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# The Problem with Honey Bees

They're important for agriculture, but they're not so good for the environment

• By [Alison McAfee](#) on November 4, 2020



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To many people, honey bees symbolize prosperity, sustainability and environmentalism. But as a honey bee researcher, I have to tell you that only the first item on that list is defensible. Although they are important for agriculture, honey bees also destabilize natural ecosystems by competing with native bees—some of which are species at risk.

The [rise in hobby beekeeping](#), now a trendy activity for [hundreds of thousands](#) of Americans, followed strong awareness campaigns to “save the bees.” But as a species, honey bees are least in need of saving. Media

attention disproportionately covers them over native pollinators, and murky messaging has led many citizens—myself once included—to believe they are doing a good thing for the environment by putting on a beekeeper’s veil. Unfortunately, they are probably doing more harm than good.

“Beekeeping is for people; it’s not a conservation practice,” says Sheila Colla, an assistant professor and conservation biologist at Toronto’s York University, Canada. “People mistakenly think keeping honey bees, or helping honey bees, is somehow helping the native bees, which are at risk of extinction.”

Colla recently published an analysis of nearly a thousand comments submitted by citizens in response to Ontario’s draft Pollinator Health Action Plan—a proposal that involved a plan for stricter neonicotinoid pesticide regulations. Despite intense public interest in bees and pollination and strong support of tighter pesticide regulations, Colla and her colleagues found that citizens had a surprisingly poor understanding of the diversity of pollinators and their roles in pollination.

“The focus on neonics [a kind of pesticide] and honey bees has taken a ton of resources away from conserving wild pollinators from their most important threats,” Colla says. She is justifiably frustrated at the misappropriated attention on saving honey bees when, from a conservationist’s point of view, native bees are the ones in more dire need of support. And while honey bee–centric businesses often support initiatives that benefit native bees, such as developing bee-friendly habitat, the financial contributions pale in comparison to what could be achieved if funds were applied to these initiatives directly. “Beekeeping companies and various non-science-based initiatives have financially benefitted from the decline of native pollinators,” Colla explains. “These resources thus were not allocated to the actual issue people are concerned about.”

For some reason, maybe because they are small, honey bees are not generally viewed as the massively distributed livestock animal that they are. There are millions of honey bee colonies in North America, 2.8 million of which are in the U.S. Approximating around 30,000 bees per colony (the size of a pollination unit), that’s roughly a billion honey bees in Canada and the U.S. alone—almost triple the number of people.

High densities of honey bee colonies increase competition between native pollinators for forage, putting even more pressure on the wild species that are already in decline. Honey bees are extreme generalist foragers and monopolize floral resources, thus leading to exploitative competition—that is, where one species uses up a resource, not leaving enough to go around.

But determining honey bees' influence on natural ecosystems requires empirical testing. It is possible, for example, that alternate foraging habits of native bees—differences in their active times of day or preferred plants, for example—could lead to little effective competition. Honey bees are so ubiquitous, though, that it has been hard to test exactly how their introduction, and subsequent resource monopolization, affects ecosystem networks.

Not so for the Canary Islands. Alfredo Valido and Pedro Jordano, researchers from the Spanish National Research Council in Tenerife and Sevilla, respectively, saw an opportunity to use these islands—a Spanish archipelago off the northwestern coast of Africa—to study how the introduction of honey bees affects the native pollinating community.

In the highlands of the islands' Teide National Park, thousands of honey bee colonies are introduced seasonally for honey production and removed again at the end of the nectar flow, creating an excellent scenario for experimentation. Their results, published in *Scientific Reports*, do not make honey bees look like the sustainability celebrities they have become.

Bringing in honey bees reduced the connectedness of the plant-pollinator networks. Nestedness and modularity, two indicators of ecosystem resilience, also declined. While some plant species enjoyed higher fruit set, fruits sampled nearest the apiaries contained only aborted seeds. “The impact of the beehives is so dramatic,” says Valido, “You can detect disruption between plants and pollinators just the day after beehive installation.”

“By introducing tens or hundreds of beehives, the relative density of honey bees increases exponentially compared with wild native pollinators,” Valido explains. This causes a drastic reduction of flower resources—pollen and nectar—within the foraging range. “Beekeeping appears to have more pervasive, negative impacts on biodiversity than it was previously assumed,” says Jordano.

Valido and Jordano suspect that their findings on the Canary Islands are generally applicable to other ecosystems where honey bees are introduced, but they note that the specific impact of beekeeping in other locations may differ. Indeed, honey bees are not always the top competitor in a pollinator network: Whether they succeed at outcompeting the native bees depends on other factors. For example, Nicholas Balfour and his colleagues at the University of

Sussex, England, found that native bumble bees were superior competitors on the tubular flowers of lavender, owing in part to their longer proboscis (tongue).

In still other ecosystems, honey bees appear not to be as influential as in the Canary Islands. After introduction in northern Patagonia, nonnative bumble bees and honey bees overtook the native bees as the most frequent floral visitors, but this had no effect on the native bees' actual visitation rates. While every ecosystem has its own quirks—with different pollinator players and participating plants—pollination network studies conducted closer to home tend to agree with the findings in the Canary Islands. “There have been studies in North America showing pollination system disruptions by honey bees,” says Colla. “Honey bees also are very effective at pollinating certain weedy species, which changes the overall plant communities.” Many of those weedy species are also invasive, including Scotch broom, dandelions, Himalayan blackberry and Japanese knotweed, among others. And beekeepers secretly love invasive plants. Their intense proliferation provides a lucrative and predictable nectar flow—perfect for the honey bees, and beekeepers, to capitalize on—but the plants, too, disrupt native ecosystems.

Even with this boost of forage, there is sometimes still not enough to go around amongst honey bees, let alone native bees. In the lower mainland surrounding Vancouver, Canada, I kept a small research apiary with 15–20 hives. It was my first year keeping research colonies in a high-density area, and I have never struggled so much to keep my bees alive.

The hives were riddled with diseases. I even euthanized one colony with symptoms of American foulbrood—standard protocol, as it's one of the most destructive, contagious diseases that honey bees face. Despite being entirely free of *Varroa destructor*—a devastating parasitic mite—at the start of the season, the hives required miticide treatments by late summer. And the colonies did not produce a crop of honey.

Colony densities in some locations have become too high, facilitating the spread of disease and exacerbating problems with poor nutrition. If it was this hard to keep my honey bees healthy, I'm not sure I can bear to think about the wild bees.

But think about them, we must. I used to believe that honey bees were a gateway species, and that concern over their health and prosperity would spill over onto native bees, benefitting them, too. While this may have happened in some cases, evidence is mounting that misguided enthusiasm for honey bees has likely been to the native bees' detriment. Beekeeping doesn't make me feel good, anymore. In fact, quite the opposite.

### **ABOUT THE AUTHOR(S)**

Alison McAfee, Ph.D., is a post-doctoral fellow in the Department of Entomology and Plant Pathology, at North Carolina State University and author of the monthly Science Insider column for the *American Bee Journal* since 2017, as well as other commissioned pieces. She specialized in studying honeybee social immune defense strategies for her Ph.D.

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