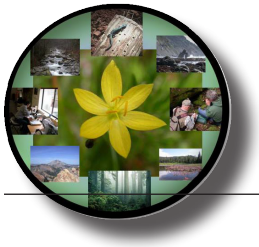
National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science
Klamath Inventory and Monitoring Network



The Klamath Kaleidoscope

Newsletter of the Klamath Inventory & Monitoring Network

Spring/Summer 2017

Finding Bats Before White-Nose Syndrome Does

Have you stumbled into any bat roosts lately? We want to know!

We need your help finding local bat roosts to help us detect and combat the spread of a dangerous fungus that has just arrived on the West Coast. White-nose syndrome (WNS), caused by the fungus, *Pseudogymnoascus destructans*, has been making its way westward from bat colony to bat colony, damaging and killing millions of bats during hibernation. WNS is named for the fuzzy white growth that can appear on bat noses, wings, and ears after exposure. It damages wing tissue and causes bats to wake more frequently during hibernation, depleting precious fat reserves. The fungus is spread from bat to bat, but may also be transported by people on clothing, shoes, and equipment. First detected in New York in 2006, WNS is now firmly established and decimating bat populations in the Eastern United States and Canada. The steady westward expansion of WNS took a big leap with its arrival in the state of Washington a year ago.

When WNS arrived in our region, National Park Service scientists formed the Pacific West Region WNS Response Group to help parks and networks respond proactively. The Klamath Network and two Network parks, Lava Beds National Monument and Oregon Caves National Monument and Preserve, wrote successful proposals to combat the spread of WNS. All three proposals share common tasks:

Townsend's big-eared bat (*Corynorhinus townsendii*). Photo courtesy Dr. J. Scott Altenbach.

- Conduct acoustic monitoring across the park landscape and monitor known colony roosts in parks to contribute to a nationwide, multiagency bat monitoring program known as NABat (https://www.fort.usgs.gov/science-tasks/2457)
- Educate park visitors about bats and WNS

In This Issue

Finding Bats *(continued)*

- Implement visitor screening and appropriate decontamination protocols for visitors and staff entering park caves to prevent inadvertent spreading of the fungus by contaminated clothing or equipment
- Conduct surveillance for the fungus and disease at known winter and maternity roosts by checking bats for symptoms of WNS and collecting skin swabs to detect presence of the fungus

We need help with this last task of determining whether and when the fungus arrives in our parks!

We cannot check for evidence of WNS if we do not know where the bats are roosting. Many bats in Eastern states congregate for the winter in large numbers at a limited number of known hibernacula. This makes observation and testing for WNS a straightforward process. In Western states, scientists simply do not know where a majority of bats spend their winter. While we are able to sample the few known hibernacula in Lava Beds and Oregon Caves, we must otherwise plan to capture and examine bats when they arrive during the spring at their maternity roosts.

What to do?

Report bat roosts

"We need your eyes and ears to find both winter and summer roosts!" says Alice Chung-MacCoubrey, program manager for the Klamath Network and member of the Pacific West Region WNS Response Team.

Keep your eyes open for bats in buildings, barns, caves, and bridges. Those are the places where we often encounter them because those are places we frequent, but bats can be in all sorts of locations, both constructed and natural. They also roost in tree snags, cliff faces, lava tubes, rock crevices, and a lot of other surprising places!

If you see or hear a cluster of bats, note the location and report it to your park's Resource Management staff.

Report sick or dead bats

Also, watch for sick or dead bats. WNS-affected bats are active at unusual times, such as flying around on a cold day in winter or in the middle of a summer day. The first detections of WNS in Washington State have been through sick or dead bats submitted for testing. So if you observe sick or dead bats, or bats having trouble with flying, do not try to handle them! Instead, contact your Resources Management staff and report it to your state wildlife agency (see below contacts). For your safety, never try to handle bats, and for the well-being of bats and their pups, try not to disturb them!

Report a sick or dead bat: https://www.wildlife.ca.gov/Conservation/Laboratories/Wildlife-Investigations/Monitoring/WNS/Report

In Oregon: http://www.dfw.state.or.us/wildlife/health_program/WNS/reporting.asp

ODFW Wildlife Health Hotline at (866) 968-2600

Learn more

The Klamath, Upper Columbia Basin, and North Coast and Cascades Networks are also collaborating with Oregon State University, Oregon Department of Fish and Wildlife, and Washington Department of Fish and Wildlife to ramp up bat monitoring in the region. You can learn more about bats, white-nose syndrome, and what is happening in West Coast states to address this devastating disease by visiting these links:

whitenosesyndrome.org

Oregon Department of Fish and Wildlife, WNS page

California Department of Fish and Wildlife, WNS page

Washington Department of Fish and Wildlife, WNS page

Bat Conservation International

Brazilian free-tailed bat (*Tadarida brasiliensis*). Photo courtesy Dr. J. Scott Altenbach.

Klamath Network Inventory & Monitoring Program

The National Park Service has implemented natural resource inventory and monitoring on a servicewide basis to ensure all park units possess the resource information needed for effective, science-based management, decision-making, and resource protection.

Parks in the Klamath I&M Network:

- Crater Lake National Park
- Lassen Volcanic National Park
- Lava Beds National Monument
- Oregon Caves National Monument and Preserve
- Redwood National and State Parks
- Whiskeytown National Recreation Area
- Tule Lake Unit of WWII Valor in the Pacific National Monument

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New Science Communication Specialist on Staff–Sonya Daw

Sonya Daw joins the Klamath Network staff as the new Science Communication Specialist.

I began working as the Klamath Network's new Science Communication Specialist last September. Although based in Ashland, Oregon, with the Klamath Network, I also work for the Greater Yellowstone, Rocky Mountain, and Mediterranean Inventory and Monitoring Networks. My job mixes technical editing with writing and graphic design. I edit many natural resource reports, but I also write and design outreach materials, like the Klamath Network's monthly *Featured Creature* articles. I love that I am always learning something new about science and nature!

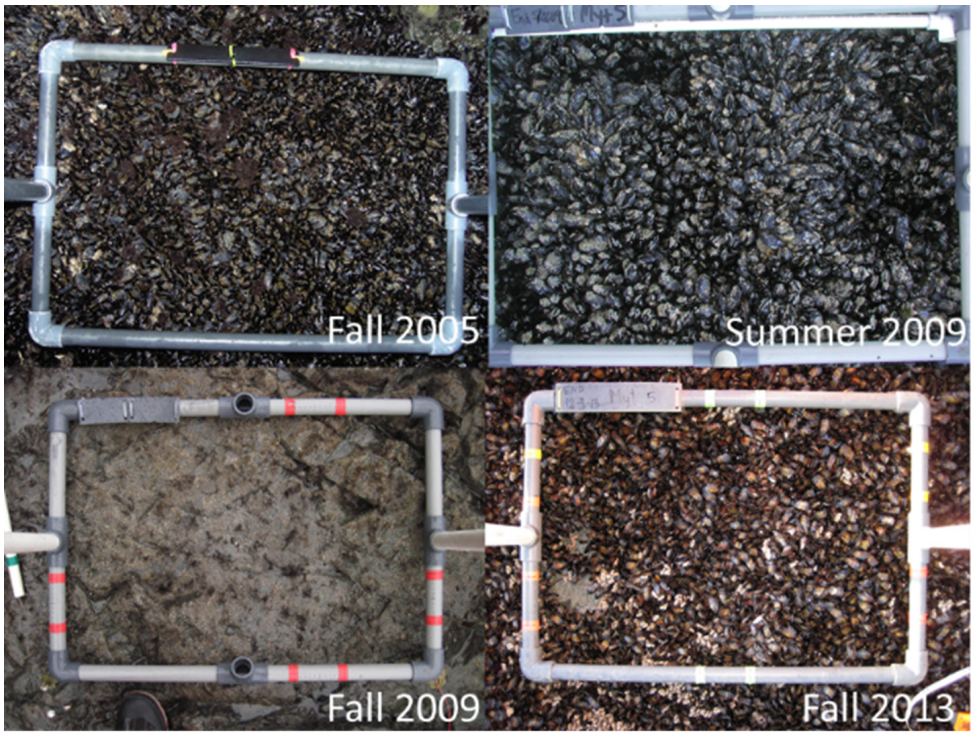
My first career was in wildlife biology. I received a BA in Biology from UC Santa Cruz (go banana slugs!) and an MS in Wildlife Biology from Oregon State University. This move is actually a return to Oregon for me. I lived in Corvallis in the 1990s as a master's student researching goshawks on the Malheur National Forest. After 17 years and many excellent adventures working with raptors and songbirds throughout the Intermountain West, I shifted gears. I wanted to find engaging ways to communicate what we learn about nature through science. To build my writing skills, I worked as a writer/editor for the Southern Colorado Plateau I&M Network, served as the Managing Editor for the *Natural Areas Journal*, and began writing for KNAU Earth Notes and Dr. Bruce Hungate's *Center for Ecosystem Science and Society* at Northern Arizona University. I also went back to school. All of that juggling ended when I graduated a year ago with an MA in English from Northern Arizona University and transitioned into this job from a Pathways position.

Along the way, my husband and I raised two boys in southern Utah and northern Arizona. The boys are now fledged and my husband works as an ecologist in Ashland. We are having fun exploring our new home. I have a passion for music, birding, and anything outdoors. I look forward to working with all of you in the parks!

Status vs. Trends: The Perils of Assessing Change Too Soon

"You can draw a line between any two points. . .doesn't mean it's the right thing to do," says Eric Dinger, Quantitative Ecologist for the Klamath Network.

Dinger was discussing the perils of assessing change too soon based on long-term monitoring data during the Klamath Conversations gathering of park staff last December. How do we know when the changes we see from year to year are more than just natural variation? How do we know what caused them? There are no easy answers to these questions, but here are some highlights from his presentation.



A good example of natural variability is the change in mussel (Mytilus californianus) density at the same photoplot from year to year and even season to season (note summer 2009 to fall 2009).

What is the difference between status and trend?

One major goal of the NPS Service's Inventory and Monitoring Program is to "determine the status and trends, in selected indicators, of the condition of park ecosystems...." Status is straightforward: the current condition of a resource, plus or minus some measure of variability. For example, we might report the average water temperature in streams at a park based on a single year or a few years of data. We report status annually in the Natural Resource Data Series publications. Trend, on the other hand, is "noncyclical, directional change over time." In other words, the change we see is moving in one direction and continues in that direction over a longer period of time. Trends can be hard to distinguish from natural fluctuations, however, which leads to a different question:

When does a change in status signal an underlying trend?

Before we can identify trends, we have to understand natural variability. What are the "normal" differences among sites and changes from year to year for this resource? How much does water temperature naturally fluctuate from year to year in this area or between sites in the same park? Trends are the changes we see after accounting for natural variability, which takes a lot of time and data to establish.

What are the perils of assessing change too soon?

Dinger warns of the peril in calling change "significant," or even worse, naming the cause of the change, before we know enough. In other words, we should be careful how we connect the lines between points of data. Dinger presented natural resource case studies in California where researchers could have mistakenly identified changes as "abnormal." For example, a severe drop in the pink surf perch catch in 1982 appeared to be associated with the startup of the San Onofre Nuclear Generating Station, but was actually tied to the naturally oscillating El Nino weather pattern that also began in 1982.

How do we avoid the peril of assessing change too soon?

We are now six years into our monitoring program and still actively learning about natural variability in Klamath Network vital signs. Once we understand "normal" variation we will cautiously explore trends.

Dinger says, "I want five points in time to even think about drawing a line through them."

For vital signs we monitor every three years (most of them), that means waiting at least nine more years (total of 15) to begin exploring trends. We will explore trends sooner for vital signs we monitor annually, like rocky intertidal organisms and the demographics portion of our landbirds program (mist-netting).

Status vs. Trends *(continued)*

How will we report the results of trend analyses?

Our Analysis & Synthesis (A&S) reports are a flexible approach for in-depth analyses and trend reporting. They can take the form of peer-reviewed journal articles or Natural Resource Reports (instead of the Natural Resource Data Series). We aim to produce in-depth A&S reports every four years for each vital sign. Early A&S reports will most likely describe the distribution and variation in a vital sign throughout a park. For example, Dinger's upcoming A&S report on streams will focus on how streamflow, substrate, and steepness vary in streams throughout each park. Future A&S reports will examine trends after 10 to 20 years of data are available. Some early A&S reports are based on enough data to include trend analyses, such as the recently published bird population trends publication (see Analysis & Synthesis/ Trend Reports on page 8).

In the meantime, we use year-to-year monitoring data for many other purposes:

- To track the status of species affected by ongoing threats
  - ochre sea stars infected with Sea Star Wasting Syndrome
  - whitebark pines affected by white pine blister rust and mountain pine beetles
  - bats potentially affected by White-Nose Syndrome
- To contribute to larger scale research studies
  - genetic research on whitebark pine trees naturally resistant to white pine blister rust
  - bird community analysis for the Klamath Ecoregion (see article in this issue)
- To detect new invasions of exotic plants in parks
- To track the recovery of plants and animals after natural disturbances, like floods and fires
- To contribute new species detections to park lists

Communication is essential! Dinger ended his presentation by inviting park staff to stay in close communication with Network scientists about how to interpret changes to vital signs during the early years of monitoring.

End of an Era!

In March of 2017, we published our ninth and final vital signs monitoring protocol: *Integrated Monitoring Protocol for Cave Entrance Communities and Cave Environments in the Klamath Network*. A week later, we celebrated the end of the protocol development era with a chocolate cake and a party! Our Network now has its long-term marching orders for monitoring these important vital signs. While the protocols may need periodic updates, we can now turn our full attention to monitoring vital signs and preparing for the next round of inventories.

The Klamath Network crew, from left to right: Dennis Odion (joining the photo virtually), Allison Snyder, Eric Dinger, Alice Chung-MacCoubrey, Dominic DiPaolo, Sean Smith, Sonya Daw.

You can download all of the Klamath Network vital sign monitoring protocols from the Reports & Publications page of our website:

- Caves
- Land Cover and Land Use
- Streams
- Whitebark Pine
- Lakes
- Terrestrial Vegetation
- Exotic and Invasive Plants
- Landbird Communities
- Intertidal Communities

Bird Communities in the Klamath Ecoregion

People spend a lot of time watching birds, and scientists are no exception. Because birds use such a wide variety of resources and respond quickly to environmental change, they are gold mines of information. Even better, most species are easy to find, especially in the spring when they are singing! Scientists from Klamath Bird Observatory, the Klamath Inventory and Monitoring (I&M) Network and others used a wealth of bird data from the Klamath Ecoregion to understand how birds naturally group themselves across the landscape. Their results were just published in PLOS ONE, "Bird communities and environmental correlates in southern Oregon and northern California, USA."

The researchers wanted to explore the relationship between bird communities and the highly diverse environment of the Klamath Ecoregion. This 17.5 million hectare ecoregion stretches eastward from the central Pacific coast across several mountain ranges to the Great Basin.

The researchers took a new approach to grouping birds. Managers and scientists typically group birds by taxonomy (genetic relation), behavior (foraging guilds), and habitat (species preferences and needs). However, none of these classifications describes how birds co-occur and interact across broad landscapes. This study looked at how birds naturally group themselves on the landscape, letting the birds define their own communities.

After identifying statistically distinct bird groups, researchers then looked for associated patterns in the environment at three different scales. Understanding this could provide a more nuanced understanding of how birds might respond to management at different landscape scales in the Klamath Ecoregion.

Research questions

1. How do birds group themselves across the landscape?
2. What environmental factors (climate, geography, and vegetation) are associated with those groups at three different spatial scales?
   A. Klamath Ecoregion
   B. vegetation formations (agriculture, conifer, mixed conifer/hardwood, and shrubland)
   C. National Park Service units
3. How well do the six Klamath Network park units represent bird communities in the broader Klamath Ecoregion?

Data sources

Data for the study came from 21 years of point count surveys conducted during the breeding season by various agencies and organizations between 1992 and 2013. Point count surveys are conducted in the first few hours after dawn. A surveyor stops at stations along a transect route and records all birds seen or heard for five minutes.

How birds grouped themselves in relation to their environment

Analyses revealed 96 species of songbirds, woodpeckers, and hummingbirds, distributed in 29 distinct groups across the Klamath Ecoregion. These groupings were strongly associated with several environmental conditions at all three spatial scales:

- Climate: breeding season mean temperature and temperature range
- Geography: elevation
- Vegetation: environmental site potential (what the natural, climax community would look like), and existing vegetation formation

In other words, bird communities tended to separate out along gradients in temperature, elevation, and certain aspects of vegetation. Several other environmental factors, however, varied by scale. For example, disturbance (e.g., wildfire) and distance to stream or lake only appeared to influence the composition of bird communities at the smallest scale analyzed—the National Park Service unit.


Steller's Jay


Black-headed Grosbeak


Black-throated Gray Warbler


Hermit Thrush


Spotted Towhee

Key species of one of the distinct bird communities associated with mixed conifer/hardwood forest. This bird community occurred in low abundance in Lava Beds National Monument, Redwood National and State Parks, and Whiskeytown National Recreation Area. All photos from Creative Commons courtesy Frank Lospalluto, except Steller's Jay, courtesy Beth Kanter.

Bird Communities (*continued*)

How well national park lands represented bird communities

Parks appeared to represent bird communities fairly well across the region. Most of the bird communities occurred within at least one of the park units. Network parks have abundant mature conifer forest and strongly represented bird communities in this habitat type. Interestingly, while forests with a mix of conifer and hardwood—often oak—trees were heavily represented in park units, the bird community associated with oak woodlands was not found in the park units. Oak woodlands do not commonly occur within the elevations and geographic settings of this ecoregion's parks. Identifying bird communities, like those associated with oak woodlands, not currently protected within park boundaries is an important first step for targeting future lands to protect.

Management applications

Using long-term monitoring data for research and management achieves an important I&M goal, says Eric Dinger, Network Ecologist, who analyzed the data:

"Using our monitoring and inventory data to better understand the ecology of bird communities and what influences the distribution of species across a landscape lays the foundation for better ecosystem management in the future."

Specifically, park managers will be able to make more informed management decisions with a better understanding of how their park contributes to bird diversity and conservation in the region. More generally, land managers from any agency in the region will have a better understanding of how environmental factors influence bird communities differently at the three landscape scales analyzed.

Recently Published Reports

Available from the Klamath Network website: http://science.nature.nps.gov/IM/units/klmn/index.cfm

Annual Reports

Whitebark Pine

- Whitebark Pine Monitoring: 2015 Results from Crater Lake National Park and Lassen Volcanic National Park

Vegetation Structure, Composition and Function

- Vegetation Community Monitoring: 2015 Results from Whiskeytown National Recreation Area and Lassen Volcanic National Park

Exotic and Invasive Species

- Klamath Network Invasive Species Early Detection: 2015 Annual Report

Landbirds

- Landbird Monitoring: 2015 Results from Lassen Volcanic National Park, Oregon Caves National Monument and Preserve, and Whiskeytown National Recreation Area

Rocky Intertidal Communities

- Rocky Intertidal Monitoring: 2014 Results from Redwood National and State Parks

Land Cover and Land Use

- Land Cover and Land Use Monitoring in the Klamath Network: 2016 Summary for Lassen Volcanic National Park
- Land Cover and Land Use Monitoring: 2016 Results for Whiskeytown National Recreation Area

Lake Aquatic Communities and Water Quality

- Integrated Aquatic Community and Water Quality Monitoring of Mountain Ponds and Lakes in the Klamath Network – Annual Data Report: 2013 results from Lassen Volcanic National Park, Crater Lake National Park, and Redwood National Park

Recently Published Reports *(continued)*

Analysis & Synthesis/Trend Reports

- Bird Population Trends from Constant Effort Mist Netting in Oregon Caves National Monument and Preserve

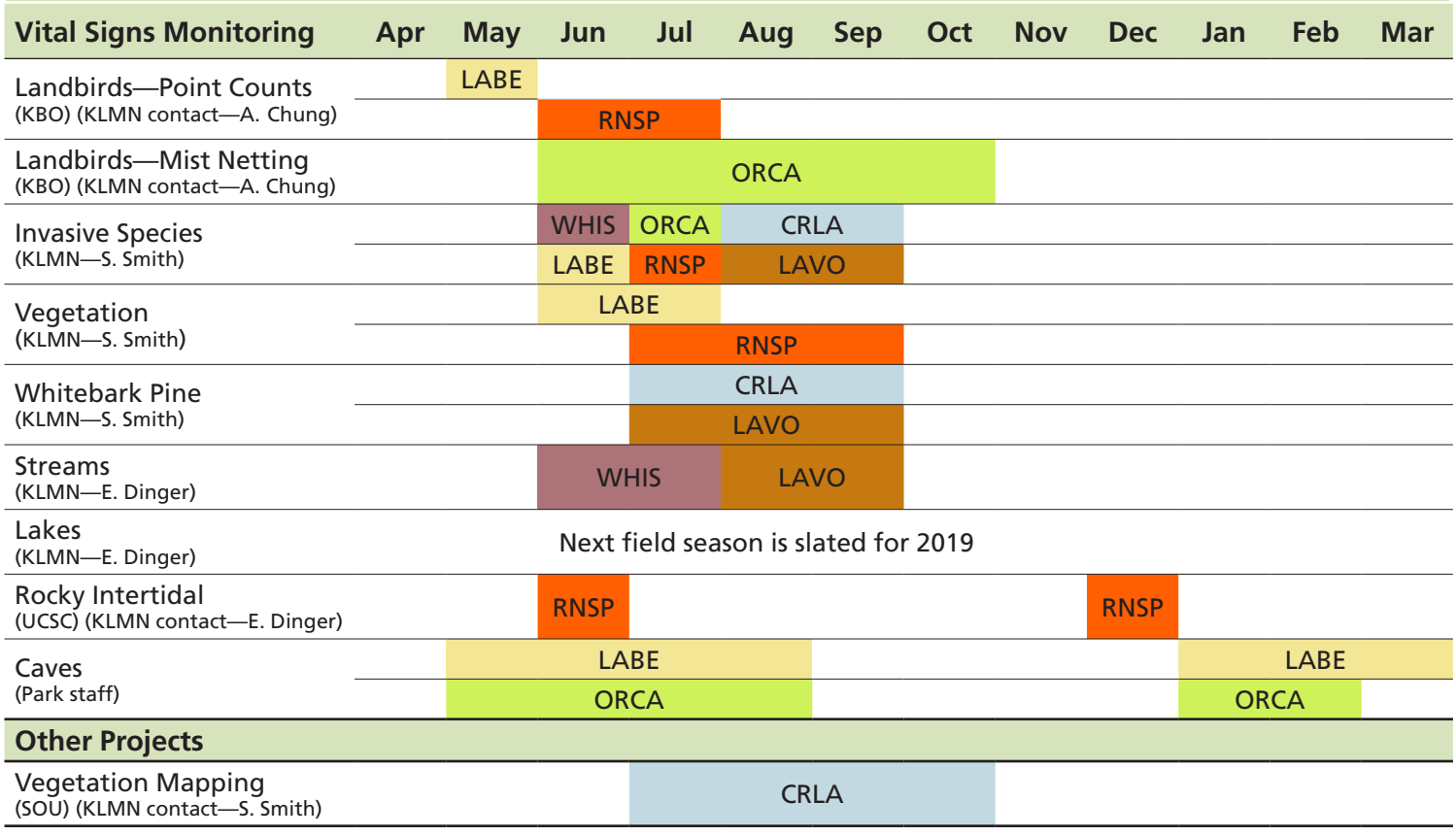
Protocols

- Land Cover and Land Use Monitoring Protocol for the Klamath Network: Narrative, Standard Operating Procedures
- Integrated Monitoring Protocol for Cave Entrance Communities and Cave Environments in the Klamath Network
  - Narrative
  - Standard Operating Procedures (18 separate documents, accessed through narrative or individually)

Journal Publications

- Stephens, J. L., E. C. Dinger, J. D. Alexander, S. R. Mohren, C. J. Ralph, and D. A. Sarr. 2016. Bird Communities and Environmental Correlates in Southern Oregon and Northern California. PLOS ONE 11(10): e0163906. doi: http://dx.doi.org/10.1371/journal.pone.0163906

2017 Field Schedule at Klamath Network Parks



Park acronyms

Crater Lake National Park (CRLA), Lassen Volcanic National Park (LAVO), Lava Beds National Monument (LABE), Oregon Caves National Monument and Preserve (ORCA), Redwood National and State Parks (RNSP), Whiskeytown National Recreation Area (WHIS)

Cooperator acronyms

Klamath Bird Observatory (KBO), University of California at Santa Cruz (UCSC), Southern Oregon University (SOU)