Newsletter

National Park Service
U.S. Department of the Interior

The Klamath Kaleidoscope

The End of the Beginning

by Daniel Sarr

In This Issue

This year we will reach a major milestone for our program. We will complete the last of our monitoring protocols! Nearly ten years in development, the foundation for the Klamath Network Vital Signs Monitoring Program will finally be laid. So far, we have been monitoring land birds for ten years at Oregon Caves, intertidal zones for five years at Redwood, and will have visited most of the parks for the remainder of the protocols.

In 2004 we convened for a series of workshops aimed at identifying monitoring questions and vital signs. In subsequent years we refined those lists, developed three Phased Reports that culminated in a Vital Signs Monitoring Plan, and completed a broad suite of species and habitat inventories across all six parks of the Klamath Network. Just as important, we learned to work together as a multipark, interdisciplinary team, leveraging talent from across all the parks and with regional partners to conceive and deliver science. We now have strong working relationships with Southern Oregon University, where the network office has been located since 2002, with Humboldt State University, Klamath Bird Observatory, US Geological Survey (USGS) Forest and Rangeland Ecosystem Science and Western Ecological Research Centers, and other regional partners.

The intensity of such collaborations has waxed and waned over time. During the initial phases, we had many meetings, a great deal of brainstorming, and generally a lot of interaction. In the last five years, Inventory & Monitoring (I&M) staff efforts have turned to the development of the monitoring protocols, as well as safety, administrative, and science communication plans, a sustained and intense process that has involved long periods of research, writing, and refinement. This focused period, with the rise of travel caps, have meant that the I&M staff have more often than not been office-bound, and collaborative meetings have been rarer. Although we certainly have many challenges ahead as we learn how to analyze and report monitoring data, the development phase is coming to a gradual close.

Having reached the end of the beginning, we can begin to look to the future and renew discussions of how best to apply our science to the many needs of the parks and region. How can our data inform park management ? How can they inform and improve the visitor experience? How can I&M scientists interact with other park professionals? I look forward to these open-ended challenges and to renewing the energy and enthusiasm that fueled our initial efforts. For example, I believe there is great potential to strengthen our collaboration with park interpretive programs and the Crater Lake Science and Learning Center. We also have a strong foundation from which to engage with park-based science programs as well as the National Park Service fire program to help inform management decisions.

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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 End of the Beginning

(continued from p. 1)

We also are in a good position to engage our research partners in the USGS, nonprofit, and academic partners in collaborative research that advances scientific understanding and supports regional conservation. We are already working with USGS to establish old growth forest research plots in all the parks of the network as well as the Bureau of Land Management's Cascades-Siskiyou National Monument. This effort not only informs us about the structure, dynamics and biodiversity of old-growth forests, but creates a common ground for interagency collaboration. Similarly, our collaborative monitoring and research with the Klamath Bird Observatory is yielding new insights into the relationships between climate change and bird distributions across the Klamath Region. In yet another effort, we are working with Humboldt State University to monitor whitebark pine ecosystems and to evaluate the nature of blister rust spread in such systems. All these efforts spring from the investments of the last decade and, we hope, will position the Klamath Network parks and the I&M Program as engaged and innovative partners in regional conservation research.

It is a great time to look back with appreciation for all the terrific support of our program by the parks, the regional and national I&M programs, and our many science and education partners. We have done a great deal together. It is an equally fitting time to look forward, as we envision how to best bring science to the parks and to the service of conservation.

Movin' On Up

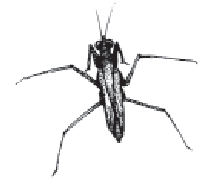
This winter Sean Mohren, the Klamath Network's Data Manager, accepted the position of Terrestrial Ecologist at Crater Lake National Park, leaving the Klamath Network office knee deep in Cabela's catalogs. This new position is a great opportunity for Sean to rekindle his former career as a wildlife biologist; he will be a great asset to the park. We wish them both well. This will leave big shoes to fill at the Klamath Network office, as Sean did such an exemplary job. We hope to fill the Data Manager position by Fall 2013, sequester permitting.

Sean Mohren (in the stern) in 2010 surveying his future habitat at Crater Lake National Park.

Since leaving the balmy life of an office warrior to accept his new position, Sean has fought for housing territory, hooted for owls, learned 10 of the 100 Eskimo names for snow, and successfully avoided doing any paperwork whatsoever. Although he has levitated to a higher plane, we are thankful he will still be part of the Klamath Network team. Sean will be working with us as a lead contact for four of our monitoring projects at Crater Lake this summer. We look forward to seeing you in your new habitat Sean! *--Daniel Sarr*

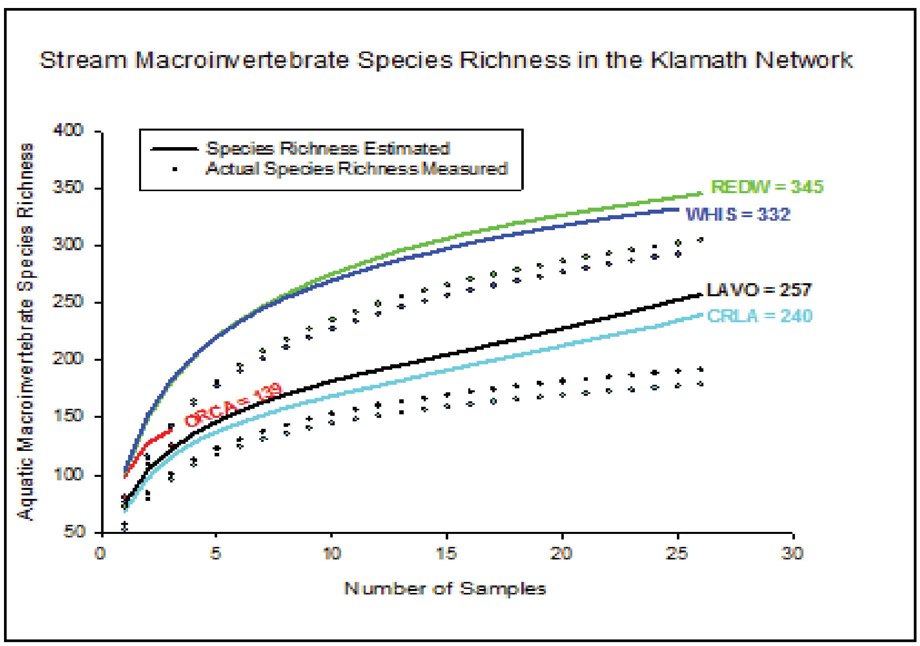
“How Many Species?”

by Eric Dinger



“How many species are there?” or “How many types?” are questions fundamental to both park ecologists/managers and to the typical park visitor. Information about native species diversity enriches the visitor experience and helps managers to preserve species and ecosystems for future generations.

For some groups of species, say plants, the answer is fairly well known – a knock on the door of the Network Botanist will inform you that Lava Beds NM has 360 different species of plants. But even so, there remains the possibility that new species are out there yet to be inventoried. As an example, our first season of vegetation monitoring turned up six species new to Whiskeytown NRA. But what about more difficult-to-survey groups of species? Or how do we know that we have sampled and recorded all the species within a park?



The answers to all of the above questions can be approximated by what are commonly known as “species estimators.” Although there are many types of “species estimators,” one of the most robust, easy to calculate, and intuitive is one developed by Anne Chao in the mid 1980s. Essentially, the estimated species richness is based both on the number of species actually sampled, plus an additional amount dependent on how many of the species are rare (only one [termed singletons] or two [doubletons] being found). As the relative ratio of these singletons and doubletons goes up, the estimated species richness is higher. As the relative ratio of the singletons and doubletons goes down (e.g., we’ve recorded many multiple individuals of each type), the estimated species richness is closer to the actual observed number. When the recorded number of species approximates the estimated species richness, we can be more confident that our species list is complete, or nearly so.

As an example of these species estimators in use, we can apply them to answering these questions for the stream macroinvertebrates of our parks (see figure). We’ve now sampled all the parks of the networks, and can answer (1) How many expected species at each park, (2) How efficient is our sampling at compiling a complete list, and (3) Is our inventory complete? And for the status-oriented park staff, which park has the greatest number of species?

We can estimate that Redwood NSP has the most diversity (not accounting for sample area and habitat heterogeneity) with an estimated 345 species, Whiskeytown NRA has 332, Lassen Volcanic NP has 257, Crater Lake NP has 240, and Oregon Caves NM has 139. As an average, our sampling documents approximately 83% of the estimated biodiversity. And “No,” our inventory is not complete.
But with many additional years of sampling and monitoring, we will one day be able to say, “Yes, we have a complete inventory.”

Vegetation Inventory of Oregon Caves National Monument

by Dennis Odion

The NPS Vegetation Mapping Program funded an effort, beginning in 2009, to inventory the vegetation at Oregon Caves National Monument and the monument's proposed expansion area. The work was done by staff at Southern Oregon University and has been completed. The Klamath Network's Inventory and Monitoring Program coordinated the effort.

A key component of the inventory is the classification of the vegetation at Oregon Caves. The classification is based on extensive field sampling that identifies each plant and its abundance in the plant community. The classification groups vegetation types having similar species composition, creating a language for communicating about the vegetation.

A map of the vegetation is also produced as part of the inventory process. Whereas a traditional vegetation map would assign a single class to each map unit, the vegetation inventories overseen by the Klamath Network are encoding more detailed floristic information from the classification, as well as information on disturbances. This helps accomplish an important goal of the inventory: it needs to serve multidisciplinary research and management applications and accommodate diverse and unforeseen user needs. Some of the uses of the vegetation inventory that can be foreseen are:

Wetland vegetation near Bigelow Lake in Oregon Caves National Monument.

- To describe the variety of vegetation occupying an area
- To characterize the effects of disturbances and management on the vegetation
- To assess risks for invasive species, fire and plant diseases (a particularly virulent, non-native plant disease, Port-Orford Cedar root rot is a major management concern at Oregon Caves)
- To assess resource conditions and how they might be managed to the betterment of NPS goals

There are also important uses of the inventory that are more specific to Oregon Caves National Monument. The inventory captures the vegetation of the entire watershed feeding the the caves. The vegetation of this watershed affects the groundwater recharge that feeds the underground stream system that formed the caves and continues to shape them. Much of the land in this watershed was clear cut in the Pacific Northwest logging boom of the 1960s through 1980s. The vegetation inventory captures this historic management, which may have led to increased groundwater due to the removal of great numbers of extremely large trees. The inventory may be particularly useful to developing restoration measures to help place the plantations on a successional trajectory that will, over time, bring them closer to the natural vegetation in terms of structure, function and composition. The vegetation inventory will also help with the development of interpretive materials allowing the public to better understand the impacts of the historic land uses in the Oregon Caves Watershed.

2013 Vegetation Monitoring: Crater Lake NP and Oregon Caves NM

by Sean Smith

Vegetation plot baseline in supalpine vegetation at Lassen Volcanic National Park.

We are poised and excited to implement our third season of monitoring vegetation composition, structure and function in the Klamath Network Parks. The past two seasons of monumenting plots and data collection have been adventuresome to say the least: we have blown out boots on the a'a' lava at Lava Beds, battled the dense understory at Redwood, savored poison oak blisters at Whiskeytown, and dodged forest fires at Lassen Volcanic. Despite the rigors, we are getting the work done as safely and efficiently as we can with smiling happy faces…most of the time. What ecological wonders and elements of landscape brilliance await us this year at Oregon Caves and Crater Lake? Only time spent with boots on the ground will tell. Our goals are simple: monument and collect data at 10 matrix plots and one riparian plot at Oregon caves, and monument and sample 20 matrix, 20 riparian, and 20 high elevation plots at Crater Lake. Matrix plots are randomly placed plots in the park landscape that are not at high elevations (>2057 m (6750 ft)) or within 100 m of a stream.

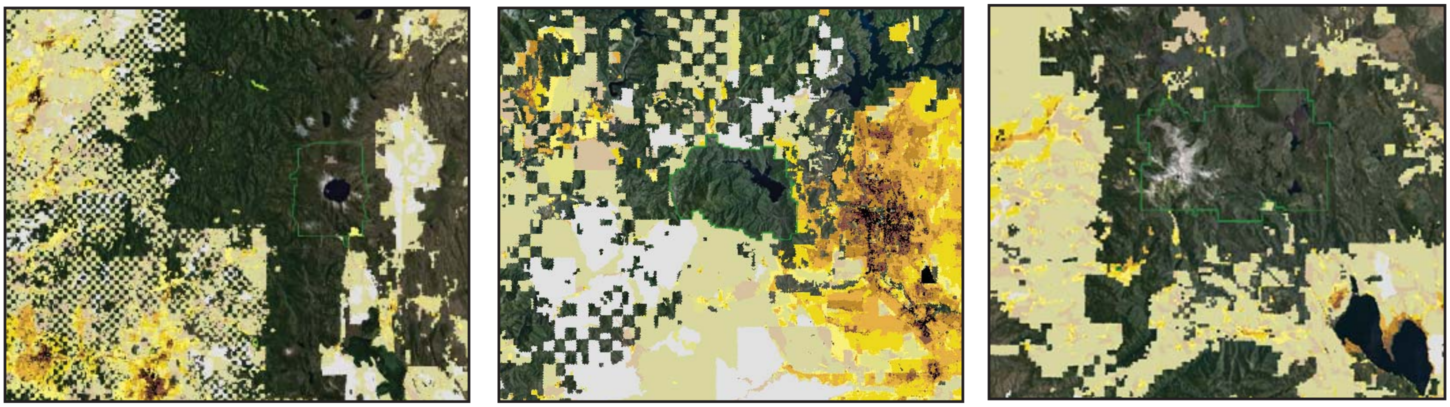
Example of riparian vegetation in Lassen Volcanic National Park.

The vegetation monitoring sites, when possible, are co-located with sample sites from other monitoring protocols. For instance, at Crater Lake, matrix sites are to be co-located with bird monitoring sites; riparian sites are to be co-located with stream monitoring sites, and high elevation sites are co-located with whitebark pine monitoring sites. Co-location allows us to explore relationships between differing ecological entities occurring in the same landscape space. With two years of monitoring under our belts, and one returning crew member, we feel well prepared and are optimistic we will reach our 2013 goals.

Land Use/Land Cover Monitoring

Reports Coming Soon to a Park Near You!

by Lorin Groshong



2010 housing density in the landscapes around Crater Lake NP (left), Whiskeytown NRA (middle), and Lassen Volcanic NP (right). Lighter yellow represents lower densities and dark yellow to brown represents higher density. Images from: NPScape Landscape Dynamics Metric Viewer at http://sciencenature.nps.gov/im/monitor/npscape/viewer/.

The first set of external reviews has been completed on the Klamath Network's Land Use/Land Cover (LULC) Monitoring Protocol. Further revisions to the protocol document are underway and a revised version is expected to be complete this fall. In order to facilitate the protocol revision and provide examples to put into the document, we are simultaneously preparing a set of reports for each of our six parks. As a result, once the protocol is approved, it will not take long to finalize the reports and send them to the parks for review.

These Land Use and Land Cover reports will contain the following information in map, chart and graph formats:

Land Cover (Anderson I and Anderson II level classifications)

Source: National Land Cover Dataset 2001, 2006, and 2011

- **Area / Category (ex: 50 km2 coniferous forest within park boundary)**
- % of total area / category (example: 15% of total land cover is coniferous forest within park boundary)
- Change in area and percent area of each category from 2001 to 2006 and 2006 to 2011
- Amount of impervious surface and its change over time

Pattern Metrics

- Patch sizes of each land cover category (2001, 2006, 2011)
- Amount of edge and core habitat within each category (2001, 2006, 2011)
- Changes in these metrics from 2001 to 2006 and 2006 to 2011

Roads

- Road density (all roads and major roads, 2003 and 2011)
- Amount of area without roads (areas >500m from all roads and just major roads)
- Changes in road density and pattern from 2003 to 2011

Land Ownership and Management/ Conservation Status

- Land owners within a 30km radius surrounding each park
- Land owners within park-defined regions of interest
- % of land owned by particular land owners within these regions
- Conservation Status rating based on land management plans submitted by land owners
- Amount of area considered "protected" within each region
- Change in "protected" area over time

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Student Internships Create Opportunities

by Daniel Sarr

In 2012, the Klamath Network launched a campuswide competition at Southern Oregon University for two natural resource interns. Working with Drs. Michael Parker and Charles Lane, we selected Kasey Graue and Kelton Shockey. Both Kelton and Kasey proved to be terrific assets to our program. Kasey (pictured below) was embedded with the Whitebark Pine monitoring crew led by Dr. Erik Jules of Humboldt State University at Crater Lake NP. Before hitting the field, Kasey also helped in the office with several Featured Creatures last summer.

Kelton was primarily embedded with our NPS-staffed streams monitoring crew at Whiskeytown NRA and Lassen Volcanic NP. He also did a short stint with the NPS-staffed vegetation monitoring crew, where he helped with season-end sampling at Lassen Volcanic. Kelton used his NPS experience as his senior capstone project, for which he analyzed aquatic integrity data for Lassen Volcanic and Whiskeytown. Kelton presented his research and learning experiences at the Southern Oregon Arts and Research conference at Southern Oregon University in May 2013.

Left to Right: Whitebark pine crew David McClean, April Sahara, Rachael Patten of Humboldt State University, and Southern Oregon University Intern Kasey Graue. All are students or recent graduates.

The interns proved to be a great resource for the I&M program's field efforts while providing terrific experience for these students. In 2013, the I&M Program is expanding these efforts by including interns in most of our projects. We will be hiring two interns to help with Geographic Information System analyses in the completion of out Land Cover and Land Use Protocol, one intern to assist with vegetation mapping at Crater Lake NP, another to assist with vegetation monitoring at Crater Lake and Oregon Caves NM, and one to assist with invertebrate study at Oregon Caves. We are in the selection process now, and it will be exciting to meet the newest group of worker/scholars.

Land Use/Land Cover Monitoring (continued from p. 6)

Population and Housing Density

Source: United States Census 1790 – 2010 by decade

- Population totals and densities by census block within a 30km radius surrounding each park
- Housing densities within a 30km radius surrounding each park
- Population and housing densities within park-defined regions of interest
- Recent changes in population and housing densities (2000-2010)
- Historical changes in population and housing densities (1940-2000)
- Projected changes in population and housing densities (2010-2100)

Disturbance

- Fire: area burned per year, cause of fires
- Insect: number of individuals (plants/trees) obviously infested per year, insect type
- Disease: number of individuals obviously infected per year, disease type
- Changes over time for all metrics

When completed, the reports should provide the first ever set of standardized and comparable summaries of land cover change for all our parks. The work should help us better understand the changing conditions and to more effectively engage in regional conservation.

Where We'll Be This Summer

Inventories		
Vegetation Mapping	CRLA, LABE	• Accuracy assessment fieldwork at Lava Beds in June • Accuracy assessment field work at Crater lake in July and August
Monitoring		
Intertidal	REDW	• Sampling will occur at Redwood in June and again in December
Invasive Species Early Detection	All KLMN Parks	• We plan to start at Whiskeytown in May, move to Lava Beds, Redwood, and Oregon Caves in June, and Crater Lake and Lassen Volcanic in July and August.
Vegetation	All KLMN Parks	• We plan to start in late June in Oregon Caves, moving to Crater Lake for July through early September.
Landbirds	All KLMN Parks	• The Klamath Bird Observatory crews plan to conduct point count sampling in June through July at Oregon Caves and Crater Lake.
Water Quality and Aquatic Communities - Lakes	CRLA, LAVO, ORCA, REDW	• The lakes crew will be at Lassen in mid-July, moving to Crater Lake in late August, wrapping up in Redwood in September.
Whitebark Pine	CRLA, LAVO	• This work will begin in mid-July at Crater Lake for training, with a second crew moving to Lassen Volcanic in late July. Work should be completed by the end of August.
Land Cover/Land Use	All KLMN Parks	• This work will occur primarily at the network office in Ashland, but the GIS Specialist will be working with all the parks throughout the summer to complete their specific reports (see article by Lorin Groshong in this issue).
Caves	LABE, ORCA	• Fieldwork will begin at Lava Beds and Oregon Caves in late June or July, concluding by September.