Queen's University Campus Mapping Report
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Map link: Queens Campus Mapping Project

Project Overview

Over the summer of 2025, SWEP students, Isabelle Price and Amelie Hughes, executed the Queen's University campus mapping project. The project distinguished native versus non-native trees and plants across main and west campus'. The intention of this project was to determine areas where native biodiversity thrives and identify regions where non-native plants may be lacking. The ratio of native plants, represented in green dots, to invasive or non-native plants, represented in red dots, is clearly distinguishable within the map. A data review and concluding findings from the project can be found below within the *Results Summary* section.

Data Collection

Data collection was performed using the ARC GIS Survey123 website and application. The survey was initially created in summer 2024 by Charles Los and was used throughout the entirety of the project. The survey consisted of plant location, date of observation, common species name, scientific name, native or invasive status, plant type and individual frequency.

To determine the correct species identification, apps including *PictureThis* and *INaturalist* were used. These apps provided the common name as well as the scientific name of each species identified. Once scientific names of each species were determined, their native status was identified. The species was designated *Native* if it was native to Ontario and *Invasive* when non-native to Ontario. Native plants, often considered weeds, were still logged as native regardless of their invasive behavior.

Each identified plant was put into one of three categories: tree, shrub or herbaceous. Further, the project used predetermined guidelines, by Charles, to quantify the frequency of each plant present. Trees and shrubs were often individually surveyed and therefore do not have a frequency. Herbaceous plant frequency was marked as either small patches, large patches, rare, intermediate, common, frequent, or ground covering. In areas with a significant patch of grass, Kentucky bluegrass was used as the most prevalent grass species and were ranked at a frequency of "ground-covering". When a species was present in more than 5% of the area, bundled together, it was marked as a

large patch and roughly less than 5% of the area, bundled together, was a small patch. The remaining frequencies were judged by surveyors Amelie and Isabelle.

Results Summary

We collected a total of 4612 surveys across Queen's campus, observing 1645 native plants and 2967 invasive plants, resulting in 36% native and 64% invasive.

- Overall top 5 most common species: Norway maple (n=268), Kentucky bluegrass (n=163), dandelion (n=156), siberian elm (n=143), white clover (n=119).
- Top 5 most common trees: Norway maple (n=268), Siberian elm (n=143), silver maple (n=71), sugar maple (n=70) and honey locust (n=64).
- Top 5 most common shrubs: Japanese yew (n=55), Common buckthorn (n=49), wintercreeper (n=34), bridal-wreath (29), Japanese meadowsweet (n=18)
- Top 5 most common herbaceous plants: Kentucky bluegrass (n=163), white clover (n=119), dandelion (n=156), common plantain (n=138), black swallow-wort (n=35).

Using the native plant data, we identified areas on Queen's campus with a higher abundance of native species, referred to as native hotspots. Five notable native hotspots include the Biosciences Native Pollinator Garden on the west side of the Biosciences Complex, the southeast corner of Tindall Field, the Endaayaan-Tkanósote residence, the Snodgrass Arboretum, and the Biosciences Native Edible Garden located just south of Nicol Hall.

Out of the 4612 individual plants mapped across Queens campus, we identified 477 unique species. Using a simple biodiversity index (scaled from 0 to 1), we calculated a value of 0.1, indicating relatively low overall biodiversity.

Species richness on main campus doubles that on west campus and other surrounding Queen's buildings, including Isabel Bader and the Donald Gordon conference center. On main campus, the five regions where biodiversity thrives most include Biosciences complex native garden, the garden beds located on the south side of Nicol hall, the courtyard located between The law Building and Mac-Corry Hall, Summerhill and the gardens surrounding Dunning auditorium.

While surveying the distribution of plants on west campus, we noticed large patches or rows of the same tree/plant species, suggesting less biodiversity. Additionally, west campus had limited native species hotspots. As the northern end of Duncan McArthur Hall is under construction, there is potential to expand the quantity and variety of native species present on west campus.

Conclusions

The overall top five most common species, as well as the top five shrubs and top five herbaceous plants, were all non-native. However, among the trees, only the top two tree species are non-native, while the remaining three - silver maple, sugar maple and honey locust - are native. In summary, these survey results clearly show a dominance of non-native species across campus, especially in shrubs and herbaceous plants. While the tree category has a higher representation of native species, there is still much room for improvement.

Illustrated by the heatmap of native species across campus, there are identifiable regions where native species can be found in abundance. However, these regions are often neighboured by non-native species. Further, the overall number of invasive plants is higher than that of native plants. These findings suggest that Queen's campus continues to lack in native species.

Our findings on biodiversity and species richness indicate that Queen's campus is in need of a larger variety of plant species. While main campus has pockets of high biodiversity, it is critically lacking in surrounding areas and secondary Queen's locations such as west campus and Isabel Bader. These results indicate a need for increased native planting across campus with hopes of encouraging ecosystem diversity alongside supporting more pollinators.

This research is intended to inform and inspire future efforts to increase native plants and biodiversity across Queen's campus. A central goal of this project was to collect data on tree species and location for the Queen's University grounds crew. We hope this information will aid Phil Wright and his team in guiding maintenance decisions and identifying areas where native tree and plant species can be introduced. Ultimately, we hope that this project will encourage diversification of plants on campus, such that a wide range of native species can thrive.

Limitations and Future Directions

We recognize that this project took place over the span of four months and therefore, may not accurately represent all plant species present due to differences in growing periods. It is to be expected that areas mapped in May and June will have increased springtime blooming plants while areas mapped in July and August have increased summer blooming plants.

Further, we recognize that nature is constantly changing and plants identified this year may not be present in future years. Summer of 2025 was exceptionally hot and dry which could have affected not only the variety of plants growing but the abundance of plants. This project may need to be done again in future years and updated accordingly, so as to account for these changes.

An important note, two large areas of Queen's campus were under construction for the majority of the summer and therefore, limited the mapping around these sites. On main campus, the Agnes Etherington art center, and on west campus, the north end of Duncan McArthur, were inaccessible. Should this research be performed again in the future, we hope that construction of these buildings will be completed.

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