Project FeederWatch at Year Eight: Urban Gardens are Winter Havens

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Abstract

Urban ecosystems can be managed to make them more accommodating to wildlife. Migrating birds pass through cities, and many birds breed or overwinter in them. To survive, birds need habitat that provides food, water, and shelter. In 2014, we initiated a multi-year survey of birds that winter on the Saint Peter's University campus in Jersey City (November to April). Using the Project FeederWatch (PFW) protocol developed by the Cornell Lab of Ornithology, we counted birds (species and individuals) attracted to resources (including feeders) within our study area. The first four seasons of PFW (2014–2017) established that five common, urban-tolerant species were consistently present every season, with House Sparrows dominating. In summer 2018, our PFW study area underwent a major renovation: we removed non-native, invasive plants and replanted with native plants, especially those beneficial to birds and pollinating insects. We also added a birdbath as a source of water and expanded seed choices at feeders. The four PFW seasons (2018-2021) following creation of this native plant garden showed an increase in the average number of species seen per week as compared to the previous four seasons; a Welch Two Sample t-test confirmed the difference to be highly significant. Total numbers of species present per season (species richness) also increased between the 1st and 2nd half of our study period. Native bird species were counted more frequently after habitat improvements. This trend was especially evident in the winter of 2020-2021 which we attribute to decreased human activity in Jersey City related to Covid-19.

Introduction

Cities are urban ecosystems. Migrating birds pass through them, and many stay to winter or breed in them. To prevent cities from becoming ecological traps, it should be our duty as managers of these ecosystems to improve urban green spaces so they are better providers of the resources that birds and other wildlife need to survive. Urbanization, habitat degradation, and climate change are among the many human-related causes of mortality in the decline of many once-common bird species. Rosenberg et al. (2019) documented that there has been a 30% decline in North American bird populations since 1970, a loss of 3 billion birds.

For eight years, we have used Project FeederWatch to survey the winter bird community on our urban campus. Four years ago, a grant enabled us to improve habitat in the study area by replacing nonnative ornamental plantings with native plants that are beneficial to birds and insects.

In addition to identifying the species and numbers of birds that winter on our urban campus, we are able to identify trends over time and to test the hypothesis that habitat improvements such as those we have implemented can attract and support a greater number of bird species in an urban area.

Materials and Methods

Project FeederWatch (PFW) has been used at Saint Peter's University (Jersey City, NJ) to monitor the winter bird community for eight winters (November to April), starting in 2014. For the protocol, see Wydner (2019). Our PFW count site is about 520 m^2 (size of two tennis courts). Data collected include maximum number of individuals of each species seen at a time, length of observations ("effort"), and physical factors such as weather and snow cover. Data is entered at the PFW website (http://feederwatch.org/) managed by the Cornell Lab of Ornithology and Bird Studies Canada. For average group size, we followed practices as defined on the PFW website. For the first four seasons (2014 to 2017), a squirrel-proof feeder mounted on a pole was kept filled with a mix of birdseed (such as milo, cracked corn, millet, black oil sunflower). Two suet cakes were also suspended on the same pole.

Thanks to a grant from the Society for Biodiversity Preservation, modifications were made to the PFW area in summer/fall 2018: (1) English ivy and other nonnative plants overgrowing part of the area were removed. (2) The area was replanted with native plants. (3) A bird bath was added to provide a water source. (4) Seed choices at feeders were expanded by adding an additional feeder on a second pole supplying sunflower seed and sometimes niger. Annual and perennial native plants are thriving in the area as management of the restored natural habitat continues.

Results

Figure 1. Development of the native plant garden started in July 2018. (A) Before native plants could be planted, English ivy overgrowing the PFW area had to be removed. (B) Afterwards, native wildflowers were planted.

Figure 2. Average Group Size For The Top PFW Species. Only five species were present in all eight seasons, with House Sparrows dominating. (MODO = Mourning Dove, AMRO = American Robin, NOMO = Northern Mockingbird, EUST = European Starling, HOSP = House Sparrows)

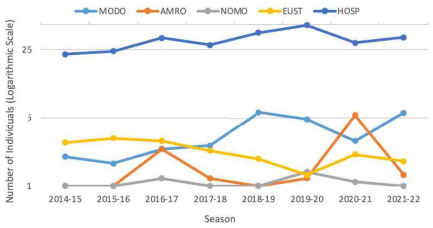


Figure 3. Summary of Species Diversity Over Eight PFW Seasons. The total number of species per season and average number of species counted weekly per season are compared. A Welch's Two Sample t-test shows that the means of total number of species per season (**blue** bars) from 2014-2017 & 2018-2021 are significantly different (t = -3.406, df = 3.8, p = 0.029).

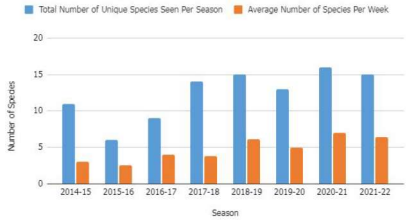


Figure 4. Numbers of Species Counted Per Week Averaged For The Seasons Before And After The Native Plant Garden. The averages for seasons 2014 - 2017 are compared with the averages for seasons 2018 - 2021.

Figure 5. Comparative Box Plot for Average Numbers of Species Counted Per Week Before And After The Native Plant Garden. Welch's Two Sample t-test shows that numbers of species per week between 2014-2017 and 2018-2021 are highly significantly different (t = -8.7779, df = 33.145, p = 3.666e-10).

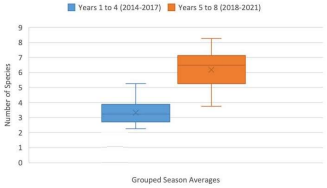


Figure 6. House sparrow group size has increased over time, peaking in 2019-20, but dropped markedly in 2020-21. SPU average group size is much higher than the average for NJ which has been trending downward.

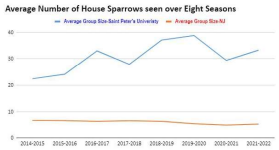


Figure 7. Mourning Dove group size started out below the NJ average but has trended upward at SPU, except for decreases in 2019-20 and 2020-21.

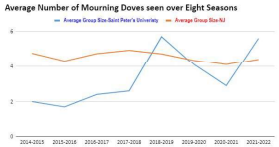


Figure 8. American Robin group size has stayed relatively constant and mostly below the NJ average except for a spike in 2020-21.

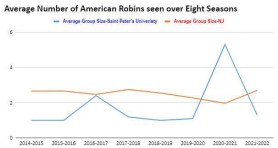


Figure 9. European Starling group size has remained below the NJ average and has shown a downward trend on campus as well as statewide.

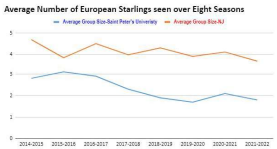


Figure 10. Northern Mockingbird group size has remained near "one" as expected since they are solitary and territorial in the non-breeding season.

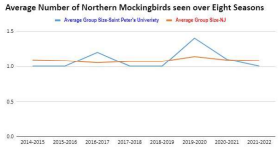
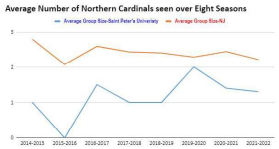


Figure 11. Northern Cardinal group size at SPU is below the statewide average but has trended upward over the past eight years.



Discussion / Conclusions

Eight years of data support our hypothesis that habitat improvements can attract and support a greater number of bird species in an urban area.

Following development of the native plant garden in summer 2018 (Fig 1), there has been a statistically significant increase in both the number of bird species "attracted" (total number of species counted per season) and "supported" (number of species counted per week) as seen from comparison of the first four seasons to the second four seasons (Figs 3-5).

In general, species richness (diversity) and numbers of native species have increased since habitat improvements were made in 2018.

The total number of species counted over eight seasons is 28 (data not shown), with only 5 species seen every season (Fig. 2).

The "Covid-19" winter of 2020-21, characterized by decreased human activity, showed a marked decrease in numbers of House Sparrows as well as the appearance of some native species not counted before or since, such as Black-capped Chickadees (data not shown).

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