

New study confirms plight of bumble bees, persistence of other bees in Northeast

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The cleptoparasitic bee *Coelioxys sayi*, shown here, is widely distributed in North America and parasitizes Megachile leaf-cutter bees. This photo was taken in Prospect Park in Brooklyn, N.Y. Credit: AMNH/J. S. Ascher

A new study shows that although certain bumble bees are at risk, other

bee species in the northeastern United States persisted across a 140-year period despite expanding human populations and changing land use. Led by Rutgers University and based extensively on historical specimens from the American Museum of Natural History and nine other bee collections, the study informs conservation efforts aimed at protecting native bee species and the important pollinator services they provide. The results are published today in *Proceedings of the National Academy of Sciences*.

Eighty-seven percent of the world's [flowering plants](#), including most of the leading global [food crops](#), are pollinated by animals. Bees are considered the most important [pollinators](#) because of their efficiency, specificity, and ubiquity. However, despite concerns about pollinator declines, long-term data on the status of bee [species](#) are scarce.

In the new study, the researchers used new web-based software to compile 30,000 museum specimen records representing 438 bee species.

"A novel aspect of this study was the use of collaborative online tools that allowed data to be captured quickly and accurately across 10 institutions, many of which lacked pre-existing capabilities in this area," said John Ascher, a research scientist in the Museum's Division of Invertebrate Zoology and an author on the paper who led the data-collection effort.

From the years 1872 to 2011, the authors observed slight declines in the number of bee species in comparable samples from the northeastern United States. Statistical analysis revealed that only three species exhibited a rapid and recent population collapse—all species of [bumble bees](#), which also have been shown to be declining in previous studies. Other species, including the oil bee *Macropis patellata*, showed more gradual declines.

Although few species were found to have severely declined, more than half of all bee species changed in proportion over time, with 29 percent of the species decreasing and 27 percent increasing. Bees that showed the greatest increase are mostly exotic species that were introduced to North America. Few such species were present in the earliest historical samples but they make up an ever-increasing proportion of more recent samples.

"Environmental change affects species differentially, creating 'losers' that decline with increased human activity but also 'winners' that thrive in human-altered environments," said Ignasi Bartomeus, lead author on the paper who conducted this work as a postdoctoral researcher at Rutgers University. "Certain traits can make species more vulnerable."

The scientists found that declining bee species tend to have larger body sizes, restricted diets, and shorter flight seasons.

They also revealed that "southern" bees reaching their northern distributional limits in the Northeast are increasing, a finding that could reflect a response to climate change. The average April temperature increased by more than one degree during the last 40 years in the study region, causing bees and their host plants to emerge earlier in the season.

Ongoing data capture will continue to expand the bee database so that statistical analyses can be applied across a broader geographic area and to a wider range of species, especially those that are rare in collections and potentially of greatest conservation concern.

More information: "Historical changes in northeastern US bee pollinators related to shared ecological traits," by Ignasi Bartomeus et al. *PNAS*, 2013.

Provided by American Museum of Natural History

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