

Media Advisory

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New Study: Air Pollution Adding Unwanted Fertilizer to California's Wilderness & Natural Areas

Plant life under siege from Joshua Tree to Sierra Nevada's oak woodlands

A new study set to appear in the Journal of Environmental Management shows that high levels of airborne nitrogen from agriculture and car exhaust are boosting the growth of invasive weeds and compromising the diversity of California's native plants. "We're essentially conducting a giant science experiment on our natural areas in California," said lead study author Dr. Mark Fenn with the Forest Service, Pacific Southwest Research Station in Riverside, Calif.

Researchers with the Pacific Southwest Research Station, the University of California, Riverside, and Creekside Center for Earth Observations found airborne nitrogen is impacting one third of the state's natural land areas. The study finds that this pollution—carried by wind and deposited as dry fallout or by rain and snow—is acting like unwanted fertilizer and is spurring the growth of exotic grasses in coastal sage scrub, annual grassland, pinyon-juniper and desert scrub areas.

This new growth of invasive grasses increases the threat of fire in desert ecosystems such as in Joshua Tree National Park, threatening its namesake species. High levels of excess nitrogen are also appearing in Sequoia National Park, to a lesser degree in Yosemite National Park, and in the San Geronio and Cucamonga Wilderness Areas, causing disturbances to native plant communities, wildlife habitat and the natural food chain.

The researchers noted elevated nitrate concentrations have been found in streams and creeks in the western Sierra Nevada mountains, far from urban areas, demonstrating that entire forested and chaparral catchments are "over-fertilized" by airborne nitrogen pollution. This affects the quality of water from natural watersheds, can acidify soils and disturb plant growth and health and can reduce forest sustainability. Also, sensitive lichens that grow on Sierra oaks and conifers and provide important food and nesting materials for wildlife are being replaced with nitrogen-loving lichens that do not provide the same ecological benefits.

"Lichens are an important early warning indicator of forest health," Fenn said. Air pollution eliminated sensitive lichens from forests in the Los Angeles basin decades ago, but they remain in the northern Sierras. "Their disappearance tells us that if airborne nitrogen pollution continues at current levels, we should expect other, possibly more dramatic harmful effects to these wild areas."

The study recommends a series of management strategies like grazing and controlled burning to reduce excess nitrogen in the ecosystem and unwanted invasive grasses. "The real long-term solution is to reduce the amount of nitrogen that agricultural activities and automobile tailpipes are adding to our air, water and atmosphere," said Fenn.

Nitrogen pollution's impact on California butterflies and plants has been [previously documented](#). See also a [report on N deposition and biodiversity in California](#). Also see [study coauthor Dr. Edith Allen's website](#).

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