National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science
Inventory & Monitoring Division

Checking Lava Beds' Vital Signs

Klamath Network Science in the Monument

National parks are the guardians of our unique American natural and cultural history. But perhaps more than ever before, parks exist in a rapidly changing landscape. Urban growth, replacement of native species by exotics, air and water pollution, increasing visitor use, frequent wildfires, and climate change all impact the natural web of life. This leads us to ask:

How healthy are our parks? How are they changing?

To answer these questions, the National Park Service created the Inventory and Monitoring Program, which is implemented at 32 networks of parks across the nation. In 2010 at Lava Beds and nearby parks, the Klamath Network began monitoring selected natural resources, called "vital signs," that serve as indicators of park condition. We visit the same sampling sites over time to track the condition of each of these vital signs in order to help park managers make science-based management decisions.

Alice Chung-MacCoubrey, Program Manager, oversees network activities and leads bat monitoring

Eric Dinger, Quantitative Ecologist, leads aquatic monitoring

Sean Smith, Botanist, leads native and invasive plant monitoring

Allison Snyder, Data Manager, ensures data quality, integrity, and security

Sonya Daw is our Science Communication Specialist

What do we monitor at Lava Beds National Monument?

Birds

Western meadowlark

Birds delight us with song and beauty, but also with scientific data! Easily detected, they are good indicators of ecological health because they respond quickly to environmental change. They spread seed and pollen across the land, contributing to the cycle of life. With the Klamath Bird Observatory, we monitor landbird communities in the monument. One common sight is the western meadowlark (*Sturnella neglecta*), whose melodious, piercing song rings out across grassy openings in the monument. Our bird monitoring tracks the distribution and health of park birds and adds to regional landbird projects, like the Avian Knowledge Network Northwest.

During the breeding season, we count birds along transects to determine

- the variety of species present
- the relative abundance of each species in the park

https://www.nps.gov/im/klmn/landbirds.htm

Plants and Early Detection of Invasive Species

Big sagebrush community

Antelope bitterbrush (*Purshia tridentata*) is another high desert shrub at Lava Beds

Perched in the high desert at the edge of the Great Basin, Lava Beds National Monument plant communities range from sagebrush steppe in the lower elevations, to juniper and mountain mahogany woodlands higher up, to pine forests at the highest elevations. One common high desert plant is big sagebrush (*Artemisia tridentata*). Sagebrush creates islands of fertility and shade in the soil below its branches that help other species establish. Deer, antelope, and jackrabbits depend on sagebrush for winter food and birds use it for cover. But disturbances, like larger and more frequent fires associated with climate change, disproportionately affect species like the big sagebrush that don't recover quickly after fire. Indeed, much of the monument's sagebrush cover has been lost to recent fires. To track vegetation community health, we monitor plant abundance and variety. We also track woody debris conditions because heavy debris buildup can fuel hotter, larger, and longer-burning fires.

Tumble mustard (*Sisymbrium altissimum*) and cheatgrass (*Bromus tectorum*) are nonnative species—plants that evolved in a different place—that occur in the monument and spread rapidly after fire. Because nonnatives can outcompete native plants, monopolize water, and change the soil, we survey park roads and trails, where nonnatives most commonly occur, to inform possible management action.

https://www.nps.gov/im/klmn/vegetation.htm
https://www.nps.gov/im/klmn/invasives.htm

Some resources we measure:

- cover and diversity of native plants
- cover and diversity of nonnative plants
- regeneration, by tree seedling counts
- mortality, by counting recently dead trees
- fuel availability, by measuring woody debris and litter and duff depths
- live tree characteristics, like volume (basal area), canopy health, and height

A sea of invasive tumble mustard

Caves

Townsend's big-eared bats

Fragile fern (*Cystopteris fragilis*)

Numerous and diverse lava tube caves lie just below the surface of Lava Beds National Monument. The caves offer a stark contrast to the sunny, high desert conditions above ground. Bears visit to drink from cool cave pool water. Winter brings hibernating Townsend's big-eared bats (*Corynorhinus townsendii*). Cold-loving grylloblattids (cricket-like invertebrates) and millipedes roam the cave surfaces. And ferns (in the desert!) grow in the cool, moist climate at cave entrances.

In some caves, air flow patterns supercool the cave rocks to well below freezing close to year-round. Any groundwater present in these areas freezes solid, creating delicate ice structures.

We monitor cave resources and their potential stressors, like human visitation, to help protect this unique ecosystem.

https://www.nps.gov/im/klmn/caves.htm

Some resources we measure:

- cave temperature
- cave ice surface area and level
- cave entrance vegetation, including lichen, moss, and ferns
- hibernating bats during the winter
- scat and other organic matter
- cave invertebrates
- amount of human visitation

Cave millipede

Explore the Klamath Network website

- Learn more about inventory and monitoring in the park, including how we monitor adjacent land use as an additional "vital sign"
- Access our Featured Creature natural history articles and Klamath Kaleidoscope newsletters
- Download a species list for the park
- Watch an 8-minute video telling our vital signs monitoring story

Contact us!

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