115 Years Later: Reassessing Grand Rapids' Flora

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Calvin COLLEGE 1876

Introduction

Figure 1: Emma Cole (1845-1910)

Emma J. Cole, a beloved high school teacher and distinguished botanist in the Grand Rapids area, published *Grand Rapids Flora: A Catalogue of the Flowering Plants and Ferns Growing Without Cultivation in the Vicinity of Grand Rapids, Michigan* (1901). Despite the passing of 115 years and tremendous development in Grand Rapids that has led to drastic changes to the natural landscape, Cole's Floristic inventory remains the most comprehensive study for the area. With that in mind, this project aims to recreate Emma Cole's inventory by discovering and reassessing the sites she described, as well as other sites in the Grand Rapids area.

Figure 2: *Grand Rapids Flora (1901)*

Methods

- Eight locations were visited over the course of ten weeks
- All species in flower or fruit were collected and identified
- Species without fertile parts were noted separately
- Species lists for each location were compiled
- Floristic Quality Indexes (FQIs) were calculated

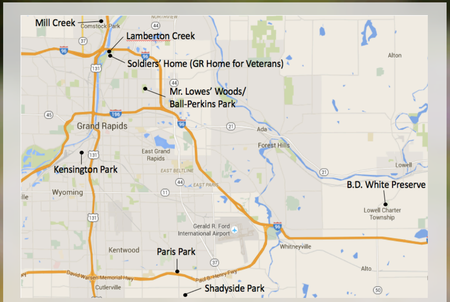
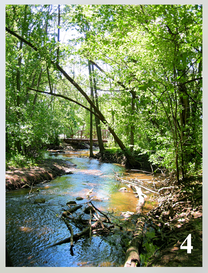


Figure 3: Map of Grand Rapids Area with inventoried sites

Floristic Quality Assessment

To evaluate each location, the species lists were used to calculate a Floristic Quality Index (FQI). This index is a quantitative measurement; it is obtained by recording the number assigned to each native species, called a "coefficient of conservatism," determining the average for the site, and then multiplying it by the square root of the total number of plant species (see Michigan's Universal FQA Calculator, http://universalfqa.org). Because FQIs are an indication of the native vegetative quality for an area, they are very helpful in comparing the overall ecological integrity of various locations. For each location, two FQIs were calculated: one that only included native species and a second that included both native and invasive species. This reveals the negative impact invasive species have on the ecological value of a given habitat.

Primary Locations



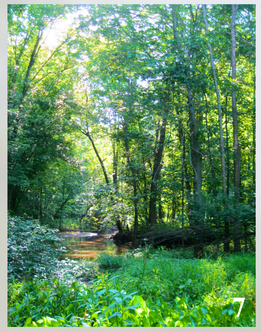


Figure 4: Lamberton Creek at Soldiers' Home Woods: This once contiguous deciduous forest has shrunk significantly in the last 100 years due to urban development.

Figure 5: Mill Creek Woods: A rich deciduous woods in Comstock Park. This area has many parts that have remained essentially untouched and thus maintained high floristic integrity.

Figure 6: Bradford Dickinson White Preserve: This preserve is made up of a dry oak-hickory forest and a shrub-carr wetland. The area in Lowell Township was established as a preserve by the Land Conservancy of West Michigan in 2005.

Figure 7: Paris Park: This area is made up of a dry deciduous woods and a large floodplain with Plaster Creek flowing through it.

Results

During the course of ten weeks, the researchers were able to:

- Document the flora of 8 sites
  - Collect 603 herbarium specimens
  - 89 Families, 202 genera, 292 Species
- Discover 2 species on Michigan's Rare Plants List.
- Discover 11 species not previously recorded for Kent County- all of which were non-native
- Assess the Floristic Quality of the study sites

Ecological Interpretation of Floristic Assessments:
FQI < 20 = minimal significance
FQI > 35 = conservatism and richness high; of statewide significance
FQI > 49 = extremely high; floristic diversity of state significance

Species of Interest:

- Rock Cress *(Boechera dentata)* -State Threatened
- Davis' Sedge (*Carex davisii*) -Special Concern

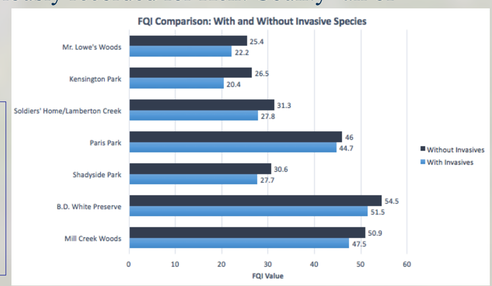


Figure 8: Floristic Quality Index (FQI) for each location from May 2016 to August 2016. Soldiers' Home Woods and Lamberton Creek were combined due to their close proximity and the likelihood that both areas consisted of the same woods during the 1890s when Emma Cole conducted her inventory.

Historical Comparison

Mill Creek Woods and Soldiers' Home Woods were both inventoried by Emma Cole and/or her students around 1895. By looking at collections and records from this time period, the researchers were able to compile species lists for these two locations. They calculated the FQIs using these lists, and then compared it to the FQIs of the species found there in 2016. Because trees and shrubs were not included in the records from 1895, they were not included in the FQIs from 2016 (with the exception of the Tulip Tree).

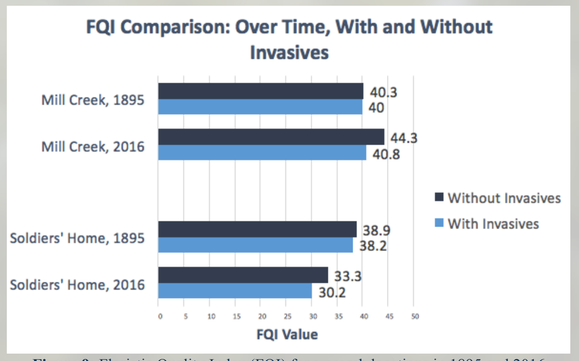


Figure 9: Floristic Quality Index (FQI) for research locations in 1895 and 2016

Mill Creek 1895-96 vs. 2016: It was surprising to see that the FQI for Mill Creek in 2016 was roughly the same as it was in 1895-96. Invasive species are playing a bigger role today than they did in 1895, but not as dramatically as one might expect over a 100-year period.

- Some species at Mill Creek, such as Indian-pipe (*Monotropa uniflora*) and Tulip Tree (*Liriodendron tulipifera*), were found both in 1895 and 2016. The grand size of the tulip trees suggests that they could be the same trees that Emma Cole's students collected from in 1895.

Figure 10: Indian-pipe (*Monotropa uniflora*), Mill Creek

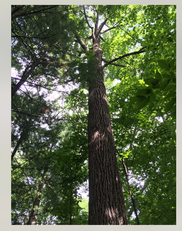


Figure 11: Tulip Tree (*Liriodendron tulipifera*), Mill Creek

Soldiers' Home Woods 1890s vs. 2016: It was not surprising that the FQI had decreased for this area. The installation of nearby gas lines and housing development has greatly shrunken the forest. While the area of the woods was small, there was still old growth Sugar Maple (*Acer saccharum*) and American Beech (*Fagus grandifolia*) that likely date back to Emma Cole's time.

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