



Vital Sign Update: 2024 Results for Vegetation Community Monitoring at Lava Beds National Monument

Importance

Sagebrush steppe—a rich mosaic of sagebrush, native bunchgrasses, and wildflowers—once covered much of Lava Beds National Monument. These communities play a vital role in the monument's health, providing food and shelter, supporting pollinators, and storing carbon. But megafires like the 2020 Caldwell Fire and 2021 Antelope Fire burned large areas of the monument at high severity. Invasive grasses, like cheat grass (*Bromus tectorum*), have rapidly colonized post-fire. Cheatgrass drives more frequent and intense fires, which support more cheatgrass, converting what were diverse sagebrush communities into near-monocultures of invasive grass. To detect concerning changes that monument managers need to know about, we've been monitoring land plants (terrestrial vegetation) at Lava Beds since 2011. We measure composition (variety and abundance of species), structure (tree size, height, and density; shrub height) and function (tree death and regeneration) as vital signs of ecological health. This brief describes how we measure one of these elements—*species composition*—at Lava Beds and reports the average conditions we observed during our most recent sampling event in 2024.

Measuring Vegetation Composition

Changes in vegetation are not always unhealthy. To understand which changes are concerning, we examine our species data in different ways. Taken as a whole, these different measures provide the context park managers need to identify negative trends and make decisions.



Within a 20 × 50 m plot (0.1 ha), botanists at Lava Beds identify plants to track changes in species composition. In smaller nested plots, we also measure the total cover of each species to calculate diversity at different scales within the park.

Species Richness

Richness is a straight count of the number of vascular plant species (not mosses or fungi) detected in our plots. In general, the wider variety of species we find, the more biodiverse and resilient the ecosystem is. Related to species richness, we also examine several measures of diversity—each one provides slightly different information about the balance of species relative to each other.

Nonnative Species

Because nonnative species can cause serious ecological problems, we report how many nonnative species we detect, how much area they cover, and the ratio of native to nonnative species. This ratio is a useful measurement to track over time and to compare with more disturbed areas inside and outside the park.

Results and Ongoing Monitoring

Every 3 years, between May and June, we monitor terrestrial vegetation at 30 sites at Lava Beds, barring unforeseen complications. In 2024, we sampled all 30 sites. We'll sample vegetation again in 2027.

Recent megafires burned large parts of Lava Beds, greatly impacting vegetation communities. Between 2011 and 2024, living tree density (basal area, m²/ha) declined by 86% on average across sites, while dead tree (snag) density increased by 979%. Over the same period, average species richness fell from 35 to 24 vascular plant species per site, and invasive nonnative cover increased by 11% on average. View the map on the back for detailed results. We'll sample park vegetation again in 2027.

More Information

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Project overview, reports, and protocol:
<https://www.nps.gov/im/klmn/vegetation.htm>

Datasets and all related publications:
<https://irma.nps.gov/Datastore/Reference/Profile/2171794>

Species Composition in Vegetation Communities at Lava Beds National Monument

