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WILD BEES ARE DYING AND ECOSYSTEM COLLAPSE WILL FOLLOW—BUT NOBODY'S TAKING NOTICE

BY **ARISTOS GEORGIU** ON 11/27/18 AT 10:59 AM EST



TECH & SCIENCE

The humble honeybee was domesticated by humans thousands of years ago, and today it plays an important role in the world economy as a pollinator of crops.

In recent years, a significant amount of attention has been paid to the numerous threats that are facing the honeybee. But contrary to what many people believe, not all bees are in dire straits. For example, numbers of the Western honeybee—the most common of the domesticated species—in the United States have actually been rising slowly in recent years (there around 2.9 million colonies today compared with 2.5 million colonies 10 years ago, according to data from the U.S. Department of Agriculture), and the species is not at risk of extinction.

This is not to say that the situation is good. Huge numbers of hives are being lost every winter and spring, with some beekeepers reporting losses exceeding 40 percent, May Berenbaum, a professor with the department of entomology at the University of Illinois, told *Newsweek*.

Essentially, honeybee numbers in the U.S. are only stable because beekeepers are becoming better at compensating for losses, so it's becoming a very time-consuming and expensive process just to maintain their current levels.

A number of policy and conservation initiatives have been put in place to address these kinds of issues. But according to a 2016 paper in *Conservation Biology*, while such efforts may sound beneficial, they may actually be exacerbating another significant problem—the decline of native bee species, such as bumblebees, of which there are around 4,000 in North America. Unlike the honeybee, a small portion of these native species are classified at risk of extinction.

"We argue that North American honeybee losses are not a conservation problem," authors Sheila Colla and J. Scott MacIvor wrote. "Rather, they are a domesticated-animal-management problem. By focusing attention on honeybees, policies and funding priorities may undermine native bee conservation and have negative impacts, ecologically and socially."

To find out more about why native bees have been overlooked and the potential implications of this, *Newsweek* spoke to Robert Gegear a professor with Worcester Polytechnic Institute's Department of Biology and Biotechnology, in Massachusetts. Gegear's research is focused on wild bee populations.

Gegear has created a project called Bee-Cology to educate the public on the importance of bee diversity and the conservation of bees, particularly bumblebees in America's Northeast. Our conversation has been edited for length and clarity.

Can you talk a little bit about the problem of pollinator decline? Pollinator decline is a problem in two very different but equally important contexts. On the agricultural side of things, which is getting a lot of attention, we've got honeybees and the loss of hives.

The other is the ecological context. We have many native pollinator species that are in rapid decline. Some are on the verge of extinction, such as *Bombus affinis*—the first bumblebee on the endangered species list here in North America.

In the agricultural context, we're talking about managed bees, and in the ecological context we're talking about wild bees. They are completely different beasts. Out of the thousands of wild pollinator species that we have, only a couple are economically important. The vast majority of pollinators don't care about crop plants. That's really affected conservation strategies. The honeybee is really driving the show when it comes to these strategies, and the problem is that we're completely neglecting native bees.

In the agricultural context, you need enough pollinators to get the pollinating done, and then you're good. So when they talk about conservation and "Save the Bees" in that context, they only care that they have one pollinator species to replace honeybee losses, but they don't care about diversity.

Bombus affinis, the rusty patch bumblebee, takes flight. *Bombus affinis* is on the endangered species list in North America.

USGS BEE INVENTORY AND MONITORING LAB

In the ecological context, what role does the honeybee play?

In the ecological context, the honeybee plays no role. We could remove the honeybee from the planet, and it would have no effect ecologically speaking. In fact, it would probably have a positive impact because honeybees are competitors for limited resources—pollen and nectar. One hive of honeybees has 10,000 individuals and can pull in 150 pounds' worth of honey. That's 150 pounds of nectar that could go to native pollinators.

A very good bumblebee hive may have 1,000 to 2,000 individuals, and even that's almost unheard of. Plus, most bees are solitary. So you've got individuals competing with thousands—somebody's going to lose.

Now, if we start removing our native bees, we have a problem because they have a unique relationship with native flowering plants that is holding up ecosystems. It's keeping ecosystems healthy, it's maintaining diversity.

The bees visit the plants; the seeds and fruit feed birds; they feed small mammals, and so on. Then you've got things at the next trophic level eating those things. When we start to lose species in that context, we're talking about extinction and the loss of components which will eventually lead to ecosystem collapse.

If we keep removing them, it's like that game Plinko from the 80s where you've got the marbles and you keep pulling out straws. Eventually you're going to pull out the wrong one and all the marbles are going to fall. We will then lose ecosystem services like water purification, decomposition, and a whole bunch of other services that we get for free—pollination being one of them.

That's the ecosystem collapse that's coming and the problem is, we have no clue where we are in that process. Why? Because we don't know enough about the ecology of individual species and their relationship with flowering plants, and the relationship of those plants with animals at the next trophic level. Each species of insect pollinator has a special role to play in the ecosystem. But we don't know how important each of their roles actually is

What are some of the problems with wild bee conservation policies today?

What people are trying to do is apply the needs of the honeybee across the board to the thousands of other insect pollinators that we have on the planet. This one-size-fits-all approach is a major problem in native pollinator conservation and, in fact, is accelerating the declines in many species that we're seeing.

The western honeybee, *Apis mellifera*, was domesticated by humans thousands of years ago. "One hive of honeybees has 10,000 individuals and can pull in 150 pounds of honey," says Robert Gegear, a researcher.

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Managed bees of course have a place to live. We control disease, and we help them to mate. In the ecological context, all of this has to be done by the bees themselves. If you look at bumblebees, they have to find a place to overwinter [to live through the winter], the queens have to find a place to nest in the spring, they have to find resources to produce male and queen bees that will mate and keep that population going. So there are all these points of vulnerability that you see in the wild side that are ignored when you look at things from the agricultural side.

One of the misconceptions about bee decline is that all bees are declining. That's absolutely false. Some bees are doing better than they have done historically, they're expanding their geographic ranges. These species, such as *Bombus impatiens*, seem to be immune to the environmental stressors that are driving other bees to extinction. And I think the competition with bees that are doing better is also contributing to the decline of many other species.

What kinds of stressors are we talking about?

Whatever the stressor is, it's likely affecting the wild bees and other insect pollinators. So in urban and agricultural areas, the use of pesticides clearly negatively affect bee health. Disease moving from managed bee to wild bee is also an issue and has been for a long time.

Diseases may become more prevalent in areas with managed bees through something called pathogen spillover. We're getting waves of infection into wild populations in agricultural areas where they're using commercial bumblebees. Now there's evidence that infections are moving from honeybees to bumblebees.

And there other things: Habitat loss from the wild bee side, I think everyone would agree, is the major driving force in the decline. Changes to habitat, such as nest site availability, overwintering availability and nectar and pollen sources, are all contributing.

We don't know enough about the ecology of each species to be able to figure out what the problem is. And because of the money that goes toward honeybees, wild bee decline isn't being addressed adequately. My research is attempting to do this through an ecology project, which I've started to help figure out what the ecological needs of different species are and what's missing in some areas.

So would you say in the public's eye that wild bees have been neglected?

Absolutely. People are unaware of what's going on: this idea of keystone species and this cascading negative effect of pollinator decline throughout the ecosystem and biodiversity. It's interesting: Even the major pollinator conservation groups talk about wild bee decline and loss of biodiversity, but it's really just lip service. In terms of what they're doing to fix it, it's all clearly honeybee biased.

A bumblebee rests on a flower in Albuquerque, New Mexico. "People are surprised to know that bumblebees make honey. They just don't make as much, and it's not commercially viable," says researcher Robert Gegear.

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Even when it comes to talking about bees and their lifecycle, they talk about in terms of the hive and honey. People are surprised to know that bumblebees make honey, they just don't

make as much, and it's not commercially viable.

And if you think the wild pollinators are ignored, native plants—which are declining along with the wild pollinators—are completely neglected. So we're trying to increase that awareness—when you lose a bee you're losing plant species. Those plant species are providing food, shelter and nest sites to all the other wildlife that you see.

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I want to say for the record I'm not bashing honeybees. They are important in agriculture. The problem is they have no place in ecology, and that distinction needs to be made.

What's the reason for the lack of scientific interest in wild bees? Is it because managed bees are so tied to industry there's more funding available?

Absolutely, that's the main factor. There's an immediate economic consequence that you can see—for example, your fruit production's down. What you can't see is loss of diversity, not unless it's dramatic. There's no immediate economic loss when it comes to the wild bee decline. There's very little if not no money focused on bees that are actually declining. It definitely has to do with economics, there's no question. It's dollars versus diversity. I've tried to apply for money from these major pollinator conservation groups, and they generally say we're looking for honeybee research.

What steps can people take to give a helping hand to native bees?

One of the obvious ones is to minimize pesticide use. People can also create pollinator habitats. [We have a list on our website of different plants](#) that would help you to bring more pollinator diversity into your backyard or your conservation land.

This must include both nectar and pollen plants, which are not the same. If we get rid of nectar, [bees] die within 24 hours. That's their fuel. But without pollen, they can't produce new bees, so the population is going to be affected.

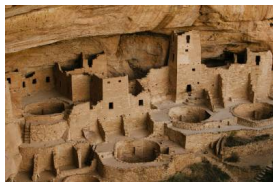
Also, minimize the use of exotic plants, because they disrupt the interactions between native plants and native pollinators. In terms of nesting habitat, having a perfectly groomed lawn is not the way to go. The more you can let go, the better. If you can get some long grasses on

your property or some matting—tufts of grass where there are cavities—those would be ideal nesting sites for bumblebees.

Using these techniques, we've been able to restore areas and show people how to increase diversity just by planting this one extra thing.

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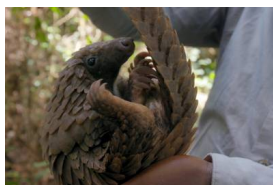
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