

Impact of Hybrid Cattail (*Typha × glauca*) on Waterbird Diversity

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Introduction

Great Lakes coastal wetlands host diverse populations of waterbirds, provide food resources, and support breeding and migration.¹ Responding positively to eutrophication and altered hydrology, invasive hybrid cattail (*Typha × glauca*) dominates throughout the region impacting waterbird populations.² In the Shiawassee National Wildlife Refuge (SNWR) [Saginaw County, MI], *Typha* has homogenized wetlands by suppressing diverse native plant communities. My research team managed *Typha* in 3.28 ha via aboveground harvesting in North Marsh, SNWR, from 2016-2018, benefiting waterbirds.³ However, the long-term response of waterbird usage multiple-years after management remains unknown. **My research will test the efficacy of restoration to increase waterbird utilization four-years post- *Typha* harvesting by comparing waterbird diversity in three wetlands with different *Typha* histories** (managed for *Typha*, *Typha* invaded, and a high-quality site).

I expect that plant community diversity, and likewise waterbird food resources, will be higher in the site managed for *Typha* (North Marsh) compared to a currently invaded site (Maankiki). I hypothesize that the expected higher vegetation diversity in the previously managed site will correlate to a higher waterbird species richness compared to the invaded site.



Figure 1 (Left).
Swift Recorder

Figure 2 (Right).
Wildlife Acoustics Recorder

Methods

At three different sites (managed for *Typha*, *Typha* invaded, and a high-quality site), I remotely collected bird habitat occupancy using autonomous recording units (ARUs) and surveyed vegetation composition, water depth, and vegetation cover surrounding each ARU. Each site contained 3 randomly distributed ARUs. Bird calls were recorded from early May to early August. Bird audio was analyzed using BirdNET technology from Cornell's Lab of Ornithology.

Research Questions

Q1: How does a legacy of *Typha × glauca* management drive plant diversity and waterbird food resources compared to invaded and high-quality sites?

Q2: How does long-term *Typha × glauca* management impact waterbird diversity compared to high quality and invaded sites?

Results

Table 1. Mean +/- standard error, water depth, total vegetation cover, and Shannon's plant diversity across 3 sites within each wetland. Significant differences between sites ($p < 0.05$), indicated by non-overlapping superscript letters.

	Maankiki	Pool 1A	North Marsh
Water depth (cm)	31.65 ^A ± 1.95	65.42 ^B ± 6.37	16.08 ^A ± 2.84
Vegetation cover (%)	62.65 ^A ± 5.78	58.33 ^{AB} ± 8.52	26.75 ^B ± 4.61
Shannon's Diversity	0.751 ^A ± 0.05	0.886 ^{AB} ± 0.08	1.074 ^B ± 0.08

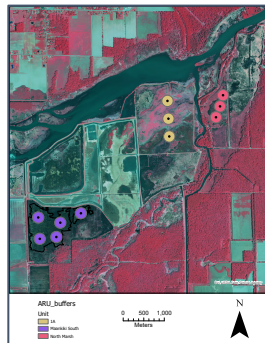


Figure 3. Locations of ARUs at 3 sites

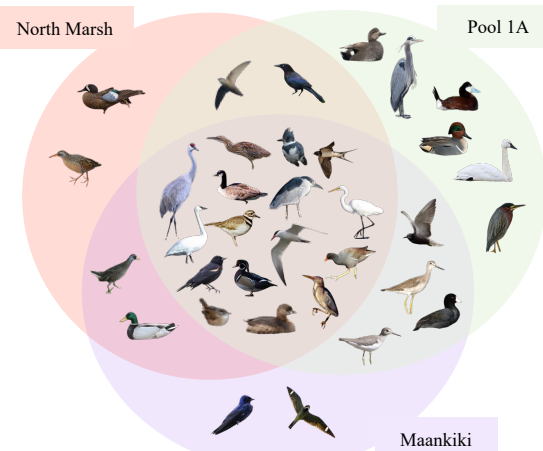


Figure 4. Bird species detected at each site.. All photos from Macaulay Library.

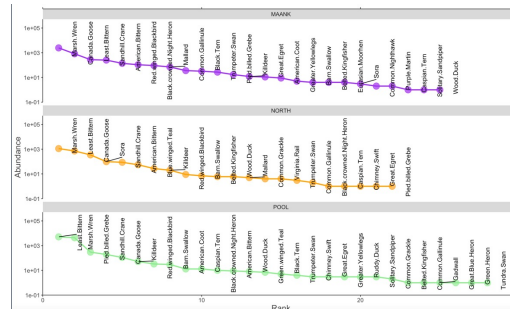


Figure 5. Rank abundance curve of bird species at each site.

Discussion

The differences in water depth, vegetation cover, and plant community composition correlate to differences among waterbird occupancy and utilization at each site. Pool 1A, the highest quality site, occupied the highest number of species (28) and the greatest number of detections, by over 200% (10,351). Maankiki, the invaded site, occupied 24 species and had 4,396 detections. North Marsh had the least number of species (22) and 2,529 detections.

Despite previous *Typha* management, North Marsh saw less waterbird species than the *Typha* invaded site. Of the three sites, North Marsh had the shallowest water depth and the least total vegetation cover, which could explain the lack of waterbird occupancy. However, North Marsh also saw the most diverse plant community which could be a response from the previous management. The deepest site, Pool 1A had the greatest waterbird diversity.

Looking Forward

The next steps involve further analysis of detections from recordings and how to best statistically understand them. I also plan to look at the impacts of landscape metrics, including interspersed and rugosity, on specific subsets of waterbird species, such as resident v. migratory birds or secretive marsh birds. In coming years, I will continue this work looking at the impact of *Typha* harvesting on waterbird occupancy over a two-year period.

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References

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