Newsletter

National Park Service
U.S. Department of the Interior

The Klamath Kaleidoscope

Turning Science into Meaning in the Klamath Network

By Daniel Sarr, Klamath Network

After years of planning and program development, it is exciting to finally start to see our science efforts gain traction on the ground and have an impact on the larger scientific community. As of June 2011, we have completed protocols approved and in place for intertidal communities, invasive plant species early detection, vegetation communities, landbird communities, and lake communities and water quality, with final protocols nearing completion for caves, whitebark pine, streams, and land cover and land use. We have field crews in the parks this summer sampling streams at Whiskeytown and Lassen Volcanic; vegetation and landbirds at Redwood, Oregon Caves, and Lava Beds; and invasive species at all the parks. We are only now finding the time to begin analyzing and sharing monitoring data with you all.

First on the docket is a three year analysis and synthesis report for landbird detection, density, and community structure that we will be developing with our partner the Klamath Bird Observatory this fall. We will also be developing a research report to describe an Index of Ecological Integrity for lakes of Lassen Volcanic and environs. Early next fiscal year, we will be developing another invasive species early detection report and a scientific paper on our invasive species monitoring efforts. The Klamath Network has submitted a paper to Park Science describing the findings of an initial whitebark pine pilot study we conducted at Crater Lake, demonstrating that mountain pine beetles are now the number one form of tree mortality in the park's whitebark stands. Perhaps most exciting is the acceptance of a paper in the journal Ecology, which presents a new technique for conducting power analyses with multispecies (community) monitoring data, and one of our first contributions central to monitoring science.

Inventory efforts have also begun bearing fruit. Sarah McCullough and Dr. Ken Tate of UC Davis led our efforts to characterize aspen communities at Lassen Volcanic, which was presented in a report to the park this spring, with a journal article forthcoming (described in more detail in another article in this issue). Dr. Caroline Sullivan, a postdoctoral Fulbright from Ireland, working with Drs. Erik Jules and Morgan Varner of Humboldt State University, completed her fieldwork studying landscape dynamics of douglas-fir forests in the Little Bald Hills region of Redwood. She will be working on final manuscripts over the coming year. We hope to provide an update on this project in the fall.

Now that we seem to have science going on abundance, our next challenge will be linking it to management and interpretation needs, and we will need help from all of you. Our Outreach partnership with Southern Oregon University, which has provided a great opportunity to explore selected dimensions of our science program with Dr. Stewart Janes and a number of students, is coming to an end this year. We welcome ideas on how we can turn inventory and monitoring efforts into meaning, understanding, and improved resource protection.

Stream at Redwood NP during vegetation monitoring site scouting. Photo by Sean Smith, Klamath Network.

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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 managerial decision-making, and resource protection.

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The National Park Service cares for the special places saved by the American people so that all may experience our heritage.

Klamath Network Dog and Pony Shows - Coming to a Park near You!

This past fall, two members of the I&M team set out to visit with two of our parks. Daniel Sarr, (Program Manager) and Eric Dinger (Aquatic Ecologist) visited Redwood National and State Parks, as well as Whiskeytown National Recreation Area. Their goal was to introduce the purposes and methods of the I&M program to a wider cross-section of park staff, and to update parks on our implementation progress. Informally called a "Dog and Pony" show, expect more visits from Network staff coming up. Future visits will update parks on other aspects of our program, perhaps on the Invasive Species and Landbird Vital Signs monitoring. This will be an opportunity for park staffs not just to learn about what we're doing, but also for us to learn from the parks!

Can the Klamath Forests Take the Heat?!
Forest Monitoring in an Era of Rapid Climate Change

How will the forests of the Klamath region respond to a rapidly warming climate? Will there be areas that are more resistant and resilient to these changes? Could there be cascading effects on wildlife and biodiversity? What, if anything, can managers do to protect against these threats?

Twisted redwood tree. Photo by Sean Mohren, Klamath Network.

A new forest monitoring project is attempting to answer these questions in the Klamath region. In a collaborative effort among USGS, NPS, BLM, and SOU, a team of ecologists will install large (approximately 2 acre) monitoring plots in old-growth forests at the Cascade-Siskiyou NM, Oregon Caves NM, Crater Lake NP, Lassen Volcanic NP, and Redwood NP. Over time, the data developed from these plots will document any changes to forest tree populations and communities, complementing the current Klamath Inventory and Monitoring Network terrestrial vegetation monitoring program.

Old-growth forests may appear timeless, but "Old-growth forests across the western US are already responding to a warming climate by showing increased mortality rates," says lead USGS scientist Phil van Mantgem. One of the project goals is to determine if similar changes are occurring in the Klamath region and how these patterns might change across the steep marine to continental climatic gradient in the Klamath region. Once established, these forest plot data will also be used as foundational information for more intensive studies on wildlife and biodiversity patterns. "This information will be extremely useful for managers," says van Mantgem. "If our old-growth forests, essentially our reference conditions for restoration, are found to be changing under our feet, it sends a strong signal that we really need to consider our management activities in the context of climate change."

Monitoring Cave Ice Loss at Lava Beds

Article and Image by Shawn Thomas, Lava Beds National Monument

Caves are abundant at Lava Beds National Monument, though only a small number are considered "ice caves," containing perennial ice features such as ice floors, ice formations, and glaciers. Why are ice caves relatively rare at Lava Beds? The caves that maintain year-round ice resources generally fit a specific morphology (i.e., shape), which allows for sustained cool temperatures. These caves are "cold sinks," trapping dense, cool air as it flows down a slope or vertical entrance and settles in a lower level. The descending cool air pushes warmer air upward and insulates the cave floor, maintaining freezing temperatures. As water percolates into these caves from snowmelt or rain, it freezes when reaching the lower levels. Many of these cold sink caves have sustained ice for hundreds of years, though with rising temperatures in recent decades, the ice has started to disappear.

Rapid ice loss has begun in this Lava Beds cave. The floor, which used to be solid ice, is now largely covered in a layer of sediment being deposited as the ice melts and recedes.

Merrill Ice Cave is a popular visitor cave that historically supported an extensive, thick ice floor. In 1997, a small hole was discovered in the ice floor with strong airflow moving up from below. This airflow, along with acts of vandalism, contributed to the hole growing rapidly larger, and within a few years, the entire ice floor was gone. While monitoring ice in 2010, Lava Beds staff discovered a similar situation in another ice cave, where a gap had formed between the ice floor and the cave wall. Over the last year, this gap has grown considerably, and the ice floor has receded, leaving a deposit over the floor as sediments melt out of the ice, possibly accelerating ice loss. This rapid ice loss is alarming and serves as another example of the uncertainty of cave ice resources.

What does the loss of cave ice mean for other cave resources at Lava Beds? Cave monitoring may reveal answers. A former ice cave at Lava Beds has experienced diminished bat use during the winter season. Bats seek specific environmental conditions for hibernation, so they may have abandoned this cave due to rising temperatures associated with ice loss. Another potential result of ice loss is rock fall. As ice recedes, so does its buoyant effect on overlying rocks and loose breakdown, possibly leading to unstable conditions in some ice caves. What else might be happening as a result of ice loss in caves? Implementation of the Klamath Network's Integrated Cave Monitoring Protocol will improve our understanding of how cave ice loss may already be impacting cave ecosystems and may reveal other, currently unknown, effects of ice loss.

Water Quality Podcasts

By Eric Dinger, Klamath Network

Jenny Mensch, an Environmental Education student at Southern Oregon University (introduced in the last Klamath Kaleidoscope), has begun working with the parks' staff on a water quality interpretative project. With input from several parks, a series of informative podcasts concerning water quality issues faced by the parks are being created. These podcasts will consist of interviews with park staff, including Interpretative staff, Resource Managers, and Specialists. Additional narration on background information will be voiced-over to provide valuable updates to the general public, along with printed material to assist in the dissemination of the material to the public.

By doing specific podcasts for each park, we can cover a broad selection of water quality issues tailored to each park. Taken together, the podcasts will cover a majority of water quality issues faced by natural protected areas. As an example, we hope to cover several topics for Crater Lake National Park: (1) the importance of long-term monitoring in water quality, (2) managing for a protected species (i.e., bull trout), and (3) the importance of a unique ecosystem. Whereas, in Lassen Volcanic National Park, potential topics are: (1) atmospheric deposition of pollutants, (2) amphibian declines, and (3) using I&M staff to supplement park-based specialists. Obviously, Whiskeytown, Redwood, and Oregon Caves will have different topics to be covered. Jenny hopes to be able to interview staff at Lava Beds concerning frozen water resources as well!

Success of the podcasts will depend on the availability of Jenny to sit down with parks staff and have an enjoyable, recorded conversation about these topics. We anticipate a substantial workload of post-processing and editing of the recorded interviews, so making time for Jenny early in the summer would be fantastic. She will be contacting many of the current readers of this – and remember, these are YOUR podcasts – help Jenny cover the topics YOU see as important to communicate to the public.

We hope to get the podcasts distributed as widely as possible: on park web sites, the Network web site, and maybe through iTunes or other readily available podcast services. These podcasts should assist the public in their learning of water quality issues, and introduce the "behind-the-scenes" park staff and management to them as well.

Stream Sampling

By Eric Dinger, Klamath Network

This past spring, the Network received feedback from seven reviewers on the our Wadeable Streams monitoring protocol. After incorporating their feedback, we have started to implement the full protocol in the parks of the Network. Expect to see the crew in Whiskeytown NRA and Lassen Volcanic NP this summer and early fall! Next year we will be in Redwood National and State Parks, Oregon Caves NM, and Crater Lake NP.

The stream monitoring crew is made up of four technicians, doing some long days in rugged, remote streams in the parks. We expect to sample 30 stream "reaches" in each park this summer. The work is very comprehensive, as we measure the biological community, the water quality, and the physical environment. If you wish to learn more about what it is we do, feel free to contact the Project Lead, Eric Dinger, and we can arrange for you to come out and give our crews a visit. Hands-on experience can be a very valuable way to learn about our program. And we are always happy for the extra eyes, and especially the extra backs to carry all the gear!

Our crew has at least one face that may be familiar to some of you in the network; Charles Stanley has returned as the Crew Leader for the past three years running. He led the Wadeable Streams pilot project in Redwoods back in 2009, led Mountain Lake sampling in 2010, and now is leading the stream crew for 2011. As one of the authors of the Wadeable Stream Protocol, it is hard to imagine a better person to be leading the crew!

Thanks to all the park staff who have worked with us to bring the sampling to their parks this year – from the housing staff, resource staff, and even maintenance staff who find time to help us with vehicles breaking down!

Stream crew members Sean Smith (left) and Charles Stanley (right) using a densiometer at a stream in Redwood during the stream monitoring pilot study. Image by Eric Dinger.

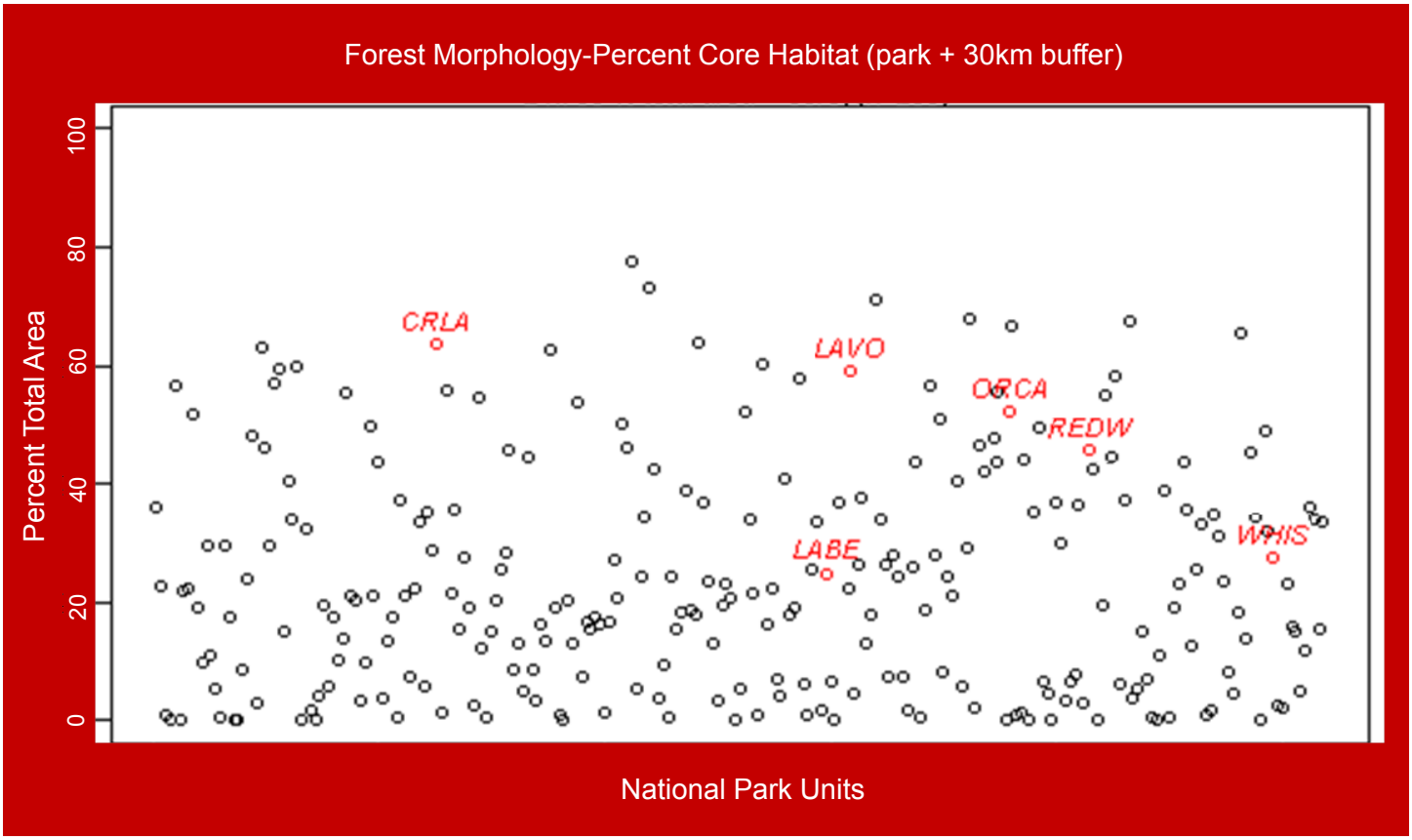
Land Use / Land Cover Monitoring Protocol Update

By Lorin Groshong, Southern Oregon University

The last time I wrote about the Klamath Network's Land Use/Land Cover Vital Sign was in the Winter/Spring 2009 issue. Since then, a huge effort has been made by the National Park Service to standardize the data and methodologies on which we base our parks' Land Cover analyses. This effort is called NPScape and is currently headed by Bill Monahan at the Inventory and Monitoring Program's national office in Fort Collins, Colorado.

In order not to duplicate efforts, the Klamath Network waited for the NPScape team to complete the first phase of the NPScape project. As part of this phase, NPScape data, products, analyses, tools, and procedures (all available on NRInfo) cumulatively identify, evaluate, and report a suite of information-rich measures for park units served by the I&M Program. Using these NPScape tools, the Klamath Network will be creating maps and statistics related to Conservation Status, Housing, Land Cover, Landscape Pattern, Population, and Roads for each of the six parks in our region. We plan to deliver products to the parks that will help inform resource managers on habitat conversion, land use intensity changes, and landscape pattern changes. Together, these measures can inform park decisions, and help to identify potential threats to park resources and opportunities for conservation. In addition to the measures selected as part of the NPScape project, the Klamath Network is also exploring the feasibility of mapping insect and disease outbreaks, wildfire, and travel corridors.

After meeting with the parks' Natural Resource staff this summer, the Klamath Network plans on submitting a draft protocol for peer review in October 2011.



A comparison of the percentage of core forest habitat (areas of uninterrupted forest cover as classified by the National Land Cover Dataset) in and surrounding Klamath Network parks versus other national park units.

Aspen in Lassen Volcanic National Park. Photo by Sarah McCullough

Lassen Volcanic National Park Aspen Study Completed

By Daniel Sarr, Klamath Network

This spring, the study of aspen stands at Lassen Volcanic National Park was completed. Aspen declines are a major concern in many parts of the West, but the extent and types of ecological changes has been observed to vary with locale, which also seems to be the case at Lassen Volcanic. The investigators, Sarah McCullough and Dr. Ken Tate of UC Davis, sampled 29 aspen stands in the park in 2007 using a modified Whittaker plot design and collecting information on tree composition and demographics and soil characteristics. They also analyzed aerial photographs from 1952 and 1999 to assess the degree of conifer invasion into park aspen stands.

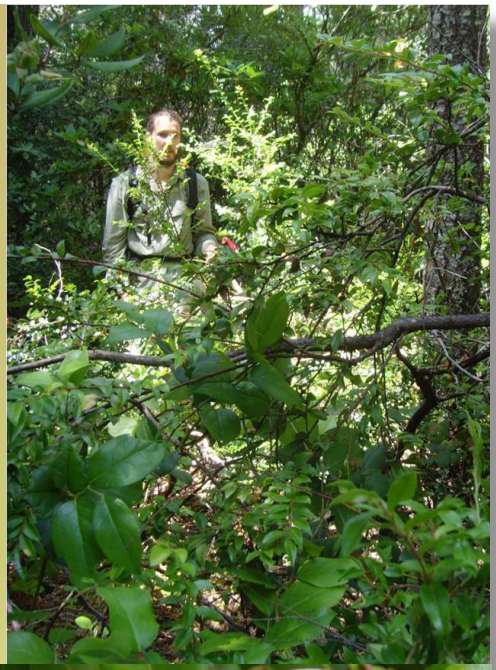
The general findings were: 1) aspen stands have disproportionately high understory plant diversity and richer understory soils than adjacent mixed conifer stands; 2) the invasion process is varied, with approximately half the stands undergoing active conifer invasion during the period and the rest being persistent aspen; 3) in the stands undergoing invasion, understory species richness, selected soil characteristics and general habitat quality appeared to be declining in direct proportion to invasion; 4) in persistent aspen stands, slight infilling of aspen had occurred; and 5) native ungulate (deer) browsing also appears to be a substantial constraint on stand regeneration.

The study has important implications for park management. To the degree that biological diversity is a chief management goal, it seems clear that aspen stands, like small wetlands and other unique habitats, contribute disproportionately to landscape biological diversity. Because aspen are shade-intolerant, early-successional trees that typically regenerate from a clonal root system, they are paradoxically both vulnerable to rapid extirpation by competition with taller and longer lived conifers and one of a landscape's most enduring features if periodically renewed by disturbances. A natural consequence is that natural (fire, flood, or volcanic or other geophysical disturbances) or anthropogenic disturbances (prescribed fire) will likely be required to keep many aspen stands in the landscape in the future. At current rates of invasion in Lassen Volcanic, it seems likely that a number of conifer-invaded stands will be lost within 20-30 years without fire or some other regenerating disturbance. Management of deer access may also be important for ensuring that aspen seedlings can recruit into the canopy. It is not clear at this point whether active aspen restoration or more intensive aspen management will be the appropriate park response, but we are excited that this research provides a stronger scientific foundation for such decisions in the future. As a final element of the project, the investigators will be pursuing publication of their research in an ecological journal later this year.

The full report can be accessed at the Klamath Network I&M web site:
http://science.nature.nps.gov/im/units/klmn/Reports/Inventory_Reports.cfm#Vegetation.

Forest Habitat Diversity Provides Insights into the Past at the Little Bald Hills, Redwood National Park

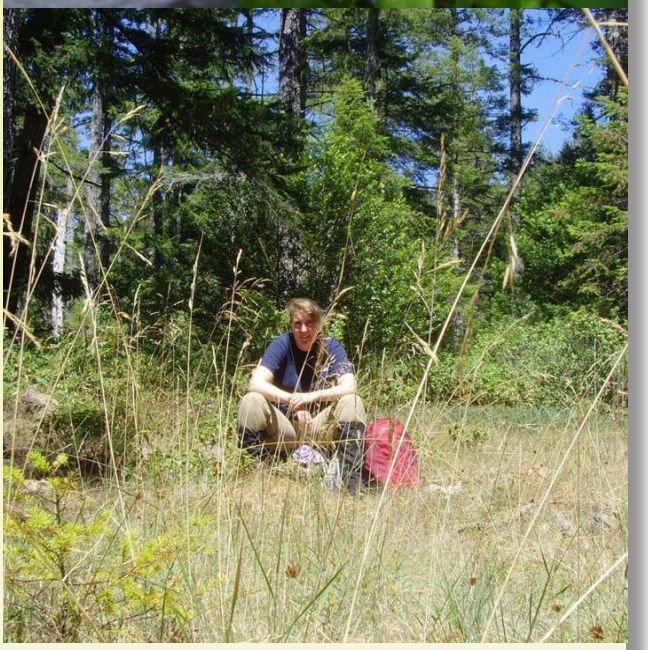
Article and Images by Caroline Sullivan,
Irish-American Fulbright Scholar



The Little Bald Hills are a floristically unique region in the northeast part of Redwood National Park, due to a band of serpentine bedrock running through the site. This geology results in serpentine soils with distinctive vegetation assemblages. This topographically and botanically diverse area of the park supports Jeffrey pine (*Pinus jeffreyi*) savannah on the hilltops, with Douglas-fir (*Pseudotsuga menziesii*) forest on the slopes. The Douglas-fir forest grades into Redwood (*Sequoia sempervirens*) forest as one moves down-slope.

My research investigated the forest dynamics of this site, particularly the Douglas-fir forest. As a botanist from Ireland, working in Redwood National Park was a wonderful opportunity. The fieldwork posed many challenges that I have never had to deal with in Ireland, such as the threat of bears and mountain lions, but there were also benefits such as developing bicep muscles from tree-coring and spending time in the beautiful Californian wilderness.

Analyses of data gathered show that the Douglas-fir forest alliance is quite diverse and includes Tanoak and Chinquapin stands previously not described at the site. This forest habitat diversity is likely to be closely related to the land management history of the site. The tanoak forest may be a remnant of tanoak resources managed by the Tolowa tribes in the area. This is just one aspect of this project; other highlights include wolf tree distribution (these are conifers with coarse, heavy-limbs with little effective lateral competition and broad crowns that were open-grown throughout most of their life history) and stand age dynamics, both of which give clues on past land uses on the site. This knowledge of the past will help inform future management of the site that harbors important cultural, plant, and animal biodiversity within Redwood National Park.



I would like to take the opportunity to thank everyone within the Klamath Monitoring and Inventory Network and Humboldt State University for making me feel very welcome and for facilitating me in this research. In particular I would like to thank Daniel Sarr, Leonel Arguello, Morgan Varner, Erik Jules, Arthur Grupe (field assistant extraordinaire), Sean Smith, Sean Mohren, and Bess Perry.

Photos from top to bottom: Field assistant, Arthur Grupe, in a dense shrub thicket in the Little Bald Hills, Tanoak acorns from the Little Bald Hills, and Caroline Sullivan taking a breather in the Jeffrey pine savanna grassland before coring more Douglas-fir trees.