

Old-growth forest may provide valuable biodiversity refuge in areas at risk of severe fire

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A northern spotted owl. Credit: USDA Forest Service photo by Damon Lesmeister

New findings show that old-growth forests, a critical nesting habitat for

threatened northern spotted owls, are less likely to experience high-severity fire than young-growth forests during wildfires. This suggests that old-growth forest could be leveraged to provide valuable fire refuges that support forest biodiversity and buffer the extreme effects of climate change on fire regimes in the Pacific Northwest.

A recent study published in the journal *Ecosphere* examined the impact of the Douglas Complex and Big Windy fires that burned in the Klamath-Siskiyou region of Oregon during July 2013, a drought year. The fires burned through a long-term study area for northern spotted owls. Using information on [forest](#) vegetation before and after the fires, along with known spotted owl nesting areas, researchers had an unprecedented chance to compare the impact of wildfire on critical old-growth nesting habitat.

"On federally managed lands, spotted owl nesting habitat is largely protected from timber harvest under the Northwest Forest Plan, but wildfire is still a primary threat to the [old-growth forest](#) that spotted owls rely on for nesting habitat," said research wildlife biologist Damon Lesmeister. "The loss of spotted owl nesting habitat as a result of severe fire damage could have significant negative impacts on the remaining spotted owl populations as well as a large number of other wildlife species that rely on these old forests."

Old-growth forests have more vegetation than younger forests. Researchers expected that this meant more fuel would be available for wildfires, increasing the susceptibility of old-growth forests to severe fire, high tree mortality, and resulting loss of critical spotted owl nesting habitat. However, the data suggested a different effect.

Lesmeister and his colleagues classified fire severity based on the percentage of trees lost in a fire, considering forest that lost less than 20% of its trees to fire subject to low-severity fire and those with more

than 90% tree loss subject to high-severity fire. They found that old-growth forest was up to three times more likely to burn at low severity—a level that avoided loss of spotted owl nesting [habitat](#) and is generally considered to be part of a healthy forest ecosystem.

"Somewhat to our surprise, we found that, compared to other forest types within the burned area, old-growth forests burned on average much cooler than younger forests, which were more likely to experience high-severity fire. How this actually plays out during a mixed-severity wildfire makes sense when you consider the qualities of old-growth forest that can limit severe [wildfire](#) ignitions and burn temperatures, like shading from multilayer canopies, [cooler temperatures](#), moist air and soil as well as larger, hardier trees."

Because old-growth forests may be refuges of low-severity fire on a landscape that experiences moderate to high-severity fires frequently, they could be integral as biodiversity refuges in an increasingly fire-prone region. Leveraging the potential of old-growth forests to act as refuges may be an effective tool for forest managers as they deal with worsening [fire](#) seasons in the Pacific Northwest.

More information: Damon B. Lesmeister et al, Mixed-severity wildfire and habitat of an old-forest obligate, *Ecosphere* (2019). [DOI: 10.1002/ecs2.2696](#)

Provided by USDA Forest Service

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