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Assessing the Impact of the Conservation Reserve Program on Honey Bee Health

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Insect pollinators are critically important for maintaining U.S. food production and ecosystem health. The upper Midwest is home to more than 40 percent of all U.S. honey bee colonies and is considered by many beekeepers to be America's last beekeeping refuge. Beekeepers come to this region because their honey bees require high-quality grassland and bee-friendly agricultural crops to make honey and to improve bee health. Agricultural grassland, such as those enrolled in the Conservation Reserve Program (CRP), support flowers that provide bees with the pollen and nectar they need. In 2014, the U.S. Department of Agriculture (USDA) and the U.S. Geological Survey (USGS) formed a partnership to assess the impact of the CRP on honey bee health and determine how the cost-effectiveness of the CRP could be improved to promote pollinator habitat. This USGS assessment has generated important findings that could improve USDA's program delivery and demonstrates the importance of the CRP to honey bees, beekeepers, agricultural producers, and the public (Otto and others, 2017, 2018).

Key Findings (2014–18)

- More than one-sixth of all honey bee yards in North Dakota and South Dakota (the top two honey-producing States) meet the key foraging requirements of honey bees just based on the existence of CRP grasslands alone. Thus, the CRP plays a considerable role in supporting the carrying capacity of honey bee colonies in this region (Otto and others, 2018).
- Honey bee colonies in areas surrounded by grassland, such as those enrolled in the CRP, are 10–15 percent larger than colonies kept in areas surrounded by mostly row crops. A USGS study determined that a bee yard surrounded by mostly grassland can yield an extra \$4,100 in annual revenue to a beekeeper compared to a bee yard surrounded by mostly row crop. A beekeeper who manages several hundred bee yards may incur sizable economic gains through nearby CRP and other conservation grasslands (Smart and others, 2018).



USGS biologist sampling honey bees and native bees on CRP grasslands in North Dakota. Photograph by Alessandra Cancalosi, under contract to the USGS.



A commercial bee yard on CRP grasslands in North Dakota. This bee yard was used as part of a USGS pollinator health assessment project in North Dakota, South Dakota, and Minnesota. Photograph by Mady Herrmann, under contract to the USGS.

Below left: A honey bee (*Apis mellifera*) on alfalfa (*Medicago sativa*). Below right: Honey bees (*Apis mellifera*) carrying pollen to the hive. Top: Bees on honeycomb. Photographs by Sarah Scott, under contract to the USGS.



Key Findings—Continued



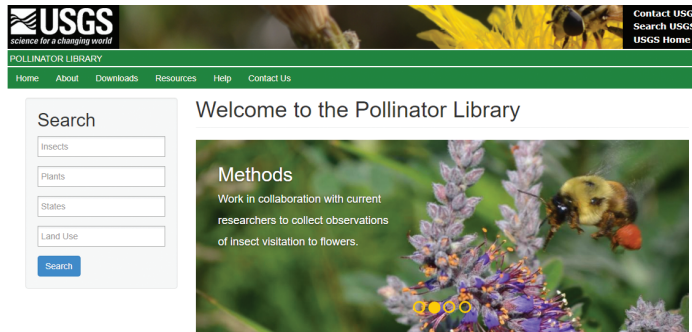
Top: A honey bee (*Apis mellifera*) visits Phacelia (*Phacelia tanacetifolia*).

Center: DNA design by Katemangostar, Freepik.com.

Bottom: A native bee rests on woolly paperflower (*Psilostrophe tagetina*). Photographs by Sarah Scott, under contract to the USGS.

Right: A screenshot of the online USGS Pollinator Library.

- The USGS led the first large-scale assessment of native bees on CRP grassland that documented what native bees were present on CRP grasslands and what flowers they used (Otto and others, 2017).
- The USGS developed a genetic sequencing strategy to rapidly quantify pollen grains collected from bees (Smart and others, 2017). This novel technique allowed the USGS to determine what flowering plants were important bee food. Knowing what flowers constitute good bee food is an important step in improving the cost-effectiveness of the CRP.
- The USGS launched the “Pollinator Library,” a decision-support tool that can be used by USDA staff for evaluating seeding mixes for the CRP (<https://www.npwrc.usgs.gov/pollinator/>). This website provides users with information on which plants are favored by honey bees and native bees. USGS scientists published a paper demonstrating how USDA staff can use the Pollinator Library to evaluate the cost-effectiveness of CRP seeding mixes (Otto and others, 2017).



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Ongoing and Future Projects

Ongoing USGS monitoring has identified periods during the growing season when flower availability is limited for honey bees. The goal of this ongoing assessment is to determine what flowering plants would be most cost-effective for including in CRP seeding mixes to provide forage for honey bees during resource-limited periods. Here, CRP would be used to fill critical resource gaps for honey bees. Filling these floral resource gaps could provide a measurable, positive impact of the CRP on bee health.

Collectively, results from the USGS assessment will assist USDA staff in developing seeding mixes that are highly beneficial to pollinators and can be implemented at a reduced cost.

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A queen bee (center) surrounded by a larger drone male honey bee and female worker honey bees. Photograph by Sarah Scott, under contract to the USGS.

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