



# AMERICAN MUSEUM OF NATURAL HISTORY

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## **NEW RESEARCH CONFIRMS PLIGHT OF BUMBLE BEES, PERSISTENCE OF OTHER BEES IN NORTHEASTERN UNITED STATES**

### **MUSEUM COLLECTIONS KEY TO GENERATING DATASET SPANNING 140 YEARS**

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.

Data capture was supported by a National Science Foundation Biological Infrastructure grant, #0956388. Additional support for this work was provided by Robert G. Goelet, Chairman Emeritus of the Museum’s Board of Trustees.

#### **AMERICAN MUSEUM OF NATURAL HISTORY (AMNH.ORG)**

The American Museum of Natural History, founded in 1869, is one of the world’s preeminent scientific, educational, and cultural institutions. The Museum encompasses 45 permanent exhibition halls, including the Rose Center for Earth and Space and the Hayden Planetarium, as well as galleries for temporary exhibitions. It is home to the Theodore Roosevelt

Memorial, New York State's official memorial to its 33rd governor and the nation's 26th president, and a tribute to Roosevelt's enduring legacy of conservation. The Museum's five active research divisions and three cross-disciplinary centers support 200 scientists, whose work draws on a world-class permanent collection of more than 32 million specimens and artifacts, including specialized collections for frozen tissue and genomic and astrophysical data, as well as one of the largest natural history libraries in the Western Hemisphere. Through its Richard Gilder Graduate School, it is the only American museum authorized to grant the Ph.D. degree. In 2012, the Museum began offering a pilot Master of Arts in Teaching with a specialization in earth science. Approximately 5 million visitors from around the world came to the Museum last year, and its exhibitions and Space Shows can be seen in venues on five continents. The Museum's website and collection of apps for mobile devices extend its collections, exhibitions, and educational programs to millions more beyond its walls. Visit [amnh.org](http://amnh.org) for more information.

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