



The Klamath Kaleidoscope

Thinking like a Watershed in the Klamath Network

By Daniel Sarr, Klamath Network

Each winter, rains and snows wet the higher terrain of the Klamath Network. Heeding gravity, waters gather and along the way carry nutrients and sediment to feed springs, streams, rivers, estuaries, and the sea. Other streams rise upward, through trees, shrubs, and herbs, trading water for carbon in leaf stomata to build habitat, feed insects, and fuel the journeys of neotropical birds. Leaves fall, feeding stoneflies and earthworms. Cycles renew. Salmon and lamprey climb rivers to return the sea's wealth to osprey and eagles. Birds return with tropical carbon in their wings. Ecosystems are as much about connection and flow as they are about the elements comprising them.

The National Park Service celebrates ecosystems in many ways, with a mandate to preserve nature and enjoyment, and to educate the people of our country. Despite this interdisciplinary mandate, boundaries to our thoughts and daily actions arise without notice. Scientists write papers for scientists, often with terminology specific to their own disciplinary niche. With some effort, these technical documents can be made interpretable to other natural resource professionals, and to other park staff and the public. Managers, in turn, speak a unique language, with an inordinate number of acronyms, that can be impossible to penetrate without assistance. These disciplinary silos occur in all agencies or organizations with varied roles and cultures. Whenever agencies are called to collaborate, whether it be to solve a financial or conservation crisis, a true Tower of Babel situation arises. Collaborative environmental management might be equally well described by the Winston Churchill quip about Russia: "It is a riddle wrapped in a mystery inside an enigma. . ." It is perhaps not a coincidence that Russia (or the Soviet Union at that time) had more than a few bureaucracies of its own!

Major environmental crises like climate change bridge nearly all our fields of endeavor and ask for transdisciplinary understanding. Political pressures and human impulses affect the most fundamental and rigorous aspects of ecosystem and conservation science. Variable climate data and varied ecological responses confound efforts to educate the public and to prepare and adapt. The changes unleashed in physical processes and biological distributions leap administrative and ecoregional boundaries. We cannot address such problems as a splintered team and with myopic thinking.

Here in the Klamath Network and Region, we enjoy living in one of the richest ecological landscapes in North America, a region of uncommon natural and cultural heritage. The challenge has never been greater to both view our mission broadly and to collaborate with our fellow government agencies as well as state, private, and nonprofit partners to study and communicate the threats to our ecosystems and to communicate their gravity to the visiting public.

The Klamath Network Inventory and Monitoring Program will be undertaking its Three Year Programmatic Review in July. At this time, we will be assessing what we are, where we've been, and what we would like to be as a network science program. Our modest program can only address a fraction of the many needs for science and education in park ecosystems, but this is a good time to begin thinking about what a collaborative science team for the Klamath Region might look like. Like a mighty river at its best, my hope is that these challenging times will entrain the interests and capacities of the many interested partners in our network and region and reshape them into a more collaborative landscape for conservation.



National Park Service
U.S. Department of the Interior

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.

Wetlands in the Klamath Network

By Sarah Finstad, Southern Oregon University

People familiar with the region encompassing the Klamath Network parks know that it is a diverse assemblage of geologic features, microclimates, and living communities. It should come as no surprise that within these six units can also be found an amazing variety of wetland types and conditions. Wetlands are unique landscape features that occur in great diversity within the Klamath Network, from coastal dune ponds at Redwood National and State Parks to acid geothermal fens at Lassen Volcanic National Park. They provide important habitat and serve other key functions within the watershed and surrounding ecosystems, but a variety of human activities have led to the damage and destruction of wetlands in our region and elsewhere.

Wetlands are crucial components of functioning, healthy watersheds and because they serve many functions that regulate the quality, quantity, and flow of available fresh water, wetlands are of special importance in the drought-prone West. Wetlands in California and Oregon, like many other regions, have been altered and significantly reduced below historic distribution, meaning that remaining wetlands are especially important and vulnerable. As wetlands have become rarer, so too have the species that depend on them. Since living conditions found in wetlands are unique and often harsh, species living there tend to be specialized to thrive within narrow environmental requirements. Many species that rely on wetlands for part of their life cycle are now listed as threatened or endangered by state and federal agencies.

“Wetlands in the Klamath Network” is a collaborative project between Southern Oregon University, the National Park Service’s Inventory and Monitoring Program, and Interpretive staff at the six parks. It was written as a guide for interpretive staff working in the Klamath Network, to provide them with the necessary resources to include wetlands in their educational and interpretive programs. Ideally, the information in this guide will also be useful for local educators and interested members of the public, and will include background information such as general ecology, history, management and regulation, as well as information specific to each park in the Network.



A field crew member walking through a wetland area at Lassen Volcanic National Park.

Cave Monitoring at Lava Beds and Oregon Caves

By Shawn Thomas, Lava Beds National Monument

The Klamath Network held a vital signs selection process in 2004, which resulted in Cave Environments and Cave Entrance Communities being chosen as two of the top 10 vital signs to monitor in the Network. Lava Beds National Monument and Oregon Caves National Monument are the two units in the Network that contain significant cave resources, so development and implementation of a cave monitoring program focused on these parks. In 2008, scoping meetings occurred between Network staff, park staff, and cave experts from Zara Environmental LLC. Ultimately, eight cave parameters were selected for monitoring: 1) cave meteorology, 2) ice and water levels, 3) dust and lint accumulation, 4) human visitation, 5) cave entrance vegetation, 6) bat populations, 7) scat and visible organics deposition, and 8) cave invertebrates. For each of these parameters, a draft standard operating procedure (SOP) was developed by Zara and submitted for comments and testing.

During January through March of 2010, a pilot study was conducted to evaluate the operational feasibility of the field methods and appropriateness of equipment, and to gain a better understanding of the type and variability of the data collected. Each of the SOPs was implemented during the pilot study or evaluated based on past park monitoring and current procedures in place at the parks. The pilot study determined that one of the parameters (dust and lint) should be excluded from the protocol, due to lack of effective monitoring methods, whereas the seven remaining parameters can be monitored as part of the protocol. With input from the pilot study, some of the monitoring procedures were modified to increase efficiency and reflect conditions unique to Lava Beds and Oregon Caves. An updated protocol was produced by Zara Environmental, LLC and submitted for peer review in July 2010.



With approval of the protocol, monitoring will be implemented in Oregon Cave and Blind Leads Cave at Oregon Caves National Monument and in 31 caves at Lava Beds National Monument. Oregon Cave contains a developed tour route, though much of the cave remains wild and undeveloped. Blind Leads Cave is a small, undeveloped cave located along a nature trail in the park.

Thirty one caves at Lava Beds, containing a diverse assemblage of resources, were selected for monitoring; these caves fall along a spectrum of heavily visited to sparsely visited caves. Also within the set of 31 caves are caves known to contain hibernating bat populations during the winter and caves known to contain year-round ice resources.

The initiation of cave monitoring at Lava Beds and Oregon Caves is a great opportunity to detect long-term trends in physical processes and biological communities. Additionally, conducting monitoring of multiple parameters at shared sites may reveal patterns and relationships among the parameters, which could greatly contribute to understanding caves as an integrated system. Ultimately, cave monitoring will help inform management decisions and guide actions promoting cave conservation and sustainable use.

From top to bottom
(all photos by Shawn Thomas):

At Lava Beds National Monument:

Galen Wangberg assisting with ice level monitoring in the Red Ice Room of Crystal Ice Cave.

Abby Tobin conducting cave invertebrate monitoring in Valentine Cave.

At Oregon Caves National Monument:

Vegetation will be monitored at cave entrances, including the main entrance of Oregon Cave.

Soda Straws in Oregon Cave.

An Irish Ecologist Visits the Redwoods

By Daniel Sarr, Klamath Network

In early May, Dr. Caroline Sullivan arrived from the wet, windy wilds of West Ireland to study forest dynamics in the Little Bald Hills of Redwood National and State Parks. Dr. Sullivan, who will spend a year working closely with Drs. Erik Jules and Morgan Varner of Humboldt State University to learn about forest ecology and silviculture in the western U.S., completed her doctoral studies at the National University of Ireland in 2009, studying High Nature Value Farmland in the West of Ireland. Her dissertation project, completed under the guidance of Drs. Micheline Sheehy Skeffington and Michael Gormally at NUI, aimed to refine land classification systems in the region to help Rural Environmental Protection Scheme planners identify what types of grasslands occur on farmland in Ireland.

At Redwood, Dr. Sullivan's project will explore the spatial and temporal dynamics of the Douglas fir forests and woodlands of the Little Bald Hills. It will complement work by HSU student April Sahara, which has evaluated forest dynamics and landcover change in the Jeffrey pine forests of the Hills. Both projects are funded with partial funding by the Klamath Network Inventory and Monitoring Program, Redwood National Park, and the Irish-American Fulbright Commission. Leonel Arguello and I have worked closely with Drs. Jules and Varner to together outline the project and facilitate the exchange. We hope you will make Caroline and her partner Barry Kearns welcome during their stay on the North Coast, and hopefully on other visits to the parks of the Klamath Network.



Klamath Network Recent Events and Upcoming Highlights

January

- Submitted final 2010 work plan

February

- Attended the Klamath Basin Science Conference
- Held the Land Cover and Land Use Scoping Meeting
- Held the KLMN Strategic Interpretive Plan Meeting

March

- Sean Mohren attended Leadership Training
- Finalized the KLMN climate change pages for park interpreters

April

- Hosted the KLMN Climate Friendly Parks meeting
- Lorin Groshong attended the I&M Data Management Conference

May

- Submitted KLMN Streams Monitoring Protocol
- Started Vegetation Monitoring and Mapping field work at Lava Beds and Oregon Caves
- Caroline Sullivan, Fulbright scholar, started her research fellowship at Redwood

June

- Daniel Sarr gave a presentation on climate change to park staff at Crater Lake
- Sean Mohren and Daniel Sarr attended the Lava Beds Resource Stewardship Strategy meeting
- Started Streams Monitoring field work at Lassen Volcanic

July

- Finalized the approved KLMN Invasive Species Early Detection Protocol
- Submitted the draft KLMN Integrated Caves Monitoring Protocol
- Held the KLMN Programmatic Three Year Review

Upcoming

- Daniel Sarr presenting an Invasive Species Early Detection poster the Ecological Society of America conference
- Revising the Vegetation Monitoring Protocol for approval
- Revising the Lakes Monitoring Protocol for approval
- Collaborating on the Whitebark Pine Monitoring Protocol with other I&M networks
- Submitting the draft Land Cover and Land Use Monitoring Protocol
- Finishing a wetlands interpretive project with SOU graduate student, Sarah Finstad
- Working with an SOU graduate student on a water quality interpretive project
- Writing the 2010 KLMN Annual Administrative Report
- Wrapping up projects with Redwood and Humboldt State University graduate students in the Little Bald Hills

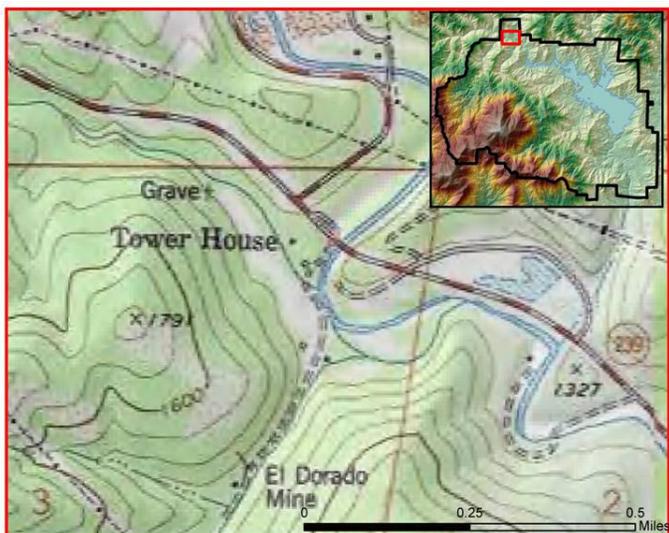
Cultural Resources, Servers, and GIS Data Standards, Oh My! *Creating a User-friendly GIS Project for the Tower House Historic District in Whiskeytown National Recreation Area*

By Lorin Groshong, Southern Oregon University

Last July, I was asked to, with the assistance of the Klamath Network, help Whiskeytown National Recreation Area (WHIS) with their data on the Tower House Historical District. They wanted to integrate their cultural resources data with other GIS data for the district and create a final product that would allow park managers to easily query and map these data.

The Tower House Historic District, listed on the National Register of Historic Places in 1973, encompasses 20 acres and includes 16 structures. Its two primary residents, Levi Tower and Charles Camden, contributed significant developments in commerce, transportation, agriculture, and industry in northern California for two decades following the discovery of gold in 1848. The district includes the Camden House, which has been preserved and stabilized; the tenant house, which is currently used as staff housing; a barn; outbuildings; a bridge; an extensive irrigation system; and the El Dorado Mine and Stamp Mill (NPS 1999).

Through several meetings at WHIS over 6 months, my trusty assistant (Ryan Reid, recent graduate of Southern Oregon University) and I gleaned the wants and needs of the managers and employees at the park. Frank Moreno, from buildings and grounds, gave us a tour of the district from his perspective and allowed us to GPS the locations of some previously unmapped utilities. Clinton Kane, Interpretive Ranger, also gave us a tour of the grounds, which included showing us some of the Camden family grave sites and the probable location of an unmapped fish pond that is only mentioned in diaries and manuscripts.



In between visits to the park, Ryan and I went through cultural resources GIS data provided by Joe Svinarich, Fire Archaeologist. We worked with Jay Flaming at the Pacific West Region office to incorporate his work with new NPS Cultural Resources GIS data standards. There were also a lot of non-GIS data that the park wanted linked to the GIS data in some way. In addition to all of this, there were multiple versions of base GIS data for the region (roads, vegetation, etc.) that needed to be sorted through by an expert. Russ Weatherbee (Wildlife Biologist) stepped up to the plate on that task, plus requested that a GIS server system be started up at WHIS to house park GIS information.

All of this was accomplished in the following ways:

1. A server for GIS data was moved from Redwood National Park to WHIS and the most current datasets were moved onto it. This allows all GIS data users to access the same GIS files, rather than having different versions in use on different computers.
2. The Cultural Resources GIS data that follow the new data standards are hosted on a regional server that WHIS can easily connect to through an ArcSDE connection. We put this data into an ArcMap project that is accessible from any computer at WHIS and the user does not need to know how to use SDE in order to view the datasets.
3. Ancillary data (hundreds of reports, historical photographs, and other scanned documents) are hyperlinked to their respective geographic features in the ArcMap project. This way, non-GIS documents can be opened from the GIS map window.
4. The final ArcMap project combines base data layers and the aforementioned data in one place so that users can accomplish most, if not all of the geographical tasks that might be required for the Tower House Historical District, including creating detailed basemaps of the region, querying locations of utilities relative to cultural resources, and observing changes to the region over time.

Literature Cited:

National Park Service 1999. General Management Plan and Environmental Impact Statement: Whiskeytown Unit, Shasta County, California. Whiskeytown Unit, Whiskeytown-Shasta-Trinity National Recreation Area, Pacific West Region, June 1999.

Map of the Towerhouse District at Whiskeytown National Recreation Area.

Stream Pilot Project and Protocol Submission

By Eric Dinger, Klamath Network

There has been so much going on at the Klamath Network that we're catching up on news from last fall!

Last August, a three person field crew started testing wadeable stream protocols based on Environmental Monitoring and Assessment Program (EMAP) of the US Environmental Protection Agency. These protocols include techniques for sampling the physical, riparian, chemical, and biological characteristics of the stream. The crew did a great job, led by Charles Stanley from Mississippi. The crew technicians were Travis "TJ" Albert and Mara Denny.

Trials to test feasibility included trying snorkel surveys instead of electrofishing for the vertebrate assemblages, as a more efficient alternative. However, when snorkeling was compared to electrofishing done in conjunction with David Anderson, Fisheries Biologist of Redwood National Park, it was found that electrofishing gave a more complete species list and afforded the crew the opportunity for more precise species identifications (it is understandably hard to identify a juvenile, shy salmonid as it swims away from you!). Based on these findings, the protocol was updated to make use of a four person crew, to allow electrofishing at all sites, come implementation.

Another finding was that stream survey work in steep terrain is exceedingly difficult and dangerous. Especially working in the Redwood forests, safely navigating the terrain dictated that we focus on streams with gradients under 15%. This helped ensure that the stream was safely sampled, plus had the added benefit of reducing natural variability in our sampling frame while still including the majority of the streams within this range.

In January, while we were still waiting to get the results of the macroinvertebrates from the contract laboratory, a deadline of June 1st, 2010 was given for protocol submission. With the lessons learned from the pilot project, and with a group effort, we were able to submit the protocol on the 21st of May. Daniel Sarr provided the leadership and guidance, Eric Dinger was the lead author, Sean Mohren took care of the Data Management portions (along with critical insights into all aspects of the protocol), Kathi Irvine helped with power analyses and statistical work, and Charles Stanley wrote and prepared many of the Standard Operating Procedures.

The draft protocol is available on the Network's Intranet site, at: http://www1.nrintra.nps.gov/im/units/klmn/monitor/mon_water_qualitycommunities_streams_protos.cfm

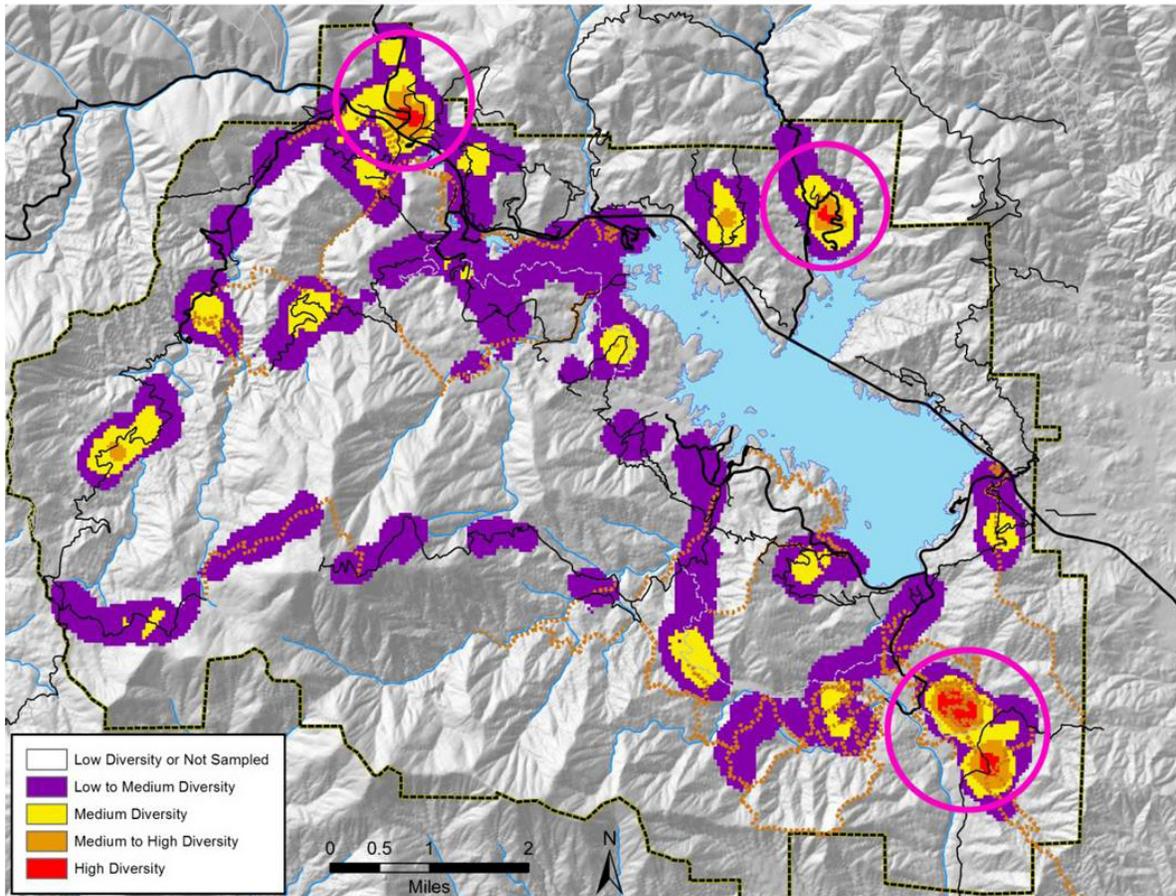
Currently under review, we hope to have the protocol finalized in time for spring 2011, when we plan on implementing the protocol at Whiskeytown, Lassen, and Oregon Caves.

Images (top to bottom): 1. Learning the difficulties of "swimming and snorkeling" (more like "crawling") in low flow streams. 2. Torrent Salamander (Rhyacotriton). 3. Charles Stanley (left) and Sean Smith (right) measuring stream habitat. 4. One of many logjams in the streams at Redwood that make stream surveys tricky work. 5. Left to right: Charles Stanley, Vicki Ozaki, and TJ Albert examining the diverse vertebrate assemble captured by electrofishing. Photos by the KLMN wadeable streams pilot project field crew.



Using Data to Improve Visitor Enjoyment

By Sean Mohren, Klamath Network



Locations of landbirds and species density from sampling efforts at Whiskeytown National Recreation Area.

One of the main goals of the Inventory and Monitoring program is to provide scientific information to the park managers, which will help ensure they have the knowledge needed to manage the lands that have been entrusted to them. The Klamath Network has been doing this over the last several years by developing and implementing our vital signs monitoring projects. However, lately I have been thinking about the NPS mission, which states that the NPS “preserves unimpaired the natural and cultural resources and values of the national park system for the enjoyment, education and inspiration of this and future generations.” I have been thinking more and more about how the Inventory and Monitoring program can meet the NPS objectives. Specifically, I was contemplating how our program affects the enjoyment and education of the visitors that come to the parks.

I began to think about our [Landbird Vital Signs Monitoring Project](#) and how we could use the data from this project to directly improve visitor enjoyment. In 2009, we sampled roads, trails, and power lines in Whiskeytown National Recreation Area for landbirds. We sampled a total of 30 routes and documented 110 species of birds. We completed a Hot Spot Analysis of the data to determine where along these routes you would have the best opportunity to see a diversity of landbirds. As you can see in the figure above, three general locations noted with pink circles had at least 13 and up to 18 species of landbirds. These locations are: 1) Trinity Mountain Road, 2) Whiskey Creek Road and Pioneer Drive, and 3) a complex of roads and trails in the southeastern part of the park (Mule Town Road, Mount Shasta Mine Loop Trail, Buck Hollow Trail, and Salt Creek Trail). Of course as an ecologist, I must provide the warning that species move around and what was here one year may be gone the next. As part of our monitoring effort, we will revisit these same sites once every three years. Over time, we will be able to determine which areas have consistently high landbird diversity.

So if you are in the mood for some great birding, but have little time to spend at the park, make sure you check out these areas for your best chance to see a variety of birds!!