Newsletter

National Park Service
U.S. Department of the Interior

# The Klamath Kaleidoscope



## Klamath Network Vital Signs Monitoring Plan Completed

By Daniel Sarr,
Klamath Network

The Klamath Network reached a major milestone in September, completing its Vital Signs Monitoring Plan. The Plan is the culmination of a four year process to develop a long-term monitoring program for tracking the integrity of the major park ecosystems in the Network. Staff of the Klamath Network parks, the Inventory and Monitoring Program, Southern Oregon University, University of Idaho, and the US Geological Survey (USGS) completed the planning process collaboratively. The plan underwent rigorous peer review and revision this year. We extend special thanks for the guidance offered by Steve Fancy and John Gross of the National I&M Program; Penny Latham of the Pacific West Regional I&M Program; Gary Rosenlieb, Roy Irwin, and Pete Penoyer of the NPS Water Resources Division; and several anonymous peer reviewers. We also appreciate the participation of many regional scientists who helped in the vital signs scoping process and review of earlier drafts of the plan. The eleven chapter document is available for download or onscreen viewing at the Klamath Network web site:

http://science.nature.nps.gov/im/units/klmn/

Introductory chapters provide background and scientific rationale for the development of our monitoring objectives. The Klamath Network monitoring objectives are:

1. To determine status and trends in selected indicators of the condition of park ecosystems to allow managers to make better-informed decisions;

2. To provide early warning of abnormal conditions and impairment of selected resources to help develop effective mitigation measures and reduce costs of management;

3. To provide data to foster better understanding of the dynamic nature and condition of park ecosystems and to provide reference points for comparisons with other, altered environments;

4. To provide data to meet legal and Congressional mandates related to natural resource protection and visitor enjoyment; and

5. To provide a means of measuring progress towards performance goals.

To tailor the monitoring to the park ecosystems, conceptual models illustrating the functioning of these ecosystems, and potential causes of their impairment, were developed. These causes of impairment were identified during the Network's vital signs

**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.

**Klamath Network**
**Inventory and Monitoring Program**
1250 Siskiyou Boulevard
Ashland, Oregon 97520-5011

**Website**
http://science.nature.nps.gov/im/units/klmn/index.cfm

**Phone**
(541) 552-8575

**Editor & Designer**
Bess Perry

**Contributors**
Klamath Network Staff and Research Partners

**Photographers**
Title Page Photographer: John McClelland (lupine in the Bald Hills of Redwood National Park). Other known photographers listed in captions.

**Mailing List**
Please pass this newsletter on to all who are interested. To be added or removed from the mailing list, please contact Dan_Sarr@nps.gov.

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

**Picture of one of the collapses in Sunshine Cave at Lava Beds National Monument. Cave collapses allow enough light to enter the cave so vegetation can grow. Photo by Sean Mohren.**

# Planning (continued from title page...)

scoping process, which led to our selection of the Klamath Network vital signs:

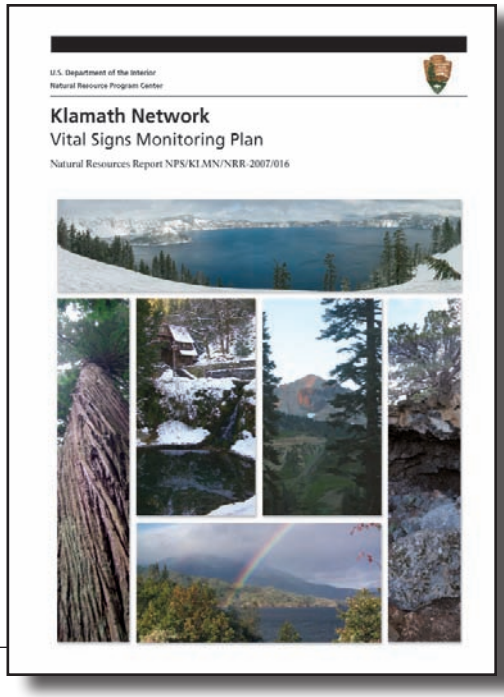
| Vital Sign | Measurable Attribute |
|---|---|
| Non-native species | Distribution and abundance of invasive, non-native plants. |
| Keystone and sensitive plants and animals | Trends in populations of amphibians, whitebark pine, and common sea star. |
| Terrestrial vegetation | Structure, composition, and population trends. Focal types include riparian forests and high elevation vegetation. |
| Landbird communities | Landbird community composition and structure. |
| Intertidal communities | Intertidal community structure and composition. |
| Freshwater aquatic communities | Composition and structure of freshwater communities. |
| Cave collapse / entrance communities | Composition and structure of cave entrance communities. |
| Water quality (aquatic, marine, and subterranean) | Water temperature, chemistry, flow, and pollutant loads. |
| Land cover, use, pattern (roads) | Changes in land cover and use in and around parks. |
| Environmental conditions in caves | Temperature, air flow, and ice levels. |
| *Air quality | Ozone, nitrogen deposition, sulfur deposition, and visibility. |
| *Weather / climate | Temperature, precipitation, and snowfall. |

**Unfunded vital signs*

The report not only describes the importance of these vital signs for monitoring integrity of park ecosystems, but it also explains the sampling designs that will be employed for each. In addition to the funded vitals signs, the Network will be compiling information about air quality and weather / climate as unfunded vital signs. Techniques for managing and analyzing the monitoring data and reporting on the status and trends of vital signs to park managers and the public are also explained. With the inclusion of budget and staffing information, the report therefore provides a full roadmap for the execution of the program. The appendices to the plan are thorough and provide valuable documentation of park resources processes affecting them.

Robert Hoffman of USGS of the Forest and Rangeland Ecosystem Science Center led the preparation of the Network's Supplemental Water Quality and Aquatic Communities Monitoring Plan. This document is included as one of the appendices and was prepared to provide additional information on water quality and aquatic communities monitoring to ensure we are meeting the standards of the National Park Service Water Resource Division. The comprehensive data management plan, prepared by Sean Mohren, Klamath Network Data Manager, is also included as one of the appendices. Both efforts are described in companion articles in this Kaleidoscope issue.

With the monitoring plans complete, we can now begin implementing our monitoring program! We are already developing monitoring protocols for intertidal, landbird community, and invasive plant vital signs. We expect to begin fieldwork for vegetation, whitebark pine, water quality, and aquatic communities monitoring in 2008. See you in the parks next summer!



# Klamath Network Landbird Protocol

## By Jaime L. Stephens, Klamath Bird Observatory

The Klamath Bird Observatory continues to work with the Klamath Network to complete the Klamath Network Landbird Monitoring Protocol. The protocol is designed to monitor breeding landbird trends over time and identify links between bird communities and habitat change. This protocol will provide quantitative information about bird assemblages to aid in developing measurable indices of ecological integrity for terrestrial ecosystems of the parks. To meet these objectives, two primary survey types will be implemented. Point count surveys will be completed in all six Network parks, on a three-year rotation. During a point count survey, the observer visits 12 stations per morning and completes a five-minute count at each station, recording all birds seen and/or heard. This method yields bird density data, a useful metric for monitoring birds across the park landscape. The spatial sampling design was determined on a park by park basis and considered park size and heterogeneity of habitat. In addition, through a cost-share agreement with Oregon Caves National Monument, mist-netting surveys will be implemented. Birds are captured during a mist-netting survey, which allows for detailed information to be collected on bird reproduction and fitness, as well as abundance. Surveys are completed every 10 days during the breeding season and every seven days during migration. This intensive methodology is well suited for the smaller park and was initiated at Oregon Caves National Monument in 2002. Bird monitoring implemented through this protocol will contribute to and be informed by regional and continental bird monitoring programs, as well as Partners in Flight conservation efforts. The Klamath Network Landbird Monitoring Protocol will be submitted in December for external review and monitoring is slated to begin in spring of 2008.

A field surveyor completing a point count in mixed conifer forest. Photo by John Alexander, KBO.

# Quantifying Natural Forest Regeneration in the Klamath-Siskiyou

## By Jeff Shatford and Dave Hibbs, Oregon State University

The name Klamath-Siskiyou conjures up images of wild mountainous landscapes, with gorgeous geology cloaked in verdent vegetation. Across the region, wildfire has had, and continues to play, an important role in shaping plant community composition. Evidence of the role of fire is plentiful on the landscape, hidden in fire scars among old-growth trees, the abundant fire-killed snags, layers of charcoal, and patchwork of vegetation types. Yet, surprisingly little has been researched on the natural regeneration of conifers and how quickly they might repopulate a site on their own after fire.

Conifer regeneration after fire in high elevation true fir forests, shown here with technican Sean Smith, can be highly abundant. All regeneration photos: Jeff Shatford.

With funding from the Joint Fire Science Program, researchers from Oregon State University (OSU), Department of Forest Science set out in 2005 and 2006 to research naturally regenerating forests throughout the region, focusing on conifer species. They worked on sites that had burned in the past 10-20 years. By simply comparing the age of seedlings to the age of the last known fire, they determined the year at which seedlings began to successfully establish. The selected sites varied in elevation, aspect, and availability of seed.

An example of the high elevation true fir forests burned up in the fires of 1987, the large volume of snags still present, and the abundant natural regeneration beneath.

Their initial findings are reported in the Journal of Forestry, Shatford, Hibbs, and Puettmann, April/May 2007: 139-146. The major implication of the research is that most post-fire areas in the Klamath Mountains are well-stocked with successful regeneration within 10-20 years of a fire, so planting is not required. Locations with little to no conifer establishment occurred within interior valleys, especially on south aspects and at low elevation.

http://www.safnet.org/policyandpress/jofo03072229p.pdf

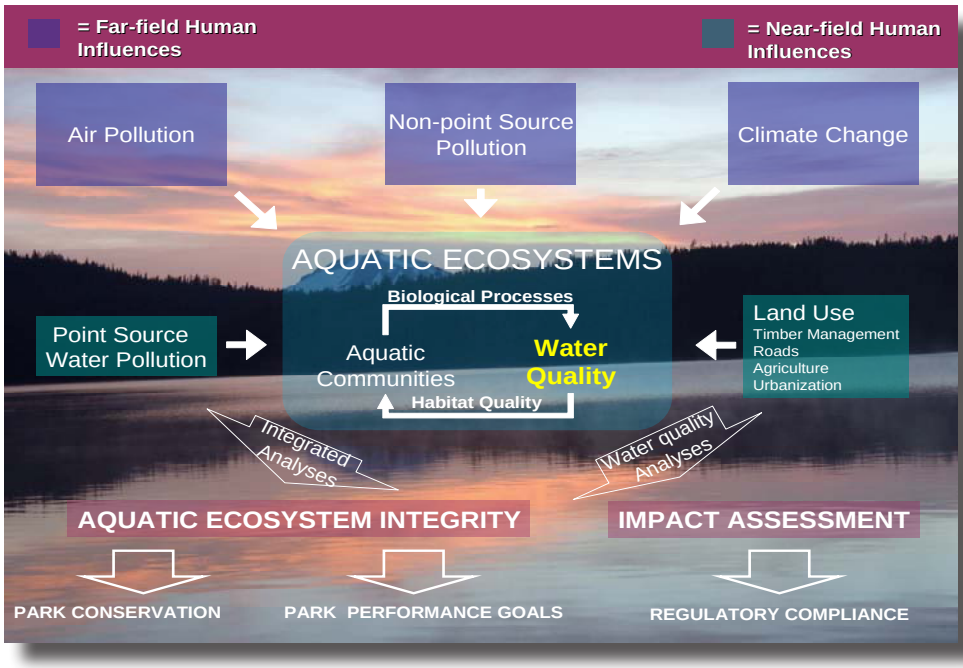
*Jeff Shatford is now a fellow Parkee, working in Wood Buffalo National Park of Canada, and can be reached at jeff.shatford@pc.gc.ca.*
*Dave Hibbs is a Professor of Ecology and Silviculture at OSU, and can be reached at david.hibbs@oregonstate.edu.*

Background image: Come August, smoke from forest fires is a common occurence over the Klamath-Siskiyou Mountains.

# Freshwater Ecosystem Monitoring

By Bob Hoffman, USGS

Perennial ponds, lakes, and wadeable cold-streams are the dominant aquatic ecosystems throughout the Klamath Network. They are integral components of the Klamath Network landscape and are useful indicators of diverse types of disturbances of natural- and human-origin that can lead to environmental and ecosystem degradation. Monitoring the water quality and biotic communities of these ecosystems, therefore, is being developed as an important, integrated element of the Klamath Network Vital Signs Monitoring Plan. The monitoring plan is designed to monitor these freshwater ecosystems in five of the six Network park units (i.e., Crater Lake NP, Lassen Volcanic NP, Oregon Caves NM, Redwood NSP, and Whiskeytown NRA). The water quality and biotic community parameters to be sampled will be useful for documenting the baseline conditions of the monitored ecosystems within a range of natural variation and for detecting potential ecosystem change caused by disturbance due to one or more large-scale stressors such as climate change, land use and visitor recreational impacts, introduction of non-native and potentially invasive aquatic species, and atmospheric deposition of nutrients and contaminants.




**Conceptual model of factors influencing water quality and aquatic communities. Model by Daniel Sarr.**

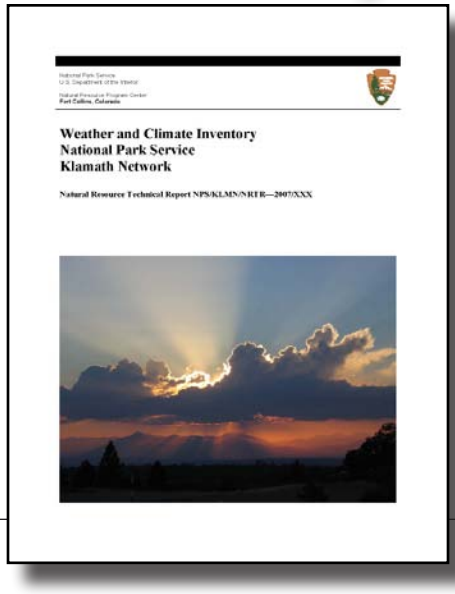
A monitoring protocol and its associated standard operating procedures is being developed to assure that the information collected will be consistent and comparable among Network park units and other NPS networks monitoring the water quality and aquatic communities of freshwater ecosystems. The ultimate outcome of this monitoring program will be that Klamath Network park units will develop, over time, a detailed understanding of the freshwater ecosystems being monitored and an extensive database that resource managers can use to effectively predict the spatial and temporal dynamics and conditions of Klamath Network perennial ponds, lakes, and wadeable cold-streams.

# Western Regional Climate Center Completes Klamath Network Climate Inventory

In early FY 2007, Drs. Christopher Davey, Kelly Redmond, and David Simeral of the Desert Research Institute's Western Regional Climate Center completed an inventory of climate stations and developed a general climate profile for the Klamath Network. The climate inventory report also provides important information on spatial and temporal variability in major climate features, as well as recommendations for improving climate monitoring in the future. The inventory was funded by the NPS National Inventory and Monitoring Program.

The Klamath Network climate report and copies of climate inventories for the other 31 I&M networks can be downloaded at:

http://www.wrcc.dri.edu/nps/reports.php



# Testing the NPS Klamath Network Protocol for Early Detection of Invasive Plants

By Ayzik Solomesheh[1] and Dennis Odion[2], [1]UC Davis and [2]Southern Oregon University

Invasive plants have been identified as the number one ecological problem and vital signs monitoring priority for the Klamath Network. Unfortunately, the number of invasive plants in national parks has increased to the point that their complete removal is too expensive or damaging, or futile. A pragmatic management strategy that recognizes this is to eradicate or control those invasive plant populations that have not yet become too well-established. Accordingly, the Klamath Network is developing a protocol for the early detection of manageable populations of invasive plants. Our monitoring protocol will also provide a basis for predicting the types of environments that will most prone to future invasions. The margins of roads and trails are already well-known to be particularly susceptible environments to invasive species. In order to further focus monitoring efforts where they may be most fruitful, the Klamath protocol will sample mainly along roads and trails. An example of the management direction that this monitoring may provide might be to identify particular trailheads or trailside areas serving as source areas for the dispersal of invasive plant propagules. By treating these source areas, managers may effectively prevent the establishment of long-standing invasions in more remote, sensitive, and/or high resource value areas.

**Figure 1. Giant knotweed (*Polygonum sachalinense*) (at Hiouchi), shown here with crew member Heather Lundgren, is a strong competitor that displaces all other species from the area where it establishes. It recently penetrated the park and is currently known from only two locations. Stassia Samuels (Redwood NP Plant Ecologist) has an active program for eradicating this species. All invasives photos: Ayzik Solomeshch.**

To test the protocol, our two-person crew searched alongside 28 roads and trails in Redwood National Park for invasive species during five weeks in September and October, 2007. Conditions were documented in both infested and uninfested areas to provide information for predictive modeling of environments susceptible to invasion and not. The crew used a global positioning system with a hand-held computer to accurately and electronically record the location of infestations and readily transfer information. The approach appeared to be an effective way to gather and communicate information vital to managers. Altogether, seven target species and 68 total infestations were found. Figures 1-4 show some of the highlights (or lowpoints!). Results are being used to improve the protocol. It is expected to be useful and applicable to other NPS networks that are developing invasive species monitoring protocols.

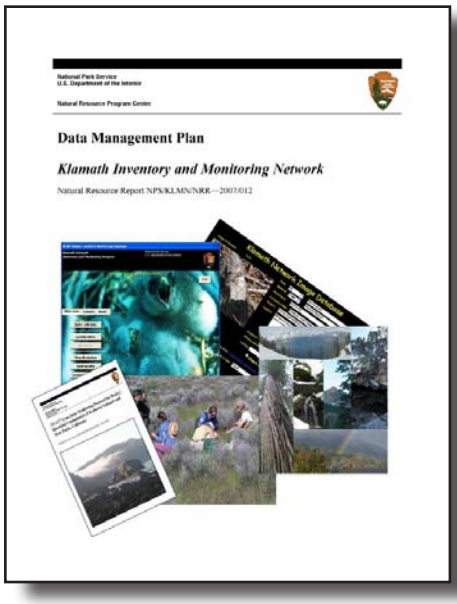
**Figure 2. Cut-leaved blackberry (*Rubus laciniatus*) (Bald Hills Road) was found in four locations and eradicated from each of them. According to Leonel Arguello (Redwood NP Supervisory Botanist) there is one more big infestation site, which requires special eradication effort.**

**Figure 3. Pampas grass (*Cortaderia jubata*) on coastal bluff (Coastal Trail Lagoon Creek). This non-native species invades natural coastal bluff habitats and disturbed areas along Hw 101, which crosses the park from north to south.**

**Figure 4. Klamath weed (*Hypericum perforatum*) on the Bald Hills Road. This species is already well established in Redwood NP along roadsides with low tree canopy. It is especially common along roads in the areas with young second growth forests recovering after logging.**

# Data Management Plan

By Sean Mohren, Klamath Network




In August of 2006, I was given the opportunity to work for the Klamath Network as the Network Data Manager. I was provided a unique challenge to develop a Data Management Program that would ensure the data collected as part of the Klamath Network Inventory and Monitoring Program would be accurate and well-managed for current and future NPS managers and staff. If the data and information are managed properly, this will ensure confidence when incorporating information developed from our program into the NPS decision-making process. As part of this challenge, the Klamath Network completed our Data Management Plan in the fall of 2007. This plan provides guidance on how the Network will collect, manage, and distribute data and information obtained by the Network. We have already started to apply several aspects of the plan to our program; however, the real test will be over the next five years as we begin to implement our long-term monitoring projects. Please feel free to look over our plan and send me any comments or questions. The plan has been made available through the Klamath Network internet site at:

http://science.nature.nps.gov/im/units/klmn/Data_Management/DM_Documents.cfm

# Whither Aspen in Lassen Volcanic National Park?

By Daniel Sarr, Klamath Network

In summer 2007, Sarah McCullough and Dr. Kenneth Tate of University of California, Davis, with funding and guidance from the Klamath I&M Program, started their exploration of the status of aspen (*Populus tremuloides*) stands in Lassen Volcanic National Park. This work comes at the request of the park, and was recognized in the vital signs scoping process. Aspen declines are a major concern in many parts of the West, but the extent and type of ecological changes vary with locale. Work on aerial photo analysis was conducted in winter and spring 2007 to evaluate change in aspen stands over time, but some lingering questions about photo quality may limit the information we can gain from remotely-sensed data. During the summer field season, Sarah and Student Conservation (SCA) Intern Alison Yee sampled 24 Whittaker-style plots in aspen stands grouped into three sampling blocks located in different parts of Lassen Volcanic National Park. Leaf litter samples were collected from 11 stands. Drs. Daniel Sarr and Dennis Odion of the Klamath Network visited the team in July, noting conditions in several stands. Initial observations suggest that conifer invasion is well underway in many stands, but that some stands on different geological substrates, such as in the Devastated Area, appear to be less invaded. Data are being prepared for preliminary analyses and a second field season is planned. A more complete assessment and report based on the remotely-sensed and two field seasons plot data will be completed in fall 2008. We are excited that this research will provide a scientific foundation for future aspen conservation and restoration efforts in Lassen.

**Mount Lassen with aspen (*Populus tremuloides*) in foreground. Photo by Daniel Sarr.**

## *Klamath Network Recent Events and Upcoming Highlights*

September 2007 Klamath Network submitted Monitoring Plan and posted new Internet and Intranet sites

December 2007 Klamath Network Interpretive Meeting and Board of Directors Meeting

January 2008 Klamath Network submits draft Landbird Monitoring Protocol

February 2008 Klamath Network submits Intertidal Communities Monitoring Protocol

April 2008 National I&M Data Management and GIS Meeting, Fort Collins, Colorado

April 2008 Klamath Network submits draft Invasive Species Monitoring Protocol

Summer 2008 Klamath Network Cave Entrance Communities and Cave Environments Protocol Scoping Meeting

August - September 2008 Vegetation Pilot Study at Crater Lake and Lassen