

# Adaptive management of non-native *Phragmites australis*

## Background

Effectively managing invasive species such as *Phragmites* is a high priority for habitat and wetland restoration. Managers are aware that management of *Phragmites* requires a long-term commitment and that multiple and repeated control methods are often necessary. However, existing studies on *Phragmites* management provide inadequate or conflicting information and more research is needed to identify the most sustainable and cost-effective combinations of strategies for long-term *Phragmites* control and habitat restoration. This study compared *Phragmites* populations found in northeastern Wisconsin with different management histories, including untreated reference sites where management has not occurred. The overall goal of this project was to increase scientific understanding of non-native *Phragmites* population control and to promote an adaptive management approach to the restoration of *Phragmites*-invaded wetlands in the Great Lakes region.

## Research Methods

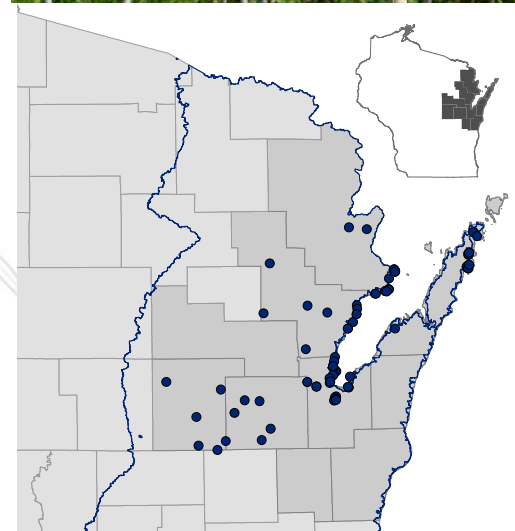
- This project included 81 sites in several northeast Wisconsin counties. Of the sampled sites, 66 had been treated at least once with herbicide, 1 had been mowed but not treated with herbicide, and 14 were untreated reference sites that had not been managed at all during the past 9 years. Among the 66 herbicide-treated sites, 21 also had also been mowed at least once since 2011.
- Researchers created an ArcGIS Online story map to serve as a clearinghouse to share information about *Phragmites* treatments in the project area. Information includes location, acreage treated, treatment type, year of treatment, herbicide product (if applicable), and treatment method. The [story map](#) is publicly available through UW Green Bay's ArcGIS Online account.
- Researchers developed and tested an objective quantitative protocol for assessing the outcome of *Phragmites* treatments, including monitoring native plant species responses. Using this standardized on-the-ground survey in combination with multi-spectral aerial imagery, this study developed a treatment assessment protocol which can be used to monitor change in *Phragmites* populations and native plant communities before and after management.
- Within each vegetation plot a soil core was taken to determine if the residual effects of *Phragmites* herbicide treatments affected the microbial communities present in the soil.
- *Phragmites* leaf samples were collected and genetically analyzed to determine what non-native and native haplotypes were present within the study area.

## Phragmites

The common reed (*Phragmites australis* subsp. *australis*) is a tall non-native grass which has aggressively invaded many Wisconsin shorelines and wetlands, particularly in the Great Lakes Basin. It spreads by both seed and via underground rhizomes and tends to form dense monotypic stands. Dense stands can negatively affect biodiversity, cause habitat loss, impair recreational use, and increase fire risk. Under [ch. NR 40](#), *Phragmites* is currently classified in Wisconsin as restricted in the eastern portion of the state where it is more established and prohibited in the western portion where it is less common.



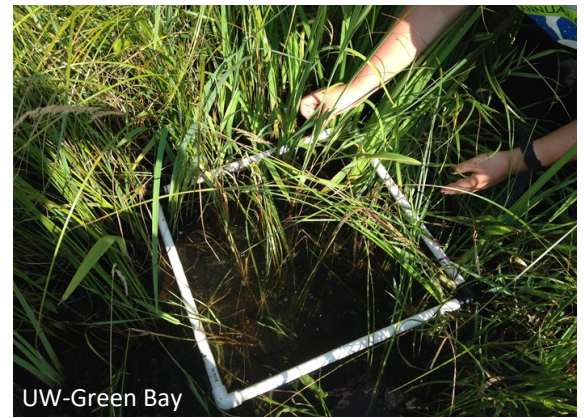
Liz Tanner



**Figure 1.** Map of study area. Blue line indicates the Lake Michigan basin. Dark blue circles indicate sample sites.

## Summary of Results

- Phragmites sites treated a single time with herbicide did not have lower observed frequency than untreated reference sites. Phragmites was least frequent at sites that were treated at least two or more times, suggesting that multiple herbicide applications may provide greater observed reduction of Phragmites.
- Phragmites was still found at more than 40% of sites that were treated multiple times, suggesting that repeated herbicide treatments and mowing may not be enough to eradicate it completely.
- The native plant species richness of sites treated multiple times was lower than the native species richness found at untreated reference sites. High conservation value native grass and sedge species which are known to be intolerant to disturbance were found at higher frequencies in untreated reference sites versus treated sites.
- Microbial species community composition and diversity within sites that had been treated did not significantly differ from that of untreated sites.
- Genetic sampling found two distinct haplotypes of non-native Phragmites (Haplotype M & O) as well as native Phragmites (Haplotype E) within the study area.



## Potential applications:

Results from this study has led to several recommendations for management of invasive Phragmites in northeastern Wisconsin. This study suggests that treatment of wetlands with herbicides and mowing will not eradicate Phragmites, and therefore adaptive and strategic management strategies will be needed to prevent Phragmites from negatively impacting vulnerable wetlands in northeastern Wisconsin. In order to re-establish diverse wetlands with high quality native vegetation, additional measures such as transplanting or re-seeding certain native grasses and sedges might be necessary to meet habitat restoration goals. Follow-up treatments by mowing or fire might help promote reestablishment of native grasses, sedges, and other species that are often missing from post-treatment sites in northeastern Wisconsin.



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