

First survey of California's bees in 50 years will look for effects of habitat destruction

May 14 2020, by Holly Ober



A tiny native California bee rests on a desert dandelion in the Sonora Desert near Anza-Borrego State Park. Credit: Holly Ober/UC Riverside

When you think of California in the 1970s, maybe you think of hippies, Fleetwood Mac or skateboards. But if you're an entomologist, you might think of all the natural spaces that have since been devoured by urbanization and wonder what happened to the native bees that lived in them.

The question isn't one of mere nostalgia or curiosity. Insect populations around the world are plunging precipitously, and scientists are

scrambling to understand why. The threat to pollinating insects is particularly dire because much of the food people eat depends on them.

Lauren Ponisio, an assistant professor of entomology at UC Riverside, has embarked on a project to figure out how [habitat destruction](#) has affected [native bees](#) in California by resampling sites first studied in the 1970s. It is the first systematic attempt to evaluate the extinction risk of pollinator species across California.

"In California, we have about every type of habitat you can imagine. When people turn these areas into cities and suburbs, we often change the system to be more useful to us by putting in roads and lawns," Ponisio said. "When we urbanize areas, we are taking away the habitats where the [wild bees](#) and plants lived, and also taking away the habitat diversity that was once there. We expect this change has led to the loss of many plant and bee species."



Lauren Ponisio holds a vial containing a California native bee she just captured in the Sonoran desert. Credit: Holly Ober/UC Riverside

California has around 1,600 species of native bees, though they bear little resemblance in features or lifestyle to the familiar domesticated European honeybee, an introduced species that has naturalized and become the charismatic face of bee population decline.

But the threats honeybees face pale in comparison to wild native bees, many of which inhabit ecological niches and depend on plants disappearing in urban sprawl. Both European and native bees are crucial pollinators for California's \$50 billion agriculture industry.

"With the global decline of managed European honeybees, making sure

our wild bee populations stay healthy will help to ensure our crops keep getting pollinated," Ponisio said.

In the early 1970s, entomologist Andrew Moldenke collected samples of native bees, along with the plants on which they were found, in habitats representative of the major plant-pollinator communities in California. The original sites were meant to capture a variety of important eco-regions including coniferous forest, desert, oak woodland, chaparral, and coastal sage scrub.



Native bees often look different from European honeybees. Credit: Holly Ober/UC Riverside

Since then, the human population in many of the original sampling locations has increased by more than 100%. Some of the original sites are now built over or otherwise destroyed.

Ponisio leads a team of researchers, in collaboration with California State University Channel Islands Professor Ruben Alarcon, that is repeating Moldenke's survey in order to find out how plant-pollinator communities have fared over time. The ambitious multiyear project will begin in the Sonoran deserts and follow the flowers northward through California's various coastal, mountain, valley, and other important eco-regions.

Ponisio's group will examine whether changes in pollinator and plant communities are driven by local changes in land use, specifically urbanization. It will also determine whether pollinator traits including nesting biology and floral specialization increase extinction risk.



Postdoctoral researchers working with Lauren Ponisio look for native bees in the Sonora desert near Anza-Borrego State Park. Credit: Holly Ober/UC Riverside

On a brilliant day in mid-March, Ponisio and her team scouted the Sonoran desert near Anza-Borrego State Park. The plant communities in Moldenke's original San Diego County desert site had been completely altered by off-highway vehicles over the past 50 years.

They found what they were looking for a few miles away from the original site, alongside a creek at the foot of a rocky mountain, where the same kind of plant community described in the original research still flourished. But a couple hours of searching yielded only a few native bees even though the desert was in peak bloom.

Though the site was not close to major cities and adjacent to a state park, studies on other organisms have shown that urbanization can have a long reach, forcing individuals to negotiate roads and buildings to forage and mate, often isolating populations. These indirect effects can spill over into wildlands adjacent to urban areas. San Diego County's population has grown 108% since the early 1970s, and Ponisio wants to know if the disappointing number of native bees reflects that.



Off-highway vehicles have denuded the vegetation in the original sampling site.
Credit: Holly Ober/UC Riverside



Lauren Ponisio and her team look for native bees in a habitat that greatly resembles the original 1970s site. Credit: Holly Ober/UC Riverside



Lauren Ponisio holds a small native bee in a glass vial in the Sonora Desert near Anza-Borrego State Park. Credit: Holly Ober/UC Riverside

Scientists have observed that urban land use tends to homogenize regional biodiversity, and though many studies have documented local losses of species richness, little is known about how regional biotic homogenization works. With research that uses historic datasets to explore how species composition changes through time, scientists can better predict the persistence and extinction of species in areas affected by urbanization.

Ponisio thinks native bees are valuable in their own right, as pollinators of California's wild native plants and important players in preserving biodiversity.

"California is a hotspot for bee diversity," Ponisio said. "As Californians, we can make a big difference in global bee conservation if we protect our native bees."

Provided by University of California - Riverside

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