

Prescribed burns benefit bees

January 29 2020, by Matt Shipman



This parasitic sweat bee was photographed in a longleaf pine forest in North Carolina. A study of these forests finds that bee diversity and abundance is twice as high in forests that are managed with prescribed burns. Credit: Clyde Sorenson, NC State University

Freshly burned longleaf pine forests have more than double the total number of bees and bee species than similar forests that have not burned in over 50 years, according to new research from North Carolina State University.

For many forests, [fire](#) is as essential as rainfall. But while several studies have outlined the benefits of human-controlled prescribed [burns](#) on forest ecosystems, little was understood about how prescribed burns, or fires in general, may impact pollinators.

"There is global concern about the decline of insects in general, and pollinators in particular, so it's really important for land managers to understand how prescribed fire affects insect communities," says Elsa Youngsteadt, co-author of a paper on the work and an assistant professor in NC State's Department of Applied Ecology.

"Given the importance of fire in maintaining longleaf pine ecosystems overall, you would expect it to be good for the region's native bees. But it's also easy to imagine small bees and their nests, especially nests in twigs and stems, just getting incinerated. We weren't sure where we would find the most robust pollinator community."

NC State researchers worked with the Walthour-Moss Foundation's longleaf pine savannah reserve, which was established to protect this endangered pine. The reserve regularly burns 90% of its plots in 3-year cycles, while the remaining 10% of plots have not been burned for at least 50 years. This provided an ideal opportunity to compare bee abundance and diversity between unmanaged and managed ecosystems.

"The southeastern U.S. has some of the highest lightning strike rates in the world, which used to contribute to low-intensity fires passing through the longleaf pine savannas every 2 or 3 years," Youngsteadt says. "But agriculture, development, and logging fragmented this landscape and blocked the movement of fire."

For this study, researchers placed bee "traps" at 16 sites: four that had been burned the year of sampling, four that had been burned one year before sampling, four that had been burned two years before sampling,

and four unburned control sites.

The researchers found that burned sites supported 2.3 times more total pollinators than plots that had not burned in 50 years. Burned sites also had 2.1 times as many different [bee species](#) as unburned sites. Within those burned areas, bee abundance and diversity tended to be greatest at sites that were most recently burned, and this abundance and diversity decreased with time since the last fire.

But why?

Fires maintain openings in the forest canopy, reduce ground cover and release nutrients into soils at the same time, creating the perfect environment for large blooms, increasing the flower resources pollinators rely on. The study also found that the low-intensity prescribed burns did not reduce the amount of nesting material for above-ground nesting pollinators, and the abundance of above-ground nesting pollinators was not impacted by the fires. Meanwhile, below-ground nesting species appeared to benefit from the increased access to bare soil.

"It's great news that prescribed fire, as currently used in longleaf [pine](#) savannas, is helping to support the pollinator community," Youngsteadt says. "But there's still a lot to learn. For example, the fires in this study were set in the winter, but many land managers use summer burns. Knowing the effects of fire in different seasons will be an important next step, as will knowing the optimal area of land to burn at any one time."

The paper, "The Impact of Prescribed Burning on Native Bee Communities (Hymenoptera: Apoidea: Anthophila) in Longleaf Pine Savannas in the North Carolina Sandhills," is published in the journal *Environmental Entomology*.

More information: Heather Moylett et al, The Impact of Prescribed Burning on Native Bee Communities (Hymenoptera: Apoidea: Anthophila) in Longleaf Pine Savannas in the North Carolina Sandhills, *Environmental Entomology* (2019). [DOI: 10.1093/ee/nvz156](https://doi.org/10.1093/ee/nvz156)

Provided by North Carolina State University

Citation: Prescribed burns benefit bees (2020, January 29) retrieved 23 April 2024 from <https://phys.org/news/2020-01-benefit-bees.html>

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