

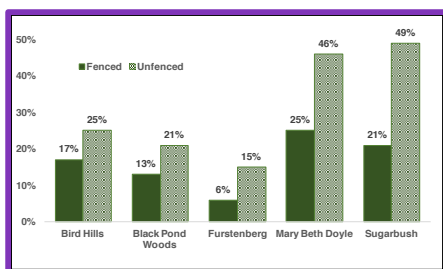


DEER IMPACTS ON WILDFLOWERS IN ANN ARBOR NATURAL AREAS ASTERS & GOLDENRODS, SUMMARY 2019



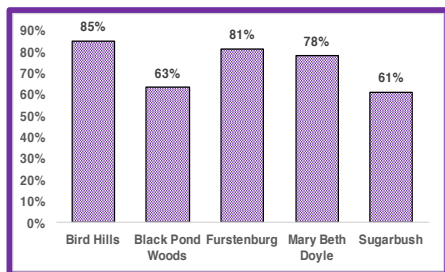
To assess how deer are affecting native plants in Ann Arbor, experimental wildflower plantings have been studied since 2017 in five natural areas (Bird Hills, Black Pond Woods, Furstenberg, Mary Beth Doyle, and Sugarbush). Plants of 12 native wildflower species with varying pollinator values and reported deer browse preferences were transplanted into paired fenced and unfenced plots and tracked for survival, growth, flowering, and deer browse. New plants were added each year; species varied depending on past performance and nursery availability. This summary focuses on the three species that consistently survived transplanting and grew large enough to flower (heart-leaved aster, bluestem goldenrod, and zigzag goldenrod) so that flowering metrics can be assessed. Data are totaled for the three species. Data on individual species, along with additional details on methods, are available in a separate report. In all, 2,324 experimental plants were monitored in 2019, with 960 analyzed here.

% MORTALITY



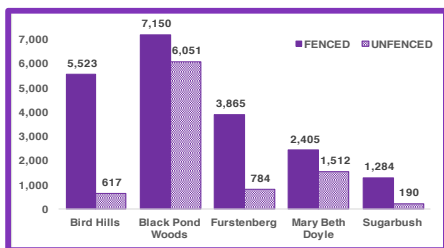
- Deer led to higher mortality of asters and goldenrods across all sites.
- Bird Hills and Black Pond Woods had the smallest differences in mortality between fenced and unfenced plots, indicating lower deer impacts on plant survival (both sites are in deer management areas).
- Sugarbush had a large difference between fenced and unfenced plots, although rodent damage contributed to high mortality inside and outside fences (fences kept out woodchucks and large rabbits but allowed smaller mammals).

% PLANTS DEER BROWSED



- Deer browsed from 60–85% of unfenced aster and goldenrod plants.
- Deer browsing may not kill plants outright (as shown by mortality rates above), but can lead to reduced growth and flowering.
- Deer browse rates were lowest at Black Pond Woods and Sugarbush (both within deer management areas).
- Deer browse rates were highest at Bird Hills (where deer are managed) and at Furstenberg and Mary Beth Doyle (where experimental plots are beyond the effective management distance).

% WILDFLOWERS BLOOMING AND # FLOWERS

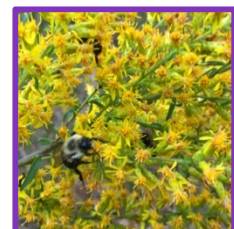


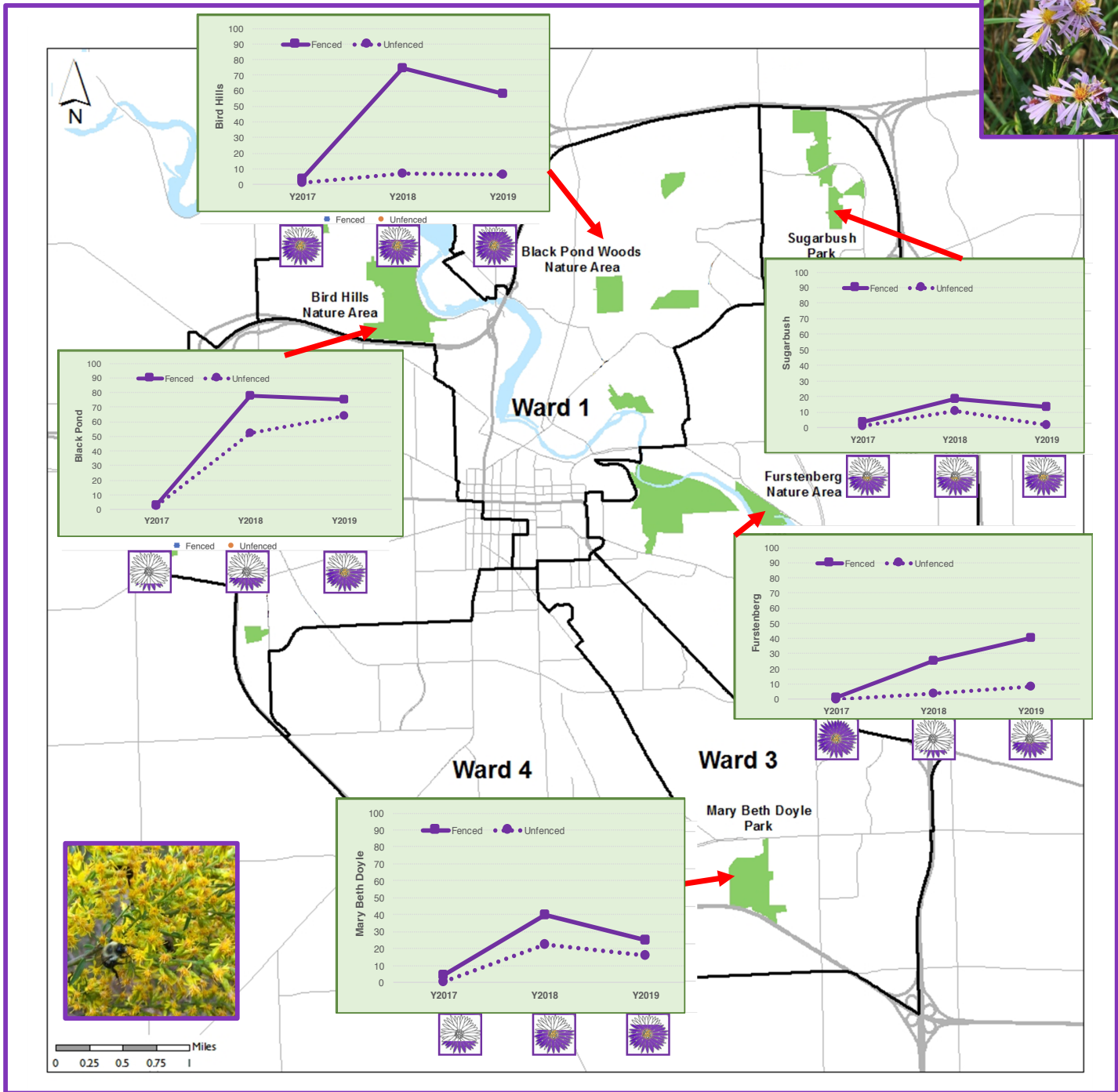
- Deer presence was associated with significantly lower flowering rates and numbers.
- The number of flowers (left) best shows combined deer impacts on survival, growth, and flowering of experimental plants.
- Black Pond Woods, where deer have been managed, had the lowest deer impacts on flower numbers, while deer exerted larger impacts at other sites, both managed and unmanaged.

CONCLUSIONS



In sum, although deer management in 2016–2019 has stabilized or reduced deer populations in 3 of the 5 wildflower study sites, deer are still associated with sizeable reductions in aster and goldenrod flowering, which may reduce pollinator resources and plant reproductive success. However, data from Black Pond Woods suggest that deer management is leading to reduced deer impacts there.





Average number of aster and goldenrod flowers per experimental plant in fenced vs. unfenced plots in Ann Arbor Natural Areas, 2016–19. Trend lines show how total flower numbers changed from 2017 through 2019 for deer-excluded fenced plots (solid line) vs. deer-accessible unfenced plots (dotted line). Flower symbols show total number of flowers in unfenced plots as a percentage of fenced plots—in the absence of deer impacts, flowers would be a solid purple. Each site had 5 pairs of fenced and unfenced plots. New plants were added to plots each year, so that the total number of plants assessed increased from 5 asters and goldenrod plants per plot (2017) to 13 per plot (2018) to 19 per plot (2019); using average number of flowers per experimental plant allows better comparisons across years. Flowering of perennial plants would be expected to increase over time as plants establish and grow, but deer impacts, weather, and increased plant competition could lead to decreased flowering.

- Deer impacts decreased over time at Black Pond Woods and Mary Beth Doyle, but increased at Furstenberg.
- Deer exerted large impacts on wildflowers at Bird Hills despite decreased impacts shown by other metrics—the red oak seedling and trillium enclosure studies (see other reports).