Old data may provide new insights on honey bee populations

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Over the past decade, beekeepers in the U.S. and other countries have had problems keeping their bees healthy. Some of the potential causes of their problems include the *Varroa destructor* mite, pesticides, pathogens, and the reduction of floral resources due to land development or conversion.

To make matters worse, there has been a lack of useful, long-term datasets on the size of honey bee populations. This lack of data makes it difficult to quantify actual changes in honey bee abundance, and to determine what causes population declines.

To help remedy this problem, Dr. Steven Highland (Utah State University) and Dr. Rosalind James (USDA-ARS) studied the few long-term datasets available—three in total—to see if they contained useful information, and their findings were recently published in *Environmental Entomology*.

"We cannot tell if colony numbers are declining if we don't have prior knowledge of their previous numbers," said Dr. Highland. "Our article identifies both the utility and limitations for each dataset, and describes for the first time how these datasets can be used together to elucidate how the colonies are being used in each state, where the population declines are happening, and where there are actual colony number increases."

The three datasets they studied included a yearly survey of honey

producers in each state by the USDA-National Agricultural Statistics Service (NASS); a quinquennial census of agriculture, which is a census of U.S. agricultural commodities also performed by USDA-NASS; and datasets from states that require honey beekeepers to register their colonies annually.

"We found the USDA Census of Agriculture provides the most accurate long-term dataset, even though the data are taken only once every fiver years," said Highland. "As this dataset has rarely been used for quantifying changes in honeybee abundance, we hope our assessment will help researchers better identify and quantify the most important causes for change in bee abundance and availability."

While the authors found that the datasets can indeed be useful for measuring honey bee abundance changes over the years, they do acknowledge some limitations of the data.

"Which of these long-term datasets, or which combination of datasets, are best used for evaluating changes in honey bee colony numbers depends on the location, nature, and purpose of the study," the authors wrote. "For all three, it should be acknowledged that none identifies the number of healthy colonies that were split into two or more. Also, while some degree of colony loss can be determined using these datasets, none actually counts the numbers of lost colonies. Furthermore, the data do not include information concerning how the colonies were used in any given year (pollination, honey production, queen rearing, etc.). More detailed data on colony gains and losses would improve our ability, in the future, to assess the impact that different human and environmental factors have on honey bee health and productivity."

  More information: Steven Highland et al. The Similarity and Appropriate Usage of Three Honey Bee (Hymenoptera: Apidae) Datasets for Longitudinal Studies, *Environmental Entomology* (2016).