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Honey Bees on the Move: From Pollination to Honey Production and Back

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Abstract

Driven by growing consumer demand for fruits, nuts, and vegetables, U.S. growers are expanding their cultivation of these pollinator-dependent crops. To service the rising number of pollination contracts and seek out quality forage to produce honey, beekeepers move their bees around the country. Limited nationwide data exist on the number of honey bee colonies that pass through each State throughout the year, the routes these colonies take, and the distances traveled. Using data from a USDA survey of beekeepers, this report quantifies honey bee colony movements over the four seasons and provides a basis for understanding how the transport of honey bee colonies affects pollination services, honey production, and the loss of colonies. The intensity of the use of pollination services across a variety of pollinator-dependent crops in various regions and States is also summarized to explain the timing and volume of colony movements.

Keywords: honey bees, honey, pollination, pollinator, honey bee colonies, *Apis mellifera*, Conservation Reserve Program, beekeepers, almonds, forage, U.S Department of Agriculture, USDA, Economic Research Service, ERS

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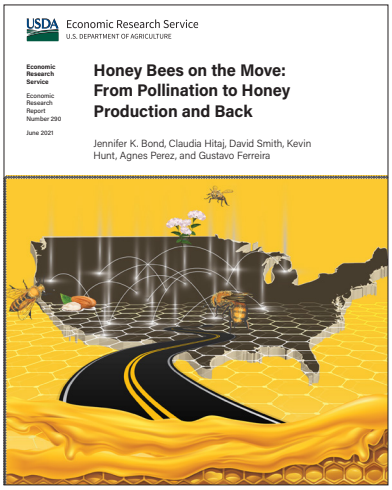


What Is the Issue?

The production of many fruits, nuts, and vegetables depends on pollination services provided by honey bees (***Apis mellifera)***. In recent years, increased demand for these crops has resulted in growing production and rising demand for pollination services. To provide pollination services and produce honey, many beekeepers transport their colonies (also called hives) around the country during the year. Limited nationwide data exist on the number of honey bee colonies that reside in or pass through each State throughout the year, the routes these colonies take, and the distances colonies are transported.

Using data from USDA, National Agricultural Statistics Service's survey of beekeepers, this report describes connections between colony movements, pollinated crop production, and forage availability. This study also quantifies honey bee colony movement patterns and distances, providing a basis to understand how the transport of honey bee colonies influences the provision of pollination services, honey production, and colony loss. Estimates of the varying intensity of pollination service use across crops and regions are also derived.

What Did the Study Find?

Honey bee colonies travel along seasonal routes across the United States. This travel is driven by the provision of pollination services (valued at roughly $250 million to more than $320 million annually); the search for forage to produce honey (valued at about $330 million annually); and the need to enhance colony survival and growth. These movements highlight the link between the production of pollinated nuts, fruits, vegetables, and seeds—especially in California—and access to the rich forage resources of the Northern Great Plains, including acreage enrolled in the Conservation Reserve Program (CRP).

surprisingly, North Dakota leads the Nation in honey production, while Montana, Florida, and California are also major producers (figure 3). In terms of value, more than 20 percent of U.S. honey in 2018 was produced in North Dakota. Typically, between spring and summer, the number of honey bee colonies in the Northern Great Plains has been observed to more than quadruple (table 4).

When honey bee colonies are crowded together, competition for forage resources can result in a decline in honey production and colony health (Abbott, 2018). South Dakota, Montana, Wyoming, Arkansas, and New Mexico require exclusion zones or buffer areas around registered apiary sites to protect the forage resources. During the summer months, when almost a third of all colonies are moved into the Northern Great Plains, there is a 3-mile exclusion zone in South Dakota and Montana; Wyoming has a smaller 2-mile exclusion zone and North Dakota has none. Smaller exclusion zones mean that relatively more hives can be placed to forage on a given parcel of land. This partly explains why North Dakota annually draws an estimated 40 percent of all commercial hives to the forage opportunity rich State (Smart et al., 2016).

Table 4
Honey bee colony stocks by State

State	Honey bee colonies			
	Summer (July 1, 2017)	Fall (October 1, 2017)	Winter (January 1, 2018)	Spring (April 1, 2018)
California	590	680	***1,150***	1,140
North Dakota	***470***	410	64	72
Florida	176	180	245	***270***
Montana	***154***	115	35	50
South Dakota	***152***	111	23	11
Minnesota	***136***	98	39	69
Georgia	121	125	***134***	***134***
Texas	104	127	205	***305***
Michigan	***103***	88	17	36
Oregon	94	94	***81***	41
Idaho	89	113	***164***	60
Washington	***82***	66	44	55
Wisconsin	***74***	51	21	24
Louisiana	***64***	58	50	48
New York	***59***	51	26	20
Nebraska	***46***	42	7	11
Iowa	40	***45***	41	***45***
Colorado	***35***	34	13	17
Utah	***35***	29	8	15
Wyoming	***35***	28	6	9
Other	***336***	305	260	263
United States	***2,995***	***2,850***	***2,631***	***2,693***

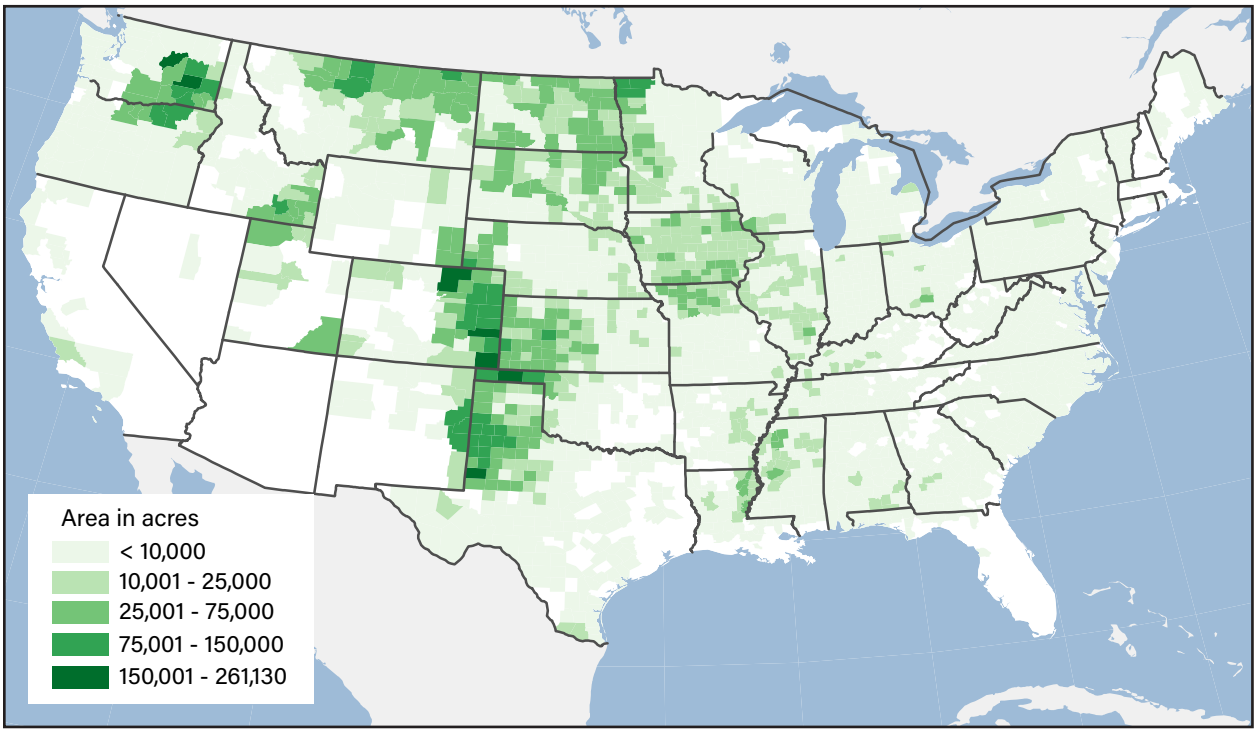
Note: Numbers in bold represent the season in each State with the most honey bee colony stocks.

Source: USDA, Economic Research Service using data from the USDA, National Agricultural Statistics Service (NASS), Honey Bee Colonies report (USDA-NASS, 2018)

The Northern Great Plains also features a concentration of acres (about 21 percent of the total) that are enrolled in the USDA, Farm Service Agency's CRP (figure 4). Some, but not all, of this CRP land is prime for honey bee forage. Beekeepers seek out places with quality forage and a low risk of chemical exposure; often, CRP land meets these criteria. Further, North Dakota is also noted for its pollinator-friendly spans of uncultivated grasslands and wetlands, especially in the Prairie Pothole Region. Smart et al. (2016) found that placing honey bee colonies on these areas of uncultivated forage land—including pasture, USDA conservation program fields, fallow land, grassland, hay land, and roadside ditches in North Dakota—had "a positive impact on annual apiary survival and honey production" relative to colonies in areas with agricultural production.

Both honey bees and wild pollinators benefit from programs that increase forage resources, such as certain practices supported under CRP. In addition to supporting the establishment of grasslands (the most common practice), USDA's Farm Services Agency also specified several pro-pollinator programs (Gallant et al., 2014; Otto et al., 2018; Ricigliano et al., 2019). The USDA, Natural Resources Conservation Service (NRCS) also has targeted conservation efforts in this area of the country and reports that 35,000 acres of land have been enhanced through their efforts (USDA, NRCS, 2016a). One such program, the USDA, NRCS Environmental Quality Incentives Program (EQIP), has 37 conservation practices that can be used by landowners to create or enhance pollinator habitat. Some practices include planting cover crops, planting wildflowers and native grasses in buffers, and improving management of grazing lands (USDA, NRCS, 2016b). The Conservation Stewardship Program (CSP) and Agricultural Conservation Easement Program (ACEP) also are aimed at helping landowners and producers to implement conservation practices, some of which benefit pollinators (USDA, NRCS, 2019).

Figure 4
Enrolled acres by county in the USDA Conservation Reserve Program, September 2018



Note: 22.6 million total acres enrolled in the USDA Conservation Reserve Program in September 2018.

Source: USDA, Economic Research Service calculations using data from the USDA, Farm Service Agency (USDA-FSA, 2019).