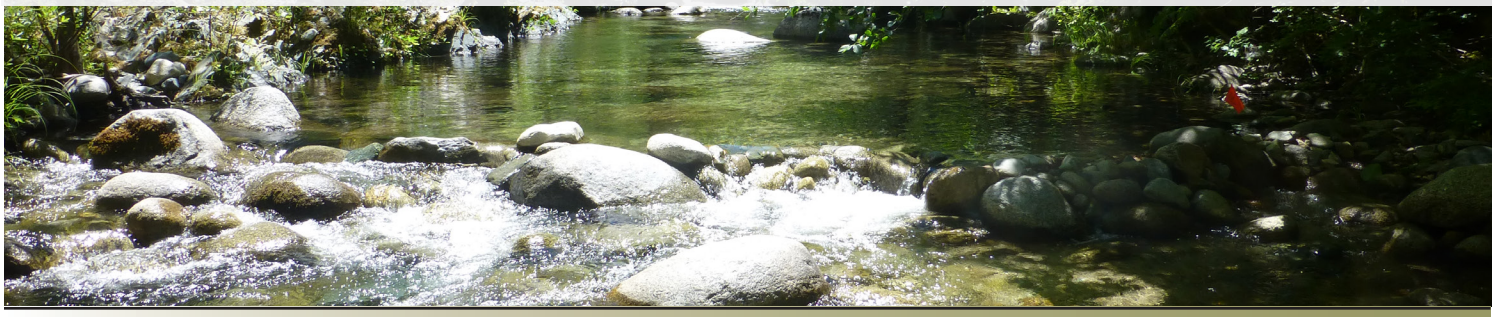
National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science
Inventory & Monitoring Division

Checking Whiskeytown's Vital Signs

Klamath Network Science



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 Whiskeytown and nearby parks, the Klamath Network began monitoring selected natural resources, called "vital signs," that serve as indicators of park condition. We make repeated visits to fixed sampling sites over time to track status and trends in these indicators and ultimately, 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 Whiskeytown National Recreation Area?

Birds

Spotted towhee (*Pipilo maculatus*)

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. Critical to park health, they spread seed and pollen across the land. With the Klamath Bird Observatory, we monitor landbird communities in the park. One of the most common birds we find is the spotted towhee. In foothill scrub and chaparral habitat, it's hard to miss its loud *chirp-chirp-tzeeee*. 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

©Earle, Gymnosperm Database

Gray pine cones are notoriously sharp and heavy

Gray pine, with its often split trunk and spindly branches

Plant communities from California's Central Valley, North Coast Mountains, and the Klamath/Siskiyou Mountains converge here to create the park's unique "Whiskeytown Mix." Oak savannah, chaparral, and conifer forests offer food, shelter, and breeding habitat for insects and wildlife. One uncommon member of this diverse community is gray pine (*Pinus sabiniana*), with its spindly shape and heavy, sharply tipped cones. Though ragged in appearance, it is remarkable for its ability to grow in rocky, dry areas and for the highly nutritious seeds in its cones. But disturbances, like invasive species and climate change, can ripple through ecosystems. Climate change has altered fire regimes in the park, leading to larger, more frequent burns. Shorter fire return intervals can affect the ability of native species, like the gray pine, to recover between 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.

While native plants dominate most of our vegetation plots, nonnatives (plants that evolved in a different place), like tree of heaven (*Ailanthus altissima*) and blackberry (*Rubus armeniacus*), do occur in the park. Nonnative plants can outcompete native plants, monopolize water, and change the soil, so we survey park roads and trails, where nonnatives most commonly occur, to inform possible management action.

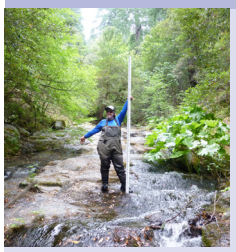
https://www.nps.gov/im/klmn/vegetation.htm
https://www.nps.gov/im/klmn/invasives.htm

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

Surveying for invasives along a trail

Water Quality and Aquatic Life



Measuring stream slope

Tailed frog (*Ascaphus truei*)

Wet areas abound with life, from the tiny aquatic insects that feed salamanders and bluebirds, to the lush greenery that feeds and shelters other wildlife. Cold, clear streams on the south side of Whiskeytown Lake flow over bedrock and boulders, supporting tailed frogs, salamanders, aquatic insects, and trout for fishing. Smaller, more sediment laden streams on the north side of the lake drain multiple use watersheds (timber and mining). In fast-flowing streams, the tailed frog has adapted to rushing water with a flattened profile, suction cup mouthparts (as a tadpole), and a very unusual frog ability: internal fertilization. Unfortunately, these frogs and the park's waters are vulnerable to climate change and other stressors, such as the devastating 2018 Carr Fire, potential marijuana grows, and the residue of historical acid mining in the northern watersheds. We sample fish, aquatic organisms, streamside plants, and water chemistry to track changes in the health of the park streams over time.

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

Some resources we measure:

- water quality, like oxygen, pH, and turbidity
- water chemistry, like nutrients (nitrogen, phosphorous) and salts
- water quantity
- habitat features, like streamside vegetation, in-stream woody debris, and stream slope
- biodiversity, including fish, amphibians, algae, and aquatic macroinvertebrates (stream bugs)

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!

Program Manager, alice_chung-maccoubrey@nps.gov, 541-552-8575

Quantitative Ecologist, eric_dinger@nps.gov, 541-552-8574

Vegetation Ecologist, sean_b_smith@nps.gov, 541-552-8570

Data Manager, allison_snyder@nps.gov, 541-552-8576

Science Communication, sonya_daw@nps.gov, 541-552-8578