



# The Klamath Kaleidoscope

## *Adventures of the Furious Five...OK...Six - Klamath Network Activities in 2009*

In the ancient times...er, wait...

In the not-so-ancient times, in the supremely legendary Klamath region, the Klamath Network's skilled warriors embarked on a battle to complete many protocols, the legendary stuff...of...of legend!

In 2009, the Klamath Inventory and Monitoring Network had an enjoyable but very writing-intensive year. Currently, we are in various stages of protocol completion for many of our vital signs. We implemented and successfully completed our first season of invasive species monitoring this summer and our corresponding Invasive Species Early Detection Protocol was provisionally approved this fall. A Landbird Protocol has also been reviewed, revised, and will be resubmitted for approval this fall. The Vegetation Communities Protocol was submitted in early summer, reviewed promptly, and is under revision for resubmission this winter. The Water Quality and Aquatic Communities-Lakes Protocol is nearly ready for initial submission in early December. In addition, we have completed or plan to soon conduct pilot studies for Integrative Cave, Whitebark Pine, Water Quality, and Aquatic Communities-Streams Protocols.

In addition to vital signs protocol development, the I&M Program was involved in a number of inventory, outreach, and research projects this year. The Klamath Network and Drs. Dennis Odion and Greg Jones of Southern Oregon University began field work for vegetation mapping at Oregon Caves in summer 2009 and provided field support for continued mapping work at Lassen Volcanic. Sarah McCullough and Dr. Ken Tate of UC

Davis worked with the Klamath Network and Lassen Volcanic park personnel to investigate the status of aspen at the park; this work composed Sarah's Master's Thesis and we are developing manuscripts for publication. Rebecca Slosberg, a graduate student at Southern Oregon University working with Dr. Stewart Janes, developed a climate change web site for the Klamath Network interpretive staff, describing specific issues for each park and discussing how I&M efforts will increase our understanding in this important sphere of knowledge. The Klamath Network worked with our first McNair Scholar from Southern Oregon University on a project to evaluate the perceptions of visitors to Crater Lake National Park. Althea Godfrey, working under the guidance of Dr. Mark Shibley, surveyed visitors to CRLA to determine why they choose to visit national parks. She conducted the field research in summer 2009 and she will be completing her senior thesis this winter.

If it was hard to follow these paragraphs, you're getting a feeling for this year in the Klamath Network I&M Office! But, like the 10,000 demons of Demon Mountain, these tasks were no match for the Six's zeal and unmatched bodacity. Who is this sextet of warriors? Well, none other than I&M kung-fu masters Sean "Po" Mohren, Bess "Tigress" Perry, Eric "Mantis" Dinger, and Sean "Viper" Smith of the Klamath Network and Dennis "Monkey" Odion and Lorin "Crane" Groshong of Southern Oregon University. They have been a joy to train and to work with...except I kept getting blinded by their sheer awesomeness!

Respectfully submitted,  
*Daniel "Shifu" Sarr*  
Klamath Network



*Our heros, in magnificent action pose  
(click for video link...on non-federal computers)*



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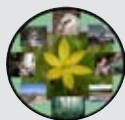
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The National Park Service cares for the special places saved by the American people so that all may experience our heritage.



*Mara Denny testing the Klamath Network Streams Monitoring Protocol at Redwood National Park. Photo by Eric Dinger.*

## *Klamath Network Recent Events and Upcoming Highlights*

### ~ June 2009

Implemented the first year of invasives monitoring at Redwood

### ~ July 2009

Submitted FY09 task agreements and modifications

Sean Mohren attended NPS Fundamentals II

Implemented second year of landbird monitoring at Whiskeytown

Implemented vegetation mapping at Oregon Caves

Implemented streams monitoring pilot study at Redwood

Implemented vegetation mapping (phase II) at Lassen Volcanic and Redwood

### ~ August 2009

Daniel Sarr attended Ecological Society of America conference

Lorin Groshong started Whiskeytown cultural resources and GIS data projects

Implemented whitebark pine pilot study

Hosted Klamath SHRO (Servicing Human Resources Office) meeting

### ~ September 2009

Sean Mohren attended Wildlife Society conference

Published Intranet climate change pages for NPS interpreters

Completed Klamath Network Climate Assessment project

Completed draft mapbooks for all six parks

### ~ October 2009

Submitted Klamath Network FY2009 Annual Administrative Report

Submitted Data Mining Final Report

### ~ November 2009

Received project annual reports

Held an interagency collaborative science meeting on climate change

### ~ Winter 2009

Submit Klamath Network FY2010 Annual Work Plan

Host caves monitoring meeting

Host PWR Administrative meeting

Board of Directors meeting

Land Use / Land Cover scoping meeting

Submit Klamath Network Annual Work Plan

Submit draft protocols for the Lakes and Caves Vital Signs

Submit final protocols for the Landbird, Vegetation, and Invasives Vital Signs



# Who's in the Woods?

By *Althea Godfrey*  
*Southern Oregon University McNair Scholar*



*Althea Godfrey.*  
<http://www.sou.edu/mcnair/scholars/godfrey.html>

Environmental issues have been increasingly newsworthy over the last two decades. Education programs have proliferated. Non-profits have made pleas for funding and protection for endangered landscapes and creatures. In the same two decades, nature-based recreation declined. Studies demonstrated a 97.5 percent correlation between the decline in national park unit visitation and the increase in use of technology and gas prices (Pergams and Zaradic 2006). Children, the next generation of visitors and supporters, spend much less time outside than their parents did as children (Louv 2006).

Funded by the Southern Oregon University's McNair Post-Baccalaureate Achievement Program and the National Park Service's Klamath Inventory and Monitoring Network, I conducted a survey with visitors to Crater Lake National Park during the summer of 2009 to examine possible explanations. My survey explored feelings, values, and perceptions about Crater Lake National Park, being in nature, and environmental protection, along with video game habits and vacation preferences.

In my survey sample, childhood experience in nature was associated with continued commitment to nature. A majority reported multiple exposures to nature as a child and that they continued to choose nature over technology in many ways. They camped in tents, stayed longer, took most of their vacations in natural spaces, and were unperturbed by the loss of electronic entertainment during park visits. It is not as clear that early exposure inspired active/activist support for the environment. The legacy of early exposure appeared personal, something they reproduced at home with gardens and on nature-based vacations.

Possibly, mentorship is playing an under-recognized role in creating definitions and attitudes. This is important to realize, as park rangers and interpretive guides may be the link in reconnecting the public with nature. Even with this small sample, I still have a rich dataset to explore, along with survey results from other locations such as nature centers and urban zoos, something I hope to explore further in graduate school. I see social research as increasingly relevant to improving future environmental conditions.

Louv, R. 2006. *Last Child in the Woods*. Algonquin Books. New York.

Pergams, O. R. W., and P. A. Zaradic. 2006. Is love of nature in the US becoming love of electronic media? 16-year downward trend in national park visits explained by watching movies, playing video games, internet use and oil prices. *Journal of Environmental Management* 80: 387-393.



*From left to right: A visitor entering Crater Lake National Park, wildlife at the park, and visitors enjoying a boat ride on the lake.*



## *The First Report of a Gilled Mushroom Fruiting Underwater* By Jonathan Frank, Southern Oregon University

The Rogue River, along the flanks of Mt. Mazama near Crater Lake National Park in southern Oregon, churns over volcanic cascades and supports a new species of gilled mushroom with the novel ability to form fruiting bodies on the bottom of the river! It grows completely submerged under cold clear water up to 20 inches deep. The new mushroom, *Psathyrella aquatica*, belongs to a large group of common "little brown mushrooms" in a genus that is often overlooked and understudied, especially in Oregon. This unusual mushroom was first noticed in 2005, by Robert Coffan, a hydrologist who was relaxing with his wife along the river. In 2007, Coffan saw the underwater mushrooms again and contacted Darlene Southworth, emeritus professor of



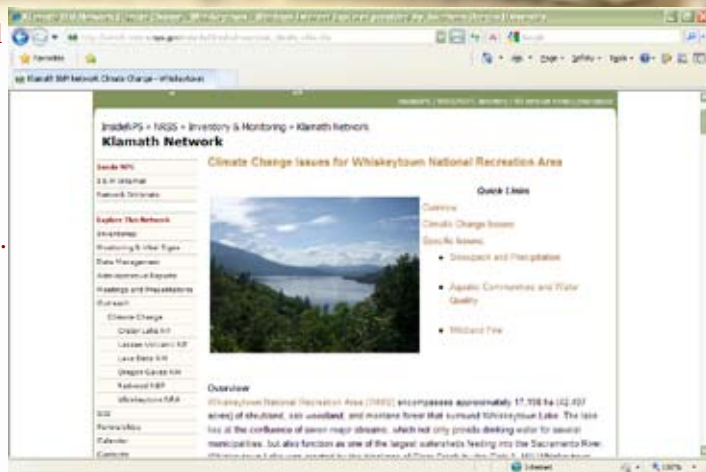
biology at Southern Oregon University. At the time, Southworth had a National Science Foundation research grant to study fungal ecology and I was working with her, sequencing DNA in the SOU biotechnology center. Together the three of us wrote a paper that has been accepted for publication in the journal *Mycologia* (January 2010). The paper describes the new mushroom species with its long whitish stipe covered with tiny fibrils, brown to grey bell-shaped cap, and numerous microscopic characters. The unusual aquatic habitat provides enough oxygen for respiration. The mushroom often has gas bubbles adorning the stipe and cap and a large gas pocket underneath the cap. Future research will establish the range of this species and reveal more about its curious fruiting habit.

*Psathyrella aquatica* in the Rogue River

## *New Resource for Interpreters on Climate Change Research* By Rebecca Slosberg, Southern Oregon University

This fall, a climate change Intranet site was completed for park interpreters to use in their research on climate change topics for the public. The site provides Klamath Network park interpreters information on scientific research relating to climate change issues within each park. As interpreters prepare programs for the public, it is important that they have easy access to the latest and most accurate scientific research. The web site distills and organizes the extensive information about Klamath Network inventory and monitoring projects by park and topic (e.g., invasive species, cave ice, birds, etc.). While many of the projects have not been running long enough to discern climatic changes, the baseline data are crucial for future assessment and enhance science communication opportunities with our parks' visitors.

This project was completed as partial fulfillment of a master's degree in Environmental Education. Having been a park interpreter myself, I was aware of the need for interpreters to have access to current scientific research. I hope this web site succeeds in being a useful tool for park staff. Communicating about big topics like climate change to the public can be daunting, but this site should give interpreters a good start in providing quality programs.



*A sample of Whiskeytown's climate change page on the Klamath Network Intranet site.*

[http://www1.nrintra.nps.gov/im/units/klmn/outreach/out\\_climate.cfm](http://www1.nrintra.nps.gov/im/units/klmn/outreach/out_climate.cfm) (NPS only)



# Towards a Better Understanding of Vegetation and Flora of Lassen Volcanic and Oregon Caves

By Dennis Odion, Southern Oregon University

The Klamath Network has been busy with formal studies to understand and map the current vegetation at Lassen Volcanic and Oregon Caves. The Network hired Dr. Ayzik Solomeshch of UC Davis, and Kristi Mergenthaler of Southern Oregon University, both with extensive botanical experience, to lead the sampling. The work completed in summer 2009 provided a number of significant highlights:

At Lassen Volcanic National Park, 170 plots were sampled over much of the park. The purpose of sampling was to thoroughly inventory the vegetation and flora and to build a vegetation classification that summarizes the complexity in plant life in relation to the underlying environment. Several rare plant community types were found, including vernal pools. Vernal pools (specialized seasonal wetlands with a high percentage of unique species) in California have high conservation priority. Pools that were described in Lassen Volcanic represent a high elevation form of these ecosystems, diversity of which has been little investigated. Although the park has been sampled by many botanists, and has a species list considered mostly complete (new species are seldom found), several new species of plants were found in the park. These included a particularly significant rare plant, the federally listed species of Indian

paintbrush, *Castilleja campestris* ssp. *succulenta*, which occurs north of Manzanita Lake. The population of this rare species appears robust and healthy.

At Oregon Caves National Monument, the vegetation and flora are much less known, especially in the proposed expansion area. A total of 90 plots were sampled throughout the park and expansion area. Over 100 species were found that had not been documented. Coincidentally, as at Lassen Volcanic, the biggest highlight may have been the discovery of an unusual Indian paintbrush. Unlike Lassen Volcanic, however, only one plant was found, making it difficult to collect material to confirm the identification. This will have to be resolved in the future. There were also two rare plants found, the Klamath gentian (*Gentiana plurisetosa*) and California globe mallow (*Iliamna latibracteata*). A far western outpost for aspen in the Klamath region was also found.

Additional sampling will be undertaken in both parks in 2010, which will help resolve uncertainties left from 2009, but also possibly raise new ones. A sentiment of all who have been involved in this work has been deep appreciation for the exceptional botanical resources of both Lassen Volcanic and Oregon Caves!



Clockwise from top left: Thomas Hender on a transect at Lassen Volcanic, Cody Williams mapping vegetation at Lassen Volcanic, Klamath gentian (*Gentiana plurisetosa*) at Oregon Caves, and Lorin Groshong (left) and Thomas Hender (right) mapping Oregon Cave's vegetation. Photos by Kristi Mergenthaler.



# *A Modest Update on Amphibian Declines, Part II*

*By Eric Dinger, Klamath Network*

In the last Klamath Kaleidoscope, I attempted to shine some light on the causes of amphibian (and reptile) declines not related to diseases. This list continues implicated causes, but in a positive light also gives suggested mitigation measures.

✧ **Herbicides, pesticides and nutrients** – Limit use and look for less harmful products to minimize impacts. Importantly, follow label instructions; many agencies may be illegally applying approved products to waterways and breeding habitats without knowing.

✧ **Livestock grazing** – Improper grazing practices can result in erosion, reduced water quality, reduced riparian zones, and impacts to the foodbase (for example, aquatic invertebrates). However, certain amphibians can do well in grazed areas (for example, Pacific Pond Turtles, Oregon Spotted Frogs, and Western Toads), possibly because the grazing creates habitats more suited to these species (for example, grazing opens up vegetation, creating basking areas). Managers should consider: Controlling livestock access to wetlands and streams; establish alternate water sources (e.g., water troughs); Minimizing spring development, using shut-off valves to minimize water extraction; Allowing refuge areas that are un- or minimally grazed; and Providing buffer zones.

✧ **Timber harvest** – Loss of canopy cover in Northwest forests creates drier conditions, with greater variability, negatively affecting amphibians (but possibly positively creating better conditions for reptiles). Managers can limit new road construction and maintain existing roads to limit new erosion. Use newer timber techniques to minimize ground compaction (e.g., harvesters and cable systems).



*Pacific tree frog at Crater Lake. Photo by Andy Duff.*

✧ **Mining, oil, and gas exploration** – Buffer waterways, ponds, and lakes from activities and infrastructure. Discourage the use of tailing ponds.

✧ **Exploitation (collection and indiscriminate killings)** – The pet trade and killings of snakes (both venomous and non-venomous) by the public has threatened many endangered species. The collection of amphibians and reptiles is usually regulated by states; these regulations should be enforced.

Education about amphibians and reptiles will also help minimize the collection and killing of specimens.

✧ **Non-native and invasive species** – Invasive plants and animals can affect native biodiversity, amphibians included, in a multitude of pathways. Managers can remove or eradicate non-natives where possible, adopt prevention policies to avoid new infestations, and avoid plantings (for example, non-native trout stockings) where and when possible.

This covers the some of the non-disease causes of amphibian declines. And as always, climate change will be a contributing factor to continued threats against native biodiversity. This summary has relied heavily on this excellent publication (and is recommended for further reading):

Partners in Amphibian and Reptile Conservation (PARC), Pilliod, D. S., and E. Wind. (editors). 2008. Habitat management guidelines for amphibian and reptiles of the Northwestern United States and Western Canada. Partners in Amphibian and Reptile Conservation, Technical Publication HMG-4, Birmingham, AL.



## *Invasive Species Monitoring: Season One*

*By Sean Smith, Klamath Network*

The Klamath I&M Program's Invasive Species Early Detection Protocol has been peer reviewed, provisionally accepted, and implemented. We implemented the first season of our Invasive Species Early Detection Protocol from April to September, 2009. During the season, a two person crew led by Sean Smith visited all six parks in the Klamath Network, beginning the season in Whiskeytown and concluding in Redwood. This protocol will be implemented every other year.

The crew visited 170 road and trail segments for a total of 395 km (245 miles). Segments were 3 km (2 miles) long, except where the total trail, road, or terminal segment length was shorter. We observed 26 invasive species (fifteen perennials, nine annuals, and two shrubs) for a total of 225 separate invasive infestations. The most observed families were Asteraceae (sunflowers) and Poaceae (grass), each with seven species. The three most frequently observed species were *Hypericum perforatum* (St John's wort), *Cortaderia* spp. (pampas grass), and *Cirsium vulgare* (bull thistle). Over 95% of invasive species infestations occurred within 4 meters of a road or trail and under 1500 meters elevation.

The sample effort matched or exceeded expectations, which was particularly heartening for the first full season of implementation. This represents the first quantitative sample of all six parks in the Network using a repeatable, peer-reviewed methodology at comparable intensities.

## *Whitebark Pine Monitoring Pilot Study*

*By Sean Smith, Klamath Network*

The Klamath Inventory and Monitoring Program identified both invasive and keystone species as top priorities for monitoring vital signs of ecosystem health. Whitebark pine (*Pinus albicaulis*) was identified as a particularly threatened keystone species because of its susceptibility to an invasive pathogen, white pine blister rust (*Cronartium rubicola*). Klamath Network Botanist, Sean Smith, and Upper Columbia Basin Network Biological Technician, Devin Stucki, initiated a pilot study from August 1st – September 4th at Crater Lake National Park to test the feasibility of co-locating whitebark pine monitoring plots with broader vegetation monitoring plots, and to compare incidence of diseases, insects, and parasites on whitebark pine with baseline information collected from 2001-2003 by Crater Lake Terrestrial Ecologist Michael Murray and NPS Fire Ecologist Mary Rasmussen.

During the pilot study, a total of 504

whitebark pine trees >15 cm diameter at breast height (dbh) and 376 whitebark pine <15 cm dbh were evaluated. The mean blister rust infection for all live trees >15 cm dbh was 25%. Twenty three percent of the whitebark pine trees >15 cm dbh we observed were dead. These results show blister rust infection to be higher than in 2001-2003, when Murray and Rasmussen reported only about 10% of whitebark pine trees with infection.

In conclusion, co-locating whitebark pine and vegetation sampling would be a fruitful approach. Given the relatively rapid mortality that's occurring in the whitebark pine community, and that the tested method of monitoring for the white pine blister rust is feasible and efficient, the significant vegetation changes that will likely occur will be important to document. Accordingly, the Network's rationale for selecting whitebark pine as a vital sign to monitor in the Klamath Network's high elevation habitats is supported.



*Whitebark pine affected by white pine blister rust at Crater Lake National Park.*



# What's a Mapbook?

By Ryan Reid, Southern Oregon University

A mapbook is a multi-page ArcMap (computer mapping) document based on a dataset and generated from an index grid that represents the mapbook pages. The application of a mapbook, dividing the map into smaller, more manageable pieces, has the same function as an atlas. The difference is that a mapbook is an interactive atlas where data can be added, removed, and updated on the fly. Figure 1 shows the index grid that represents the pages of the Lassen Volcanic National Park mapbook. By double clicking on a mapbook page title from the mapbook tab in the table of contents, a user can zoom into any grid section they choose, narrowing the point of focus to only what is being displayed on the chosen page. Figure 2 shows what the mapbook tab looks like and Figure 3 shows an individual mapbook page.

Mapbooks are easy to use, aesthetically pleasing, and quite practical. An entire mapbook can be exported into a slideshow or pages can be exported individually for printing. This is how the Klamath Network intends to use the mapbook tool to assist their field crews. Instead of carrying around seven minute or fifteen minute USGS topographic quadrangles, field crews can print copies of a mapbook page or pages that displays their project data or sites, which makes for easy transport and managing. While the topo quads are set to a specific scale and cannot be changed, a mapbook page can be set to any scale to depict as much or as little detail deemed necessary by the user. The mapbooks for the KLMN parks are set up in a way that field crews can find these templates on the server, save a copy, change the document to meet their needs, and print – tasks that can be accomplished with little to no GIS or geographic software training.



Figure 1: Rendering of the index grid used to generate a mapbook for the Lassen Volcanic National Park, GIS data included.

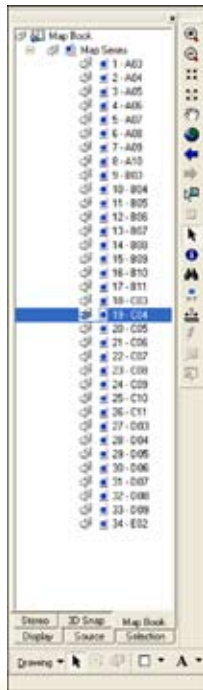


Figure 2: Table of contents with the mapbook tab and mapbook page titles.



Figure 3: Mapbook page C04 from the LAVO mapbook.