Bats not bothered by forest fires, study finds

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A survey of bat activity in burned and unburned areas after a major wildfire in the southern Sierra Nevada mountains found no evidence of detrimental effects on bats one year after the fire. The findings suggest that bats are resilient to high-severity fire, and some species may even benefit from the effects of fire on the landscape.

The study, led by bat ecologist Winifred Frick of the University of California, Santa Cruz, will be published in the journal PLOS ONE on March 6. The findings are important because current understanding of how wildlife responds to fire is based almost entirely on studies of a limited number of species, most of them birds, Frick said. Bats make up a large component of mammalian diversity in forest ecosystems, where they play an important role as insect predators.

"This is the first study to directly address species-level response by bats to stand-replacing fire, and our results show that moderate to high-severity fire has neutral or positive impacts on a suite of bat species," Frick said.

Studies that show how animals respond to fire help inform the ongoing public policy debate over the role of fire in ecosystem management and whether fires should be suppressed or allowed to burn on public lands, according to coauthor Joseph Fontaine, a fire ecologist at Murdoch University in Perth, Australia.

"A great deal of tension exists between public land managers, environmental groups, and other stakeholders—including homeowners,

ranching interests, and the timber industry—over allowing stand-replacing crown fires on public forests," Fontaine said. "This study fills a critical gap on how fire affects an important group of animals."

The researchers conducted the study in an area of Sequoia and Inyo National Forests where the 2002 McNally Fire burned more than 150,000 acres. The fire burned with mixed severity, leaving a mosaic of low- to high-severity damage, as well as patches of unburned forest. The study compared bat foraging activity in areas of unburned, moderately burned, and severely burned forest.

The researchers conducted surveys in 2003, using high-frequency microphones to record the ultrasonic echolocation pulses that bats use to hunt insects. Of the 16 bat species known to live in the area, some have distinctive sonic signatures, while others can be sorted into groups with similar echolocation sounds and foraging behaviors. In this study, the researchers identified six "phonic groups," including three individual species and three groups of species.

The results showed that the responses of the six phonic groups to moderate and high-severity fire were either neutral or positive. The heterogeneity such fires create in the landscape may be an important feature, resulting in a habitat structure that benefits a range of species, Frick said.

"Bats could be resilient to this kind of natural disturbance," she said. "We go out there and see a charred landscape and we think it's totally destroyed, but the bats may find it a productive habitat for their needs."

Some species seem to prefer burned areas for foraging. This could be due to reduced clutter and increased availability of prey and roosts after a fire, although further research on these topics is needed, according to coauthor Michael Buchalski, a doctoral student at Western Michigan

University. "Fire may provide a pulse of insects immediately after the fire and create roosting habitat later on as snags decay and their bark peels back," he said.

More information: dx.plos.org/10.1371/journal.pone.0057884

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