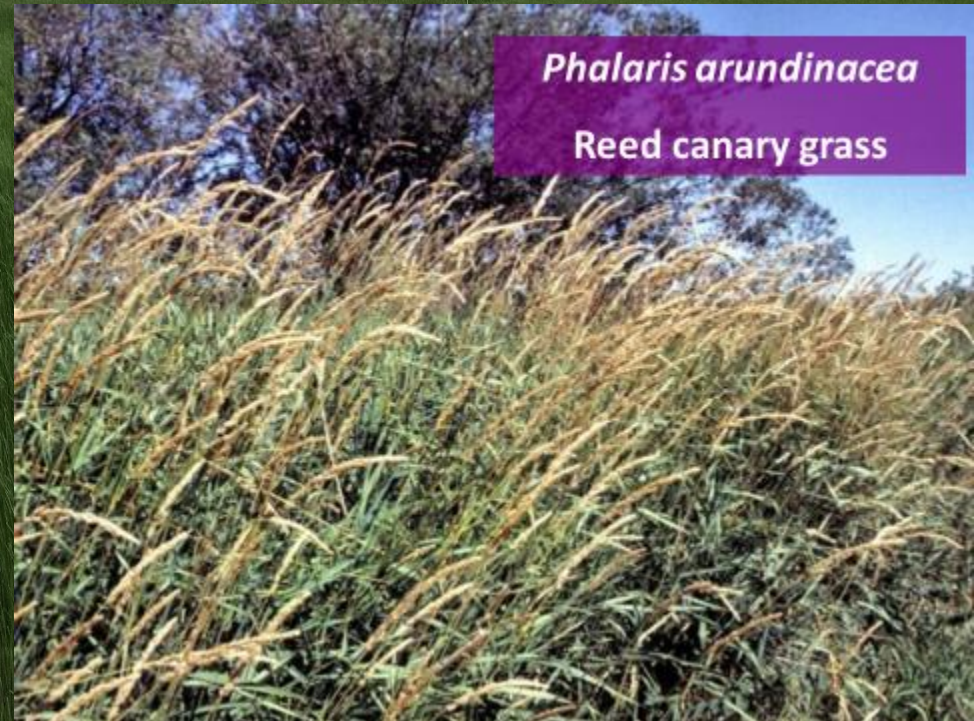
(hybrid cattail)

invasive

Invasive wetland plants disrupt ecological functions



Phragmites australis
Common reed



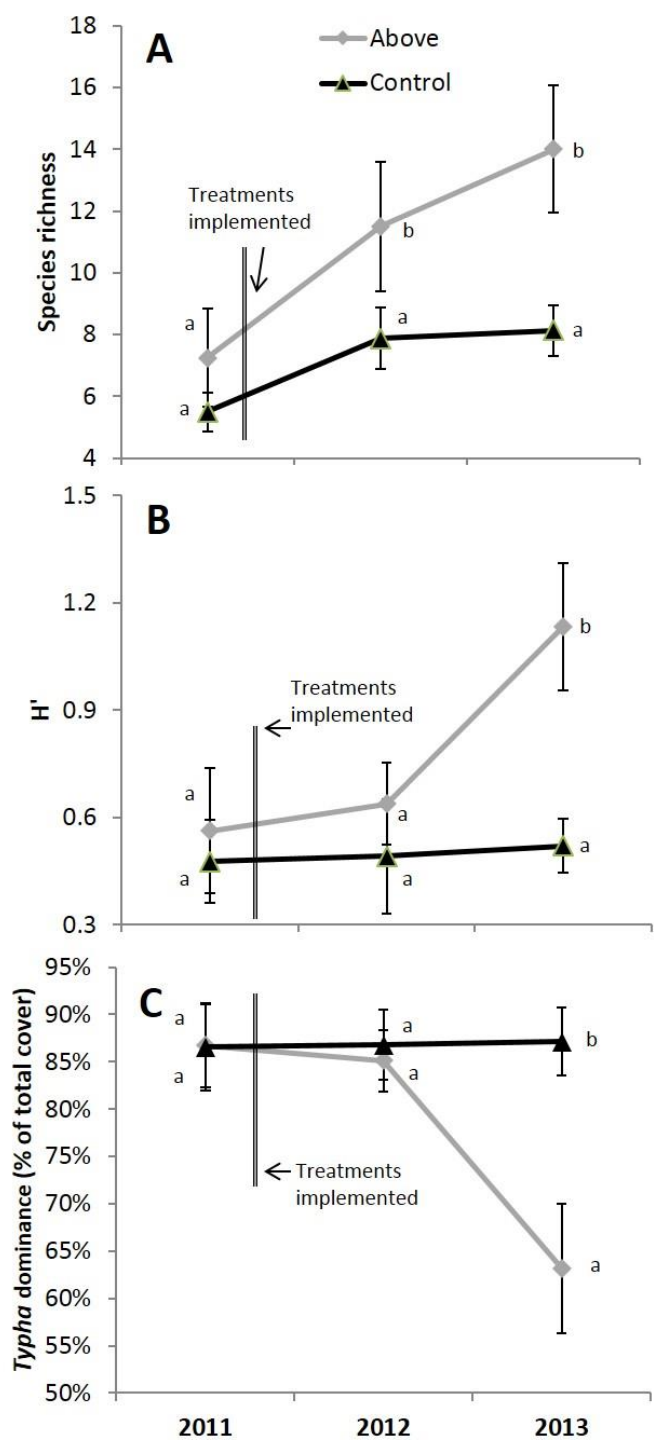
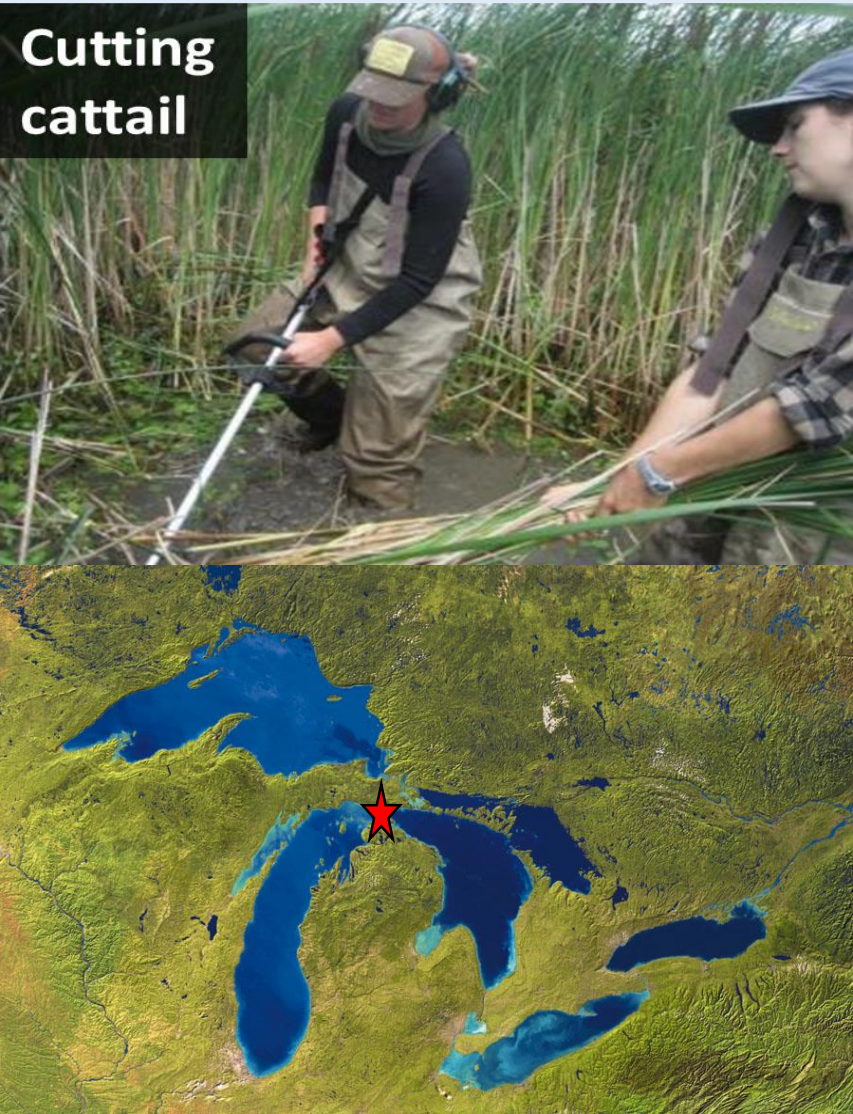
Phalaris arundinacea
Reed canary grass

Current Wetland Management Practices

- Herbicide
 - Effective, but releases nutrients from biomass **and** herbicide into environment
- Fire
 - Logistically difficult in most wetlands, especially urban/suburban
- **Harvesting**



Harvesting aboveground material shows a benefit to plant diversity





Scaling Up



Cheboygan Marsh

This photo was taken in **Cheboygan Marsh** in mid-September 2017, shortly after the implementation of the second harvest.



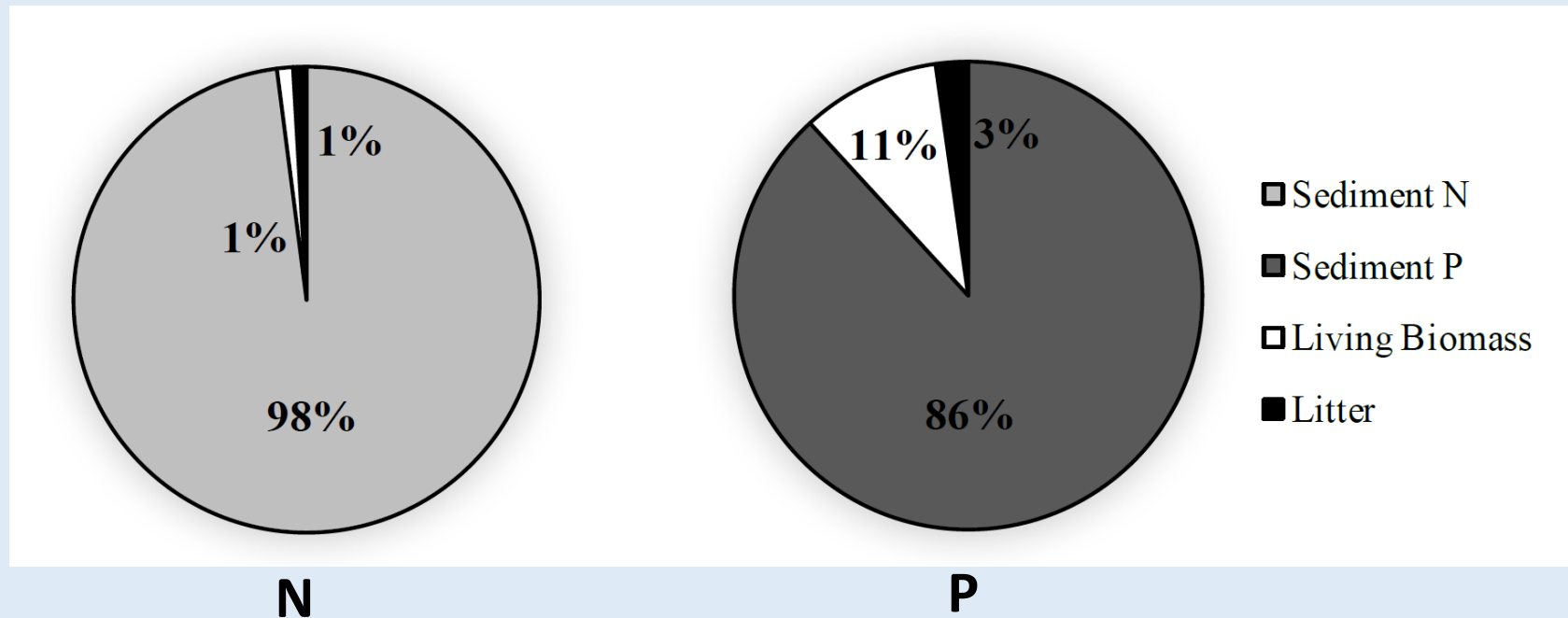
Control

Single harvest

**Double
harvest**

Large scale Harvesting

- Nutrient Removal Benefit
 - Each harvest removes:
 - 89.1 Kg N/ha (79.1 lb/ acre)
 - 5.5kg P/ ha (4.9 lb/ acre)



Improving Wetland Habitat Connectivity



Large-Scale Harvesting

- Analyzing effects on biodiversity and habitat
 - Plants
 - Birds
 - Fish
- Utilizing harvested biomass
 - A soil amendment for agriculture
 - Direct application
 - Composting
 - A feedstock for anaerobic digestion (energy from methane)

Cattail biomass as an agricultural amendment: Shiawassee NWR



Cattail biomass as an anaerobic digestion feedstock: UW Oshkosh



Future research

- Potential for Chloride removal
 - Dry tissue contains ~25,000 ppm Cl^-
- Economic analyses
 - Carbon budget for biomass utilization
 - Densification/ enhanced transport of biomass
- Benefits of roadside biomass removal
- Maximizing habitat complexity
 - Open water harvesting
 - Long term effects on biodiversity

