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California's Controlled Fires Boost Biodiversity

In certain ecosystems, such as the mixed-conifer forests of the Sierra Nevada, region of the western United States, fires are a natural and essential occurrence for maintaining forest health. However, for many decades, resource managers in California and other western states prevented or suppressed natural fires to limit the potential for catastrophic spread.

Suppressing fire in this region for long periods has led to an unusually large increase in the number of small trees and excess accumulations of logs, branches and needles on the forest floor. Currently, forest managers are using prescribed--also called controlled--fires, thinning and other methods to reduce tree densities and ground debris that could serve as fuel. However, as explained in Ecosphere, an open-access journal of the Ecological Society of America, the ways in which these fuel-management practices affect the biodiversity of these forests is not well understood.

To answer this question, Karen Webster formerly from Sequoia and Kings Canyon National Parks in California, and Charles Halpern from the University of Washington, Seattle, used more than two decades of data on changes in the abundance and diversity of plants following prescribed burning in these mixed-conifer forests. They analyzed data collected periodically from 51 forest plots that were burned once, twice or not at all during the 20-year study period.

The researchers found that after ten years, burned plots supported more than twice as many native plant species as nonburned plots, and the once-burned plots showed a nearly threefold increase by year twenty. In addition, species diversity increased with severity of burning and nonnative species did not benefit from fire. In general, plots that were burned twice showed patterns similar to those burned only once, suggesting that the use of repeated burning to reduce fuel accumulations does not have a damaging effect on the native vegetation.

"Information on the ecological consequences of reintroducing fire to these forests is critical for park managers," said Webster, "especially with current operational constraints. For example, air quality regulations and budget limitations require managers to be as effective as possible with controlled burns. Our findings offer important insights that can aid park managers in developing approaches to reduce risk of fire, and at the same time, enhance biological diversity. Long-term studies of the effects of reintroducing fire to these forests are extremely valuable, both for current management and for the future, given threats such as climate change and the spread of nonnative species."