

Study: Native, city-living bees and wasps thrive in large green spaces, flowering prairies

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The study found that experimental plots surrounded by 15 or more connected acres of greenspace and flowering prairies containing native plants, like the one pictured here, created conditions most conducive to the conservation of native bees and predatory wasps. Credit: Mary Gardiner

Converting vacant urban lots into greenspaces can reduce blight and improve neighborhoods, and new research shows that certain types of such post-industrial reclamation efforts offer the added bonus of benefiting bees.

Ohio State University researchers studying ways to encourage biodiversity in vacant urban lots found that experimental plots surrounded by 15 or more connected acres of greenspace and flowering prairies containing [native plants](#) created conditions most conducive to the conservation of native bees and predatory wasps.

These insects are important for pollination and insect pest control, two ecosystem services that benefit both rural farmland and the growing urban agricultural industry. Estimates suggest Cleveland, Ohio, where the research was conducted, is home to over 200 community farms and gardens.

"Both urban and rural farms require pollinators for efficient crop productivity because bee visitations can enhance crop quality and quantity," said Katie Turo, first author of the study and recent Ph.D. graduate from Ohio State's Department of Entomology.

Optimizing bees' city-living conditions could also help offset threats to their diversity and survival. Bee populations are challenged by a range of stressors—[habitat loss](#), [climate change](#), pesticides and [invasive species](#)—that "are huge issues that aren't going away anytime soon," said Turo, now a postdoctoral researcher at Rutgers University.

The researchers sought to assess urban "greening" strategies that could support multiple ecosystem services provided by plants and insects, said Mary Gardiner, professor of entomology at Ohio State and senior author of the paper. And the results suggest that while infrequently mowed turf grass used for many urban greening efforts can support insects, some

other types of minimally managed greenspaces could offer even more benefits to important native pollinators.

"Even in the middle of the city, bees were using these small patches of habitat," Gardiner said. "This is one of the first times a paper has demonstrated that native bees responded with a reproductive benefit from the establishment of native plantings within a city."

The research is published online in the journal *Conservation Biology*.



Credit: Mary Gardiner

This study of how greenspace quality, size and configuration affected

bee and predatory wasp nesting was part of a long-term, large-scale project for which the team designed different vacant lot management styles in eight neighborhoods across Cleveland.

Among 40 of those lots, five greenspace designs were tested for effects on bee and wasp reproduction, with the existing weedy vegetation in lots mowed monthly serving as a control. Experimental treatments included a dense no-mow grass lawn, a flowering lawn of mixed grasses, a prairie of tall native grasses, and a native flowering prairie of grasses and plants.

The researchers assembled a bee and wasp trap nest composed of a series of cardboard straws at each site. Over the three-year study, Turo X-rayed each straw to count the number of larvae inside, and confirmed those counts by observing the emergence of adult bees and wasps in the spring. Of the 17 species identified, 64% were bees.

The analysis showed that a higher abundance of native larvae was associated with the conservation plots surrounded by larger patches of additional urban greenspace—at least 15 connected acres was ideal—and more native bee larvae were observed in the flowering prairie.

In addition, native flowering prairies attracted a unique composition of bee and wasp species when compared to the control lots containing natural occurring weedy plants and turf grasses—a clue that greening urban spaces with native flowering plants could provide an important bee and wasp habitat, Turo said.

The findings could prove useful to the world's estimated 350 "legacy" cities—former industrial hubs whose landscapes have changed dramatically as a result of lost manufacturing industries and depopulation.

A common solution to these changes has involved demolishing clusters

of abandoned buildings and homes and covering over the land left behind with turf grass that needs minimal maintenance. Cleveland, for example, has lost over 50% of its population since the 1950s, leading to demolition of unneeded infrastructure and the creation of almost 4,000 acres of vacant land across 27,000 lots.

There are many community and environmental considerations at play when greening initiatives are proposed in municipalities. Despite the complexities, Gardiner and Turo said their research suggests that thoughtful conservation gives nature a chance to blossom in unexpected settings.

"This work has shown that some proportion of the bees and wasp community will respond to larger patches of greenspace being reinstated in the landscape, even if they are not the natural habitat that was there pre-development. And I think that's really exciting," Gardiner said.

More information: Katherine J. Turo et al, Effects of urban greenspace configuration and native vegetation on bee and wasp reproduction, *Conservation Biology* (2021). [DOI: 10.1111/cobi.13753](https://doi.org/10.1111/cobi.13753)

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