# Summary

I surveyed the Upper Rockingham Bottoms Prairie and three others at Nahant Marsh in order to determine the species composition, diversity levels, and if there are any invasive or aggressive native species present that pose a threat to the prairies' health. I discovered all of the prairies are diverse and full of flourishing native plants. However, there are many invasive and aggressive native plants present, especially in areas that are prone to flooding or haven't been controlled burned consistently. These results mean the prairies are healthy, but we need to consistently perform controlled burns and remove invasive/aggressive native plants in order to maintain their health.

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### Introduction

The Upper Rockingham Bottoms Mitigation Bank Prairie is a nine-acre plot of native mesic, tall grass, and wildflower plants. It was initially restored from a row-crop soybean field in 2020 as part of a mitigation project. Since then, the prairie has been planted several times with around 75 native plant species. The major problem with the restoration process has been the infiltration of invasive & aggressive native species, most commonly the eastern cottonwood. To combat this, the staff performed a controlled burn in the fall of 2024. I will determine how the biodiversity has changed since the controlled burn and if it successfully eliminated or lowered the levels of invasive species present. I will also compare the biodiversity of this prairie to other prairies in the marsh to get a reference to compare to.

# Study Questions

- What are the diversity levels and species composition of the prairies at Nahant Marsh?
- Are there any invasive or aggressive native plants present that pose a significant threat to the prairie?
- How effective was the controlled burn in the Upper Rockingham Bottoms Prairie at increasing diversity and eliminating invasive species?

#### Methods

I randomly distributed square-meter quadrats within each of the four prairies (Upper Rockingham, Lower Rockingham, Driveway, & Oak Savannah) and identified what species of plants were present in the quadrat and what percentage of area each occupied. I used the plant identification app called Seek, along with field guides, to help me classify species. I took 70 samples in the Upper Rockingham Bottom Prairie and slightly less in the other three prairies throughout the time period of June 10 to July 11, 2025. I then averaged up all the data for each prairie to get an idea of what the species composition is and how prevalent invasive & aggressive native species are. I then compared the diversity and invasive/aggressive native levels for the Upper Rockingham Bottoms Prairie to the other prairies, the sections of the prairie that wasn't burned last fall, and to past data for that prairie.

# **Prairie Locations**



# Upper Rockingham Bottoms Prairie Evaluation

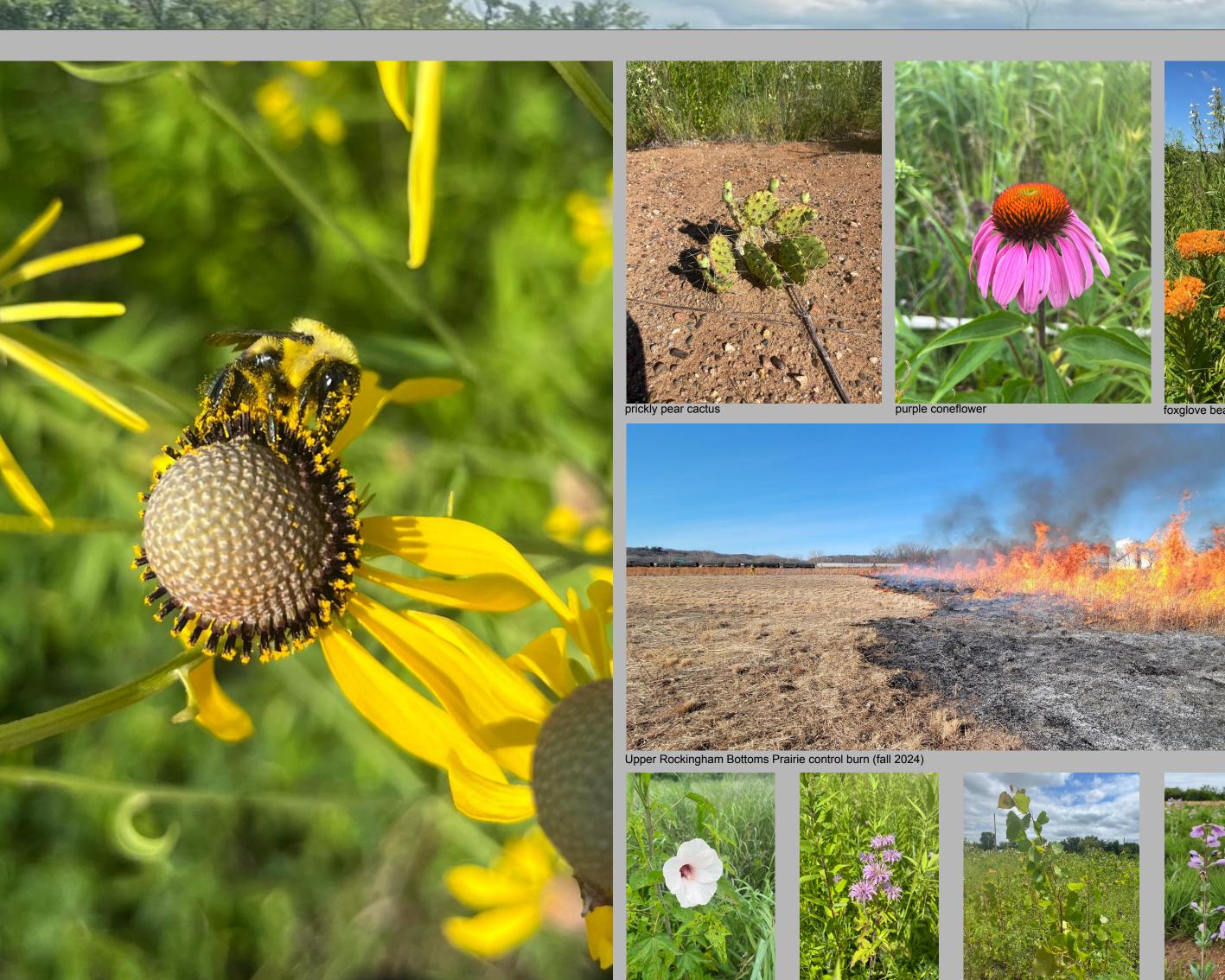
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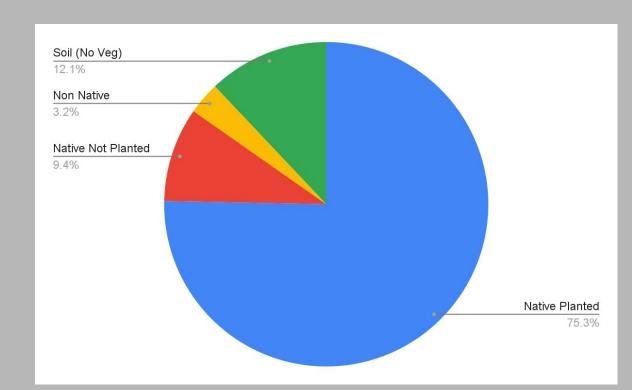






Acknowledgements: Thank you Jimmy Wiebler, Kinsey Nielson, Elizabeth VanCamp and the Nahant Marsh Staff for all the help!

### Results



**Figure 1:** Upper Rockingham Bottoms Plant Composition

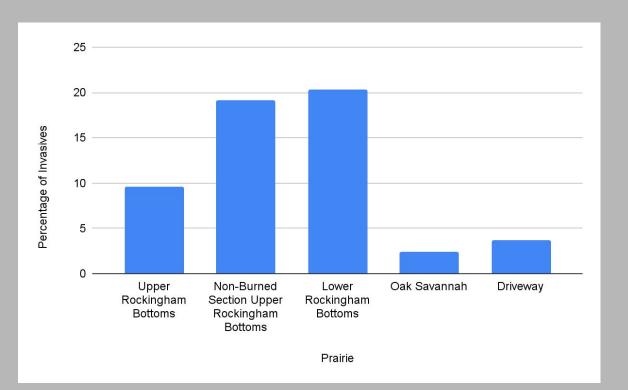


Figure 2: Percent composition of invasive/aggressive native plants of all prairies

There was a total of 65 species surveyed at Upper Rockingham Bottoms Prairie with 96.3% of the plant area being native plants and 3.7% non-natives. Of the 75 species initially planted in the prairie, 45% of them are still present. The Simpson Diversity Index Score for the prairie is 0.897 which means it is very diverse and has quite evenly populated species. There were 10 invasive & aggressive native species documented taking up 9.7% of the prairie. The majority are eastern cottonwood trees taking up 6.3% of the prairie. There is an increase of 10 more species present and an increase of 0.01 in the Simpson Index Score from last summer. However, the area of invasive & aggressive native species has increased by over 3%. The native to non-native ratio of the non-burned section of the prairie was indistinguishable compared to the rest of the prairie that was burned. However, the non-burned section of the prairie had 9.5% more invasive & aggressive native plants present. All four prairies surveyed had similar high native to non-native plant composition ratios, however they all had very different levels of invasive & aggressive native species present likely due to seeding timing, controlled burn timing, and flooding (fig. 2).

#### Conclusion

According to the results, I can conclude that the Upper Rockingham Bottoms Prairie is still in fairly good health due to its high species diversity & distribution and due to its prevalence of native plants present. However, the levels of invasive and aggressive native species are increasing and is concerning for the prairie's future. The sections of the prairie that were recently burned did see a decrease in invasive and aggressive native plants compared to the sections that were not burned though. The prairies that were in greater flood plain regions experienced a greater amount of invasive species infiltration as well due to seeds being washed in and out of the prairie. The Nahant Marsh staff will work to remove these invasive and aggressive native plants by performing more controlled burns each year, applying herbicides, and manually removing them by hand. They will also reseed the prairies when needed to maintain the diversity of native plants. The abundance of long-lasting keystone species like lead plant, big bluestem, and rosinweed along with pollinator-attracting species like milkweed gives great faith in the future of these prairies as well.