Logging site slash removal may be boon for wild bees in managed forests

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New research suggests the removal of timber harvest residue during harvesting may be a boon for wild bees, an important step toward better understanding the planet's top group of pollinators.

The findings are important because bees are the driving force behind $100 billion in global economic impact each year, with insect pollinators enhancing the reproduction of 90 percent of the Earth's flowering plants, including many food crops.

Insect pollinators are also ecologically critical as promoters of biodiversity. Bees are the standard bearer because they're usually present in the greatest numbers and because they're the only pollinator group that feeds exclusively on nectar and pollen their entire life.

Researchers at Oregon State University spent two years studying 28 contiguous 1-acre clearcut sites. They assessed whether the abundance and diversity of wild bees was affected by the removal of timber harvest residue, also known as slash, and the soil compaction that goes along with it.

"Bees are important for biodiversity in managed forest landscapes but we just don't have a very good handle on them in these areas," said lead scientist Jim Rivers of the OSU College of Forestry.

The study plots occurred within a managed conifer forest in western Oregon. Each plot received one of five unique treatments, ranging from

removing only the boles—tree trunks that are used to make lumber—without compacting the soil at all (no heavy equipment used on the plot) to removing all of the logging slash and compacting the entire plot.

The findings were surprising, Rivers said.

"The combination of the most intense timber residue removal and soil compaction treatment made for the greatest number and diversity of bees," he said.

Over the two years of the study, scientists collected more than 7,500 bee specimens representing 92 distinct species of wild bees from five of the seven bee families. The number of trapped bees tripled from year one to year two despite identical sampling techniques.

Most of the trapped bees were ground-nesting species, and more than half of them were members of the sweat bee family.

"Sweat bees were really common in our traps, and there were many different species of them," Rivers said. "We know there are wild bees in managed forest landscapes in our region, particularly young forests. But it was surprising that there were that many bees in our study, particularly because floral resources were missing from our sites because of herbicide application that occurred as a part of the broader study."

While the most intensive harvest residue treatment led to the greatest abundance and observed species richness, the other four treatments also harbored a diversity of wild bees.

The findings are an early step toward understanding how forest management actions might affect bees, a critical knowledge gap that has not been addressed by researchers to date.

"These results are an eye opener," Rivers said. "It made me think about how we can use the lessons from this study to provide habitat for wild bees. What I'd love to do is attempt to create nesting areas for soil-nesting bees within our working forests."

After clearcutting, Rivers explains, there may be some soil exposed by harvest operations, but it's typically for a limited amount of time.

"I'd like to take some sites, say 10 x 10 meters, and scrape off the duff to see if we can promote populations of soil-nesting bees, which are important for forest biodiversity and may even contribute to crop production," he said. "Although most managed forests are not adjacent to crops that require pollination, native bees are critically important for promoting biodiversity through their pollination of natural plants that, in turn, are used by a large number of wildlife species that eat fruits, nuts and seeds."

More information: James W. Rivers et al, Wild bee diversity is enhanced by experimental removal of timber harvest residue within intensively managed conifer forest, *GCB Bioenergy* (2018). DOI: 10.1111/gcbb.12531

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