Honey Bees and Native Pollinators: Us vs. Them?

by SHANNON DURHAM

The question

The Western Honey Bee is a non-indigenous naturalized (established and widespread) species in the United States. Some conservationists wonder if honey bees are outcompeting native pollinators for floral resources resulting in native pollinator decline or extinction. Current data suggests that while honey bees can impact native pollinators, evidence of honey bees outcompeting native pollinators remains inconclusive.

Competition is defined as "an interaction between individuals, brought about by a shared requirement for a resource that is in limited supply, and leading to a reduction in the survivorship, growth and/or reproduction of the competing individuals concerned." A "negative interaction" is one that "reduces individual fitness and therefore threatens the long-term survival of a population."[1]

To determine if honey bees are outcompeting and negatively affecting native pollinators, three factors must be examined: the historic native pollinator population, the historic interaction between honey bees and native pollinators, and scientific evidence of honey bees outcompeting native pollinators.

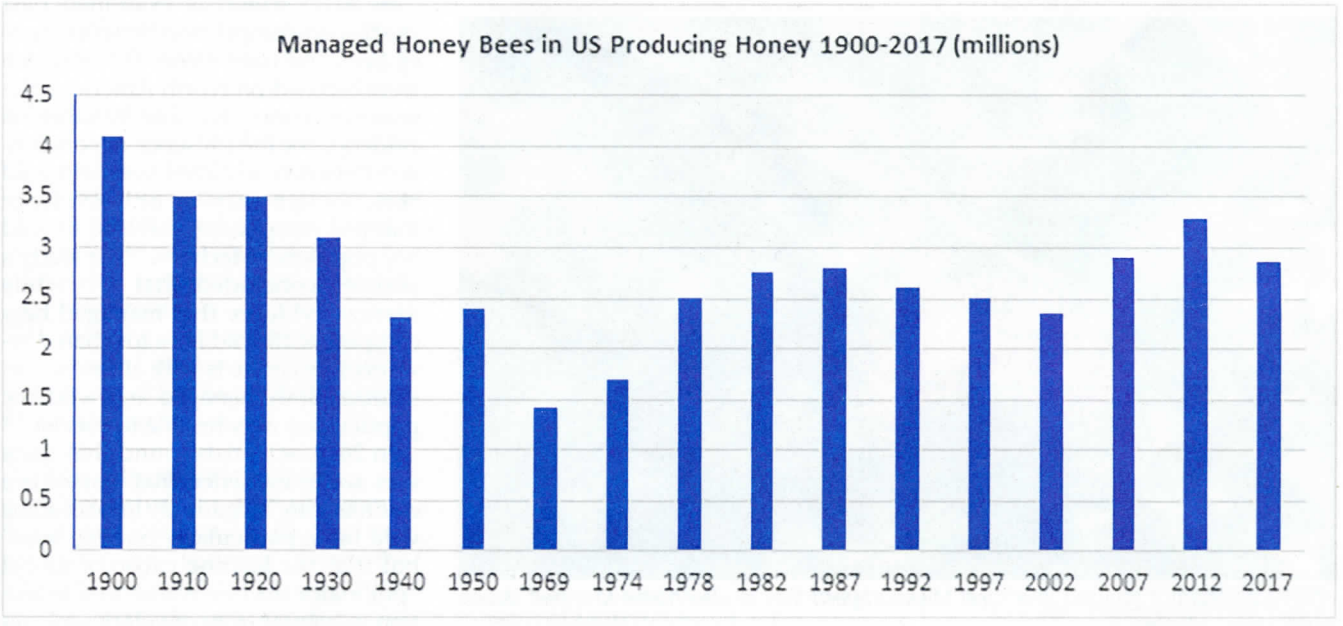
Historic native pollinator populations

The U.S. currently has over 4,000 different species of native pollinators.[2] Studies have been undertaken to determine if any of these populations have declined.

Scientists found it difficult to identify native pollinator population declines because there was never historical data on "absolute abundance." There is evidence of decline in some bumble bee species. The major causes for the decline were thought to be pathogens from imported bumble bees used for commercial greenhouse pollination, along with habitat degradation and loss.[3]

A 2013 study focused on native pollinators in the Northeastern United States. Scientists examined museum records of over 438 species over a 140-year period and found that "native species richness weakly decreased, but richness declines were significant only for the genus *Bombus*. Of 187 native species analyzed individually, only three declined steeply, all of these in genus *Bombus* [the bumble bee]."[4]

Based on available evidence, with the exception of a handful of bumble bee species, the populations of most native pollinators appear to be relatively stable. To date, there still is no scientifically accurate method of counting native pollinators in the field that would reflect actual population numbers.[5] Without accurate



Source: USDA NASS, Census of Agriculture (various years, 1900-2017)[8]

Apis mellifera *is one of dozens of pollinator species drawn to buckwheat and sunflowers in full bloom.*

population counts, evidence that declines have occurred and pinpointing why declines have occurred, it would be hasty to conclude that honey bees have caused a decline in native pollinator populations.

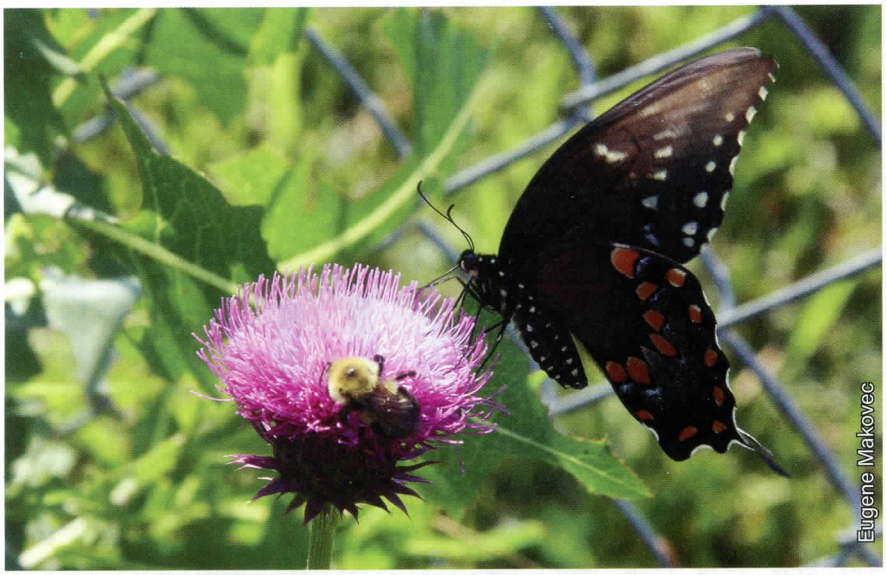
Historic interaction between honey bees and native pollinators

For 400 years, honey bees and native pollinators have co-existed in the United States. The Western honey bee was first brought to the U.S. by European settlers in 1622.[6] Newly established colonies quickly swarmed and created an abundance of feral colonies. By the mid-1700s, colonists regularly hunted the populous feral honey bee colonies in the forests.[7]

In 1900, there were approximately 4.1 million managed honey bee colonies in the U.S. Over the past 100 years, according to the U.S. Department of Agriculture's census on managed honey bee colonies that produce honey, the U.S. has averaged approximately 2.7 million managed honey bee colonies annually.[8]

Based on the historical interaction between honey bees and native pollinators in the U.S., if honey bees did outcompete native pollinators, then this most likely occurred long ago when honey bees were first introduced.

The Western honey bee and native pollinators have had 400 years to become acquainted and adapt to each other's presence. As such, the continued presence of the Western honey bee is unlikely to be the root cause of any modern native pollinator decline or extinction.



Native pollinators abound in a rural Missouri yard that is also home to a half dozen honey bee colonies.

Are honey bees outcompeting native pollinators?

Most research to date on competition "has concentrated on one or more of the following three measurements: the overlap in resource use between honey bees and native bees; the change in visitation rates of native bees; and the change in the levels of resources harvested by native bees when honey bees are present." Over the past 25 years, a series of studies on honey bee and native pollinator competition has been published. The studies appear to be mostly inconclusive with regard to competition.

In 2009, scientists concluded that many past studies on honey bee and native pollinator competition "were compromised by low replication, confounding factors or poor interpretation." Scientists must "not just measure floral resource overlap, visitation rates and resource harvesting, but they must also assess direct measurements such as individual survival, fecundity or population numbers" to determine if there is a negative impact. "More direct studies of the impact of honey bees on native bee survival, fecundity or population density have shown little evidence that the presence of honey bees has any impact on native bees" but it is inadvisable "to make any definite conclusions until more research is conducted."[9]

In 2017, scientists examined past studies on competition between honey bees and native bees (19 of which were focused on North America). Researchers concluded that, "... there is evidence for the presence of competition between managed bees and wild bees, though there is little evidence that this competition can lead to wild bee population declines." The study's authors concluded that "... while there is evidence that managed bees compete with wild bees for shared resources, in contexts with abundant resources, both managed and wild bee populations may be able to coexist."[10]

In 2018, scientists found that there was some evidence that honey bee colonies can "negatively impact some wild bees, particularly bumble bees" but that the leading cause of global "pollinator decline is due to a reduction in habitat from development, ag-

ricultural intensification and urbanization." The study also found that in some circumstances there was either no competition or even a positive correlation between native pollinators and honey bees.[11]

Based on scientific studies, the evidence that honey bees are outcompeting native pollinators is mainly inconclusive. What can beekeepers do to ensure that honey bees and native pollinators can continue to live alongside each other?

Helping Native Pollinators and Honey Bees Flourish

There are several ways beekeepers can help both honey bees and native pollinators.

1. **Education**:
   - Educate the public about the connection between native habitat and a healthy ecosystem.
   - Explain why tidy green lawns are pollinator deserts and demonstrate how to incorporate pollinator gardens into established landscapes.
   - Encourage the use of native grasses and reduce the need for pesticides.

2. **Increase Native Habitat**:
   - Partner with roadway authorities to plant native pollinator habitat alongside roadways.
   - Identify large open spaces in public parks, school fields, agricultural fields, commercial complexes and subdivisions that have room for native habitat, and offer to work with those entities to increase native pollinator habitat.

3. **Legislation**:
   - Work with local governments and developers to ensure that a certain percentage of greenspace in future developments is dedicated to pollinator habitat.
   - Relax residential grass height requirements so that lawn mowing only needs to be performed once a month (instead of weekly) during the active growing season.

4. **Agricultural Enterprises**:
   - According to the Integrated Crop Pollination Project that received funding from the USDA from 2012 through 2017, if farmers and ranchers include native pollinator habitat around crops, then "native pollinators can work with honey bees to maximize pollination."[12]
   - Work with farmers to plant more native habitat with the goal of increasing pollination.

Conclusion:

In the U.S., honey bees and native pollinators have co-existed for 400 years. Not only are honey bees a vital component of U.S. agriculture, but they are also our "canary in the coal mine" when it comes to alerting us to pests, diseases, loss of habitat and pesticides that can affect honey bees, native pollinators and other insects.

To date, scientific studies indicate that the best option in maintaining the co-existence of honey bees and native pollinators is to exchange our ornamental plants, lawns and open fields for an abundance of native habitat. Beekeepers have an interest in keeping our environment healthy and will continue, with the help of their honey bees, to be stewards of the environment.

Citations

1 **Paini DR. 2004.** Impact of the introduced honey bee (*Apis mellifera*) (Hymenoptera: Apidae) on native bees: a review. Aust. Ecol. 29:399-407. 399-401.

2 **Moisset, B., and S. Buchmann. 2011.** Bee Basics: An Introduction to our Native Bees. USDA Forest Service and Pollinator Partnership, Washington, DC.

3 **National Research Council. 2007.** *Status of Pollinators in North America*. Washington, DC: The National Academies Press. https://doi.org/10.17226/11761. 8-34.4

4 **Bartomeus, I. et al.** Historical changes in northeastern U.S. bee pollinators related to shared ecological traits. *Proc. Natl Acad. Sci. USA* 110, 4656–4660 (2013)

5 **Prendergast, K. S., M. H. M. Menz, K. W. Dixon, and P. W. Bateman. 2020.** The relative performance of sampling methods for native bees: an empirical test and review of the literature. Ecosphere 11(5):e03076. 10.1002/ecs2. 3076. 18.

6 **Nelson, Eric. 1967.** History of Beekeeping in the United States. U.S. Dept. Agr., Agr. Res. Serv., Agr. Hdbk. 2.

7 **Barrett, Bruce, et al. 2018.** Honey Bees as Pollinators, Their Habitats and Products. Univ. of Missouri Extension. 2.

8 http://lib-usda-05.serverfarm.cornell.edu/usda/AgCensusImages/1940/03/07/1302/Table-08.pdf
http://lib-usda-05.serverfarm.cornell.edu/usda/AgCensusImages/1969/02/05/598/Table-03.pdf
http://lib-usda-05.serverfarm.cornell.edu/usda/AgCensusImages/1969/02/05/599/Table-71.pdf
http://lib-usda-05.serverfarm.cornell.edu/usda/AgCensusImages/1974/01/51/314/Table-04.pdf
http://lib-usda-05.serverfarm.cornell.edu/usda/AgCensusImages/1978/01/51/182/Table-25.pdf
http://lib-usda-05.serverfarm.cornell.edu/usda/AgCensusImages/1982/01/51/121/Table-38.pdf
http://lib-usda-05.serverfarm.cornell.edu/usda/AgCensusImages/1987/01/51/28/Table-41.pdf
http://lib-usda-05.serverfarm.cornell.edu/usda/AgCensusImages/1992/01/51/1574/Table-40.pdf
http://lib-usda-05.serverfarm.cornell.edu/usda/AgCensusImages/2002/01/51/1708/Table-32.pdf
https://www.nass.usda.gov/Publications/AgCensus/2007/Full_Report/Volume_1,_Chapter_1_US/usv1.pdf pages 25, 26, 28

9 **Paini DR. 2004.** Impact of the introduced honey bee (*Apis mellifera*) (*Hymenoptera: Apidae*) on native bees: a review. *Aust. Ecol.* 29:399-407. 399-404.

10 **Mallinger RE, Gaines-Day HR, Gratton C. 2017.** Do managed bees have negative effects on wild bees?: A systematic review of the literature. *PLoS ONE* 12(12): e0189268. 6, 25.

11 **Wojcik, V.A., Morandin, L.A., Davies Adams, L. & Rourke, K.E. 2018.** Floral resource competition between Honey Bees and wild bees: is there clear evidence and can we guide management and conservation? *Environ. Entomol.* 822-833.12

12 https://icpbees.org

Shannon is a beekeeper who is also the Secretary of the Cherokee Beekeepers Club in Cherokee County, Georgia. She recently completed the Apprentice program at the University of Montana Online Beekeeping Program and is currently enrolled in the Advanced Level of the University of Florida Master Beekeeping Program. She has a Juris Doctor degree and currently works as a project manager for an industrial millwright company in the corrugated industry. Contact Shannon at GABeekeeper@yahoo.com