Newsletter

National Park Service
U.S. Department of the Interior

The Klamath Kaleidoscope

Klamath Network Completes Their First Vital Signs Monitoring Protocol!!

By Sean Mohren
Klamath Network

Having completed the Klamath Network Vital Signs Monitoring Plan in September 2008, the Network has been able to turn their focus to developing and implementing monitoring protocols for each of our 10 vital signs. After a four year process and through an outstanding effort by university, park, and Network staff, the Klamath Network has completed our first monitoring protocol, entitled "Long-term Monitoring Protocol for Rocky Intertidal Communities of Redwood National and State Parks (RNSP), California." Staff from Redwood National Park, the Inventory and Monitoring Program, University of California, and Southern Oregon University worked together to complete the pilot study and monitoring protocol for this vital sign. We would like to send a special thanks to the staff at the Center for Ocean Health/ Long Marine Laboratory, University of California, Santa Cruz, who were responsible for implementing the field work and developing the majority of this protocol. In particular we would like to point out the much appreciated efforts of Karah Ammann, Dr. Peter Raimondi, and all the members of their field crew. We would also like to thank Dr. Dennis Odion, Southern Oregon University, for all of his help in coordinating the efforts of protocol development. Finally, we would like to send out our gratitude to David Anderson, Redwood National Park, for his help in coordinating the efforts between the park, Network staff, and the University of California. This protocol is available for download at the Klamath Network web site:

Sea anemones. All article photos by Dave Anderson.

http://science.nature.nps.gov/im/units/klmn/Monitoring/vs/Intertidal/vs_intertidal.cfm

Taking advantage of the monitoring efforts developed and being implemented by the Multi-Agency Rocky Intertidal Network (MARINe), the Klamath Network is implementing their rocky intertidal communities monitoring protocol at three sites located in RNSP: Damnation Creek, False Klamath Cove, and Enderts Beach Cove. These three sites will contribute to a network of sites sampled from northern Oregon to southern Californa and help fill in a geographic gap in northern California.

The major objectives of this protocol include: (1) monitor the temporal dynamics of target invertebrate and algae and surfgrasses across accessible, representative, and historically sampled rocky intertidal sites; (2) determine status, trends, and effect sizes through time for morphology, color ratios, and other key parameters describing population status (e.g., size, structure) of the selected intertidal organisms; (3) integrate with and contribute to a monitoring network spanning a broad geographic region, in order to evaluate trends at multiple scales, from the park to region-wide, taking advantage of greater sample sizes at broader scales; and

Fucus gardneri at False Klamath Cove.

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.

Brandy Creek Falls, Whiskeytown National Recreation Area. Photo by Bess Perry.

Protocols (continued from title page...)

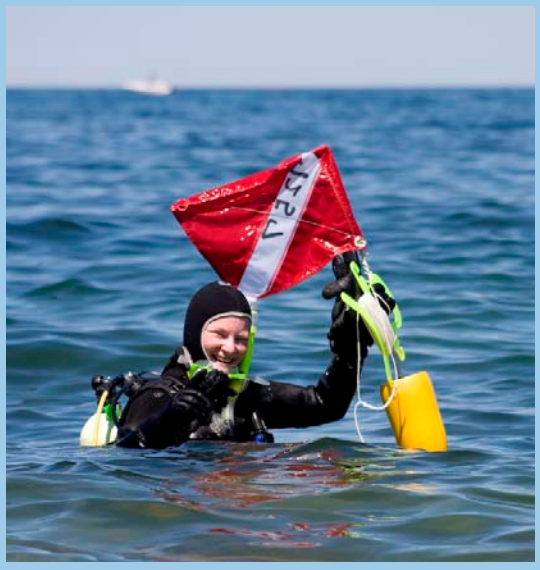
(4) detect and document invasions, changes in species ranges, disease spread, and rates and scales of processes affecting the structure and function of rocky intertidal populations and communities to better understand normal limits of variation.

Working with the staff at the University of California and RNSP, we will continue to implement this protocol this summer. Be sure to check out our web site for periodic updates on the progress of this project.

In addition to the Intertidal protocol, the Klamath Network is making their best efforts to complete protocols related to the Landbird and Non-native Species Vital Signs in the near future, so be on the look out for those protocols as we begin to wrap them up. Have a wonderful summer and be sure to get out and enjoy our great parks!

Enderts rocky intertidal sampling site.

Welcome Our New GIS Specialist!



The Klamath Network is pleased to have a new GIS Specialist, Lorin Groshong! Lorin grew up in Ashland, Oregon and bonded with the environment here as a Forest Service fisheries technician in the Applegate and Ashland Ranger districts. During graduate school, she spent summers doing fisheries work at Crater Lake National Park. Her Bachelor's Degree in Environmental Science came from Northwestern University in Evanston, Illinois, but she quickly came back home to get a Master's in Geography from the University of Oregon. Her graduate research focused on remote sensing techniques for mapping riparian vegetation in Yellowstone National Park and, when not in the field, she spent a lot of time teaching GIS and Remote Sensing courses at the U of O. Lorin's other profession is as a classical musician. She plays oboe in the Rogue Valley Symphony and a few other ensembles in Southern Oregon.

Wetland Classification at Lassen Volcanic and Crater Lake National Parks

By Cheryl Bartlett, Oregon State University

A moist meadow community dominated by false hellebore and arrowleaf groundsel at Crater Lake. This community type was among the most species rich of those we sampled. Photo by Kier Morse.

A scenic wet meadow/fen in the Forest Lake drainage of Lassen Volcanic National Park. It was later determined that a portion of this wetland was very likely a rare acid geothermal fen. Photo by Cheryl Bartlett.

A high elevation wetland at Crater Lake. A cluster of small wetlands (including this one) found in the area were floristically unique from all other wetlands sampled in the park. Photo by Kier Morse.

For most visitors to Lassen Volcanic and Crater Lake National Parks, a trip wouldn't be complete without stopping to admire a lush meadow, relaxing in the shade along an alder-lined creek, or contemplating life among the sedges that ring many of the lakes and ponds in these two parks. Each of these experiences have, at their core, interactions with wetland plant communities, which in addition to their scenic value, also play a vital ecological role on the landscape by providing habitat for wildlife, being biodiversity hotspots, storing water, and sequestering carbon.

During the summers of 2005 – 2007, I was the lead botanist on an Oregon State University (OSU) based team, led by Drs. Mark Wilson and Paul Adamus. We collected data at wetlands in the two parks to document the vegetation composition, species abundance, and environmental characteristics associated with each wetland visited. Now, we are using this information to develop a wetland community classification for each park, which places individual wetlands into groups based on the species and, to a lesser extent, the environmental characteristics they have in common. This classification will give park managers a clearer picture of what these wetlands look like ecologically and the commonality of each community type. Also, it will greatly facilitate managing wetland types with a particular set of characteristics, rather than individual wetlands. To date, we have described more than 20 wetland plant communities for each park from the data collected.

In addition to the community classification, OSU researchers, in partnership with the Klamath Network, are conducting a gradient analysis to determine what environmental factors are the strongest drivers of vegetation patterns in the parks' wetlands. These factors include characteristics such as elevation, aspect, average precipitation and temperature, and hydrologic regime. This information can then be used to give a picture of general patterns to expect under a certain set of conditions, and what might happen if those conditions change (e.g., via climate change). Once these patterns are described for each park, the results will be compared to determine if the environmental drivers are similar or different between the two parks and how environmental factors affect the distribution of a set of species that the two parks have in common.

Finally, we are examining the link between community type, environment, and biodiversity to describe the characteristics associated with the varying degrees of richness observed in the wetlands of these two parks.

Data analysis is currently in the final stages for this project; a draft of the community classification is expected in the near future. After a brief hiatus, I will complete the final report and my thesis from this project in early 2009.

The Sawsedge's Revenge: Preliminary Notes on the Wetlands of Burren National Park, Ireland

By Daniel Sarr, Klamath Network

The Burren region in County Clare, Ireland, is a broad plateau of glaciated limestone bedrock that faces the Atlantic on the southern shore of Galway Bay. Due to its unique geologic, climatic, and human management history, the Burren is a center of floristic and invertebrate rarity and endemism in northwest Europe. Similar to our own Klamath-Siskiyou region, the Burren has literally "captured" floristic diversity as plants moved north and south during warmer and colder epochs; it now holds a globally unique assemblage of arctic, alpine, and Mediterranean species. Burren National Park is located near the southeastern edge of the Burren and contains many examples of the region's unique geologic features and wetlands, particularly turloughs (winter lakes). These strange wetlands are believed to occur in only a few places in the world where karstic landscapes allow surface flooding from rising groundwater during the wet season. They have been described evocatively as the floodplains of underground rivers.

Turloughs provide essential habitat for a number of native Irish plant and animal species. Plants such as the turlough violet (*Viola persicifolia*), Northern yellowcress (*Rorippa islandica*), shrubby cinquefoil (*Potentilla fruticosa*), alder buckthorn (*Frangula alnus*), and the liverwort (*Riccia cavernosa*) occur primarily in and around turloughs. Numerous rare invertebrates have also been recorded, including the large mussel-shrimp (*Cypris bispinosa*), small diving beetle (*Bidessus unistriatus*), and scarce emerald damselfly (*Lestes dryas*). In addition to the turloughs, Burren NP has a number of permanent lakes, fens, and bogs harboring unique and interesting biodiversity.

I had the pleasure and privilege of studying wetlands in Burren NP this spring under a Fulbright Fellowship with assistance from Dr. Micheline Sheehy Skeffington of the National University of Ireland, Galway and John Curtin, fourth year student there. My initial intent was to explore the plant ecology of the park's turloughs, but after discussions with park staff revealed a need for a more complete inventory, I chose to sample all the major wetland communities. In May and June 2008, we collected 96 releve samples in the park's major wetlands and photographed and monumented major wetland types. John will collect another 24 releves after I leave.

After spending years studying the geography and vegetation of the western U.S., it was both daunting and invigorating to enter a landscape where I had very little botanical knowledge. As expected, the unknown sedges and rushes piled up quickly, and to my delight so did the buttercups, but we eventually began catching up and patterns began to emerge. Lucky for us, the wetlands, although richly varied, lack the often spectacular plant species richness of the rugged limestone pavements upslope. The key to the diversity of park wetlands, as in the larger Burren landscape, is the presence of limestone (calcium carbonate) rock and the heterogeneity in habitats it creates. In northwest Europe, the gradient in pH from highly alkaline limestone areas to acidic boglands is critical for understanding floristic patterns, with many species classified as calcicole (calcium loving) or calcifuge (calcium fleeing). Generally, where the climate is wet enough, as it is in much of Ireland and Scotland, acidic bedrock allows the extensive colonization by sphagnum mosses, which retain water and further acidify the soil, creating boglands. Alkaline areas such as the Burren hold back the sphagnum, have less bog, and typically have highly distinctive floras. Yet the Burren's deceptively desert-like landscape experiences an abundance of rainy and wet days, so sphagnum bogs can form in selected places, creating acidic bog islands in the alkaline sea. The unique niches in the fractured limestone pavement, from barren surfaces called clints, to clefts in the limestone, called grykes, also couple with the mild, wet climate to allow many species to coexist.

Generally, the wetlands of the park reflect the highly alkaline nature of the limestone landscape with a very distinctive calcicole flora that includes the carnation sedge (*Carex panicea*), tawny sedge (*C. hostiana*), bog thistle (*Cirsium dissectum*), devil's bit (*Succisa pratensis*), and various orchids (*Dactylorhiza* and *Platanthera* spp.). At the upper edges, where flooding is of shorter duration, we found ash (*Fraxinus excelsior*), purging buckthorn (*Rhamnus cathartica*), and shrubby cinquefoil (*Potentilla fruticosa*) sending their roots into the grykes. Lower down, where flooding lasts much of the year, we encountered dense stands of emergent marsh (called reedswamp in Europe) dominated by bulrush (*Schoenoplectus lacustris*), giant reed (*Phragmites australis*), and the infamous sawsedge (*Cladium mariscus*). Areas that dry in

The early marsh orchid (Dactylorhiza incarnata ssp. pulchella). All article photos by Daniel Sarr.

John Curtin sampling the sawsedge (John is 6'5")...and being sampled himself!

the summer often have extensive marl flats that evoke the saline playas of the Great Basin, with specialized species like shoreweed (*Littorela uniflora*) and many-stalked spike-rush (*Eleocharis multicaulis*). In the areas where bog has accumulated, the calcifuge flora thrives, including heather (*Calluna vulgaris*), cross-leaved heath (*Erica tetralix*), bog-cotton (*Eriophorum* spp.), and bog asphodel (*Narthecium ossifragum*). Taken together, many of the wetland species of Ireland are represented in the park's varied habitats. A rich wetland heritage worth preserving!

Daniel Sarr keying out a buttercup.

As a field-starved desk pilot, I was glad to get my field legs under me again and to get an intimate taste of an Irish park landscape. All in all, I have to say it compares well with tramping the Klamath parks, though the trees and mountains are smaller, the distances shorter, and for a soundtrack one must replace the mournful call of the coyote with the lustful crow of a distant farm rooster. Although it must be said we had lovely weather for west Ireland, it was very nice to work all day in the cloud-dappled sun with temperatures between 55 and 70 F and just enough cross breeze to chase away bugs. Even better, our only companions were herons, gulls, frogs, and clouds most days and the feeling was beautifully expansive and desert-like. As moving sun and shadows painted the naked rock hills, I kept thinking of a monochromatic and miniature Colorado Plateau. The terrain is rough though-it can snap an ankle like a piece of vermicelli! Imagine a diabolical mix of Schonchin Lava Flow at Lava Beds NM with Chaos Jumbles at Lassen Volcanic NP. Not ideal for hiking in rubber boots! As at Lava Beds, it is not a place to hike at night. Broad meadows are laced with water-filled sinkholes that lead into the karstic underworld. And, most menacing of all, are the stands of carnivorous sawsedge, which extract tissue samples at the slightest provocation. Sawsedge, like poison oak and Himalayan blackberry, is one autotroph that fights back. But a few scrapes are a small price to pay for a chance to see such a place. In short, I found Burren NP to be a fascinating landscape that I highly recommend for a visit by anyone with an appetite for wetlands, wildflowers, archaeology, pubs, or just beautiful natural landscapes.

Bloody cranesbill (Geranium sanguineum) and Skaghard Lough, Burren National Park, Ireland.

But preservation is a complex challenge in a landscape that has been populated by people for at least six millennia. The Burren is filled with archaeological sites, from portal tombs and Mesolithic ringforts that were over 2000 years old at the time of Christ, to abbeys and castles of Gaelic and Normal lords of the late Medieval, to the stone walls of the Irish famine era, and the old villages and peat-scented pubs that add the warmth and music to west Ireland. The landscape that we now see and appreciate is a manifestation of the impacts of this continuous but ever-changing current of civilization and its needs. Glaciated, deforested, eroded, grazed, and yet shockingly rich in its fertile barrenness. Livestock and feral goats still graze much of the Burren, as they have for centuries, keeping woody plants at bay and allowing the rich herb layer to persist. Recent intensification in agriculture, such as fertilization and changes in stocking patterns, however, threaten to change the age-old patterns. Park managers must try to evaluate how much grazing to allow, where, and when to ensure that this unique anthropic landscape and its inhabitants survive for future generations.

A Day in the Woods: Field Trip to Whiskeytown

By Reejan Shrestha, Southern Oregon University

I still remember the day that Bess Perry, National Park Service staff at Southern Oregon University (SOU), came to International Student Association (ISA) meeting for the first time. When she proposed the idea of camping at Whiskeytown National Recreation Area, all the ISA members welcomed it by clapping and cheering. I was particularly excited because I, who have never been out of this little valley of Oregon since coming to the US to study, saw this as an opportunity to expand my horizons. Days passed, weeks passed, months passed, and finally the long awaited day of camping arrived!

It was the 31st of May, 2008, inaugurated by subtle sunlight. As planned earlier, 20 ISA members, together with Bess, gathered in front of SOU Hannon Library before beginning the journey to California. After a couple of hours on the highway, playing see-saw uphill and downhill, laughing at the "Beware of Bears" sign posts, we reached Redding. The first thing we noticed in California was the price of gas, which read $4.50 per gallon. Worrying a little bit about the worsening American economy, we headed towards our final destination. The quick stop at the grocery store in Redding gave us enough time to stretch and grab the food that we were going to enjoy that evening during our camp out.

Top: Whiskeytown Lake, viewed from the Visitor Center.
Bottom: Some of Southern Oregon University's International Student Association members enjoying Brandy Creek Falls.
All article photos by Saeed Al Alwan.

At Whiskeytown, we were heartily welcomed by a team of four guides headed by Ranger Susan Weaver, who has twelve years of experience. Interpretive Park Ranger Clinton Kane and the National Park Service set up an adventurous day for us! The first thing we did in Whiskeytown was go hiking. After climbing a dusty and twisty road to the Brandy Creek Falls trailhead, we put on our boots and started the hike. We walked uphill, in a ragged line, along a small trail to a waterfall. Our guides stopped frequently to explain the rich cultural history of Whiskeytown. Pratik Kumar Patel, a student from India, looked very enthusiastic when he asked how the park got that interesting name. The head guide explained that there are many stories about where the area got its peculiar name, the most common of which being that a miner was carrying a load of whiskey barrels on his mule, when the barrels broke loose and tumbled into a nearby stream, giving Whiskeytown its whiskey name. She further explained to us that Whiskeytown used to be a famous location for gold mining and is currently an important water resource for California.

Most of us were hiking for the first time in our lives, but when I glanced at the faces of the other hikers, none of them looked tired. Instead, I saw rays of enthusiasm. At that point, I realized that nature is really powerful. I felt like we were being powered by that same stream, Brandy Creek, which was singing in its own way down the hill and by that green forest which was blooming in its fullest at the height of spring. We all talked about how this experience compared to protected areas in our home countries and how interesting it was to explore somewhere outside of Ashland!

A Day in the Woods (continued).
When we finally reached the falls, they were well worth the hike! The different levels of the Brandy Creek Falls were beautiful to explore and watch the rushing water. After taking a couple of snapshots with our digital cameras, some to be deleted and some to be posted in Facebook later, we walked down the hill only to have more fun at the lake. We switched into swimming suits and learned all about kayaking and kayak safety from Ranger Jeremiah Hockett. He pointed out many interesting features on the kayak tour of Whiskeytown Lake, such as osprey nests, deer, and some of the many coves lining the edges of the reservoir. The lake was clear enough to seem untouched by the growing population of California, and blue enough to challenge a poor, unskilled swimmer like me. Everybody looked very scared when we were pulling our kayak along the sandy bank of the lake. Once we found ourselves floating on the water, we began to feel more comfortable paddling and started splashing each other. Thanks to the life jackets, some even dared to jump in the water. As we returned back to the bank, we watched the sun going to sleep in between two mountains on the horizon.


Clown millipede.

Finally, exhausted from the daylong hiking and kayaking, we headed toward the Dry Creek campground and set up camp. We were excited to spend a night outdoors and reward our hiking and kayaking adventures with some good BBQ. Our discussions of the trip by the crackling campfire lasted long into the night. The next morning, we spent more time enjoying Whiskeytown Lake before cleaning up camp and heading back to Ashland. The entire trip was a great outreach experience for the National Park Service and for the ISA. We really enjoyed exploring one of the beautiful parks in the area.

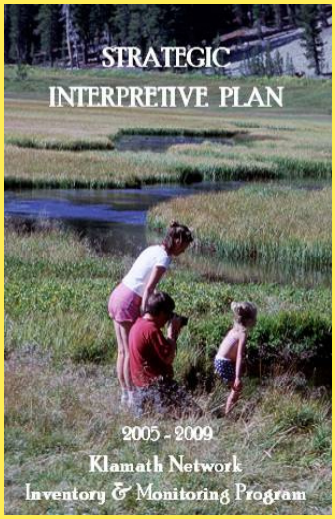
Thanks to the Klamath Network, Whiskeytown, and the ISA for this wonderful day in the woods. The day once gone is gone forever, but I am confident that the times we have spent together in Whiskeytown are going to be with us for the rest of our lives.

Reejan Shrestha is on exchange from his university in Japan, and is originally from Nepal. Saeed Al Alwan is also studying at SOU and is from Saudi Arabia.

Climate Change Workshop

By Sean Mohren, Klamath Network

In 2005, three groups, representing three different communities (NPS Interpretation, NPS I&M Program, and an outside educational institution) came together on the Southern Oregon University (SOU) campus with a goal of developing a strategic interpretive plan. The objective of the plan was to build a framework for creating thoughtful and meaningful interpretive products to the parks, residents, and visitors of the Klamath region. As part of this plan, climate change was selected as one of the five topics to address.



If you do an Internet search on "climate change," it is a sure bet you can become overwhelmed with the more than sixty million results that pop up. To help us get a better handle on all the information that was available on climate change, the Network decided to hold a workshop at SOU. On May 6-7, 2008, the Klamath Network held a workshop with Interpretive and Natural Resource NPS staff, regional NPS staff who are currently taking a leading role on climate change, and regional climate scientists to discuss our current knowledge about climate change and how we could use that knowledge to better communicate issues associated with climate change to the public. The meeting had an amazing turnout with staff that represented a variety of disciplines, including Superintendents, Regional and Park Natural and Cultural Resource Chiefs, Park Rangers, Educational Coordinators, Interpretive and Natural Resource Specialists, Physical Scientists, Vegetation Ecologists, Wildlife and Fish Biologists, Geologists, and Climate Scientists.

Overall, the 2-day workshop went very well and we were able to come up with broad topics, such as precipitation, carbon dioxide and greenhouse gases, fire, visitor use/recreation, ecotone shifts, and park sustainability, as well as some specific examples, that could be used to help us focus our discussion of climate change. In the fall/winter of 2008, the Klamath Network will work with a student of the McNair Scholarship program at SOU to develop some materials park interpreters can use to help discuss climate change at their parks.

A Flora of Lava Beds National Monument

By Sean Smith, Southern Oregon University and Klamath Network

Beginning in April 2005, I began an inventory of the vascular plants of Lava Beds National Monument, CA. The project, funded by the Klamath Inventory and Monitoring Network, fulfilled one of several requirements for an MS in Environmental Education at Southern Oregon University (SOU). I graduated in Spring '08 from SOU. The completion of my thesis would not have been possible without the support of the Klamath Network, in particular Daniel Sarr and Dennis Odion, and the SOU professors Steve Jessup, Charles Welden, and Frank Lang. Finishing the thesis was part one of a two part process: part two is getting the Flora published. The target press is Oregon State University, as they have published several regional floras. We are all awaiting the publication of the Flora…but in the meantime, new species are still turning up at Lava Beds! On a recent trip, I discovered four species previously unknown in the monument. One of those species is likely *Piptatherum exiguum* (little ricegrass), a native grass, that, according to the online Jepson Manual, is currently unknown from the state of California!

Discoveries like *Piptatherum exiguum* are novel but not completely unexpected at Lava Beds. The monument is located near the junction of the Sierra, Klamath, Cascade, and Great Basin geological provinces and straddles the boundary between the Modoc Plateau and the Cascade Range floristic/geologic regions. The floral elements at Lava Beds are largely represented by sagebrush steppe of the Great Basin Floristic Province (Modoc Plateau region) but also include coniferous forests dominated by Pine species characteristic of the Cascade, Sierra, and Northwestern California (Klamath subregion) regions of the California Floristic Province. Further adding to the monument's floristic diversity are recent geologic phenomena such as cindercones, lava flows, and associated lava tubes. These provide unique topography, edaphic conditions, and microclimates, allowing for the existence of disjunct plant populations and species range extensions within the monument.

During the course of this project, 89 species (and the list is still growing) were added to the Lava Beds National Monument vascular plant list. I collected many of these species; others, found through a query of the California Consortium of Herbaria, were collected in the past but not reported to monument personnel. In total, 361 (again, a list that is still growing!) vascular plant species have been collected from Lava Beds.

Rosa woodsii var. ultramontana is occasional along the northern border of Lava Beds National Monument. A plant of moist places, it is restricted to the margins of Tule Lake. Both article photos by Sean Smith.

Heterocodon rariflorum is rare at Lava Beds National Monument. The entire population of this rare flowered member of the Campanulaceae family is represented by two individuals growing at Post Office Cave.

Fish and Amphibian Inventory at Lassen Volcanic National Park

By Michael Parker, Southern Oregon University

The stocking of non-native fish into Lassen Volcanic National Park (LVNP) lakes was discontinued in the late 1970s and many lakes have since returned to a fishless condition. A lack of comprehensive surveys, however, meant present fish distributions were largely unknown, as were impacts of fish predation on native biota. A collaborative study by scientists from Southern Oregon University, US Forest Service Redwood Sciences Laboratory, and National Park Service surveyed all lentic habitats within LVNP to describe current fish distribution and assess potential impacts of non-native fish on amphibian populations and lake communities. Of particular interest was the Cascades frog (*Rana cascadae*) populations that had precipitously declined in the region and were feared to have been extirpated from the park.

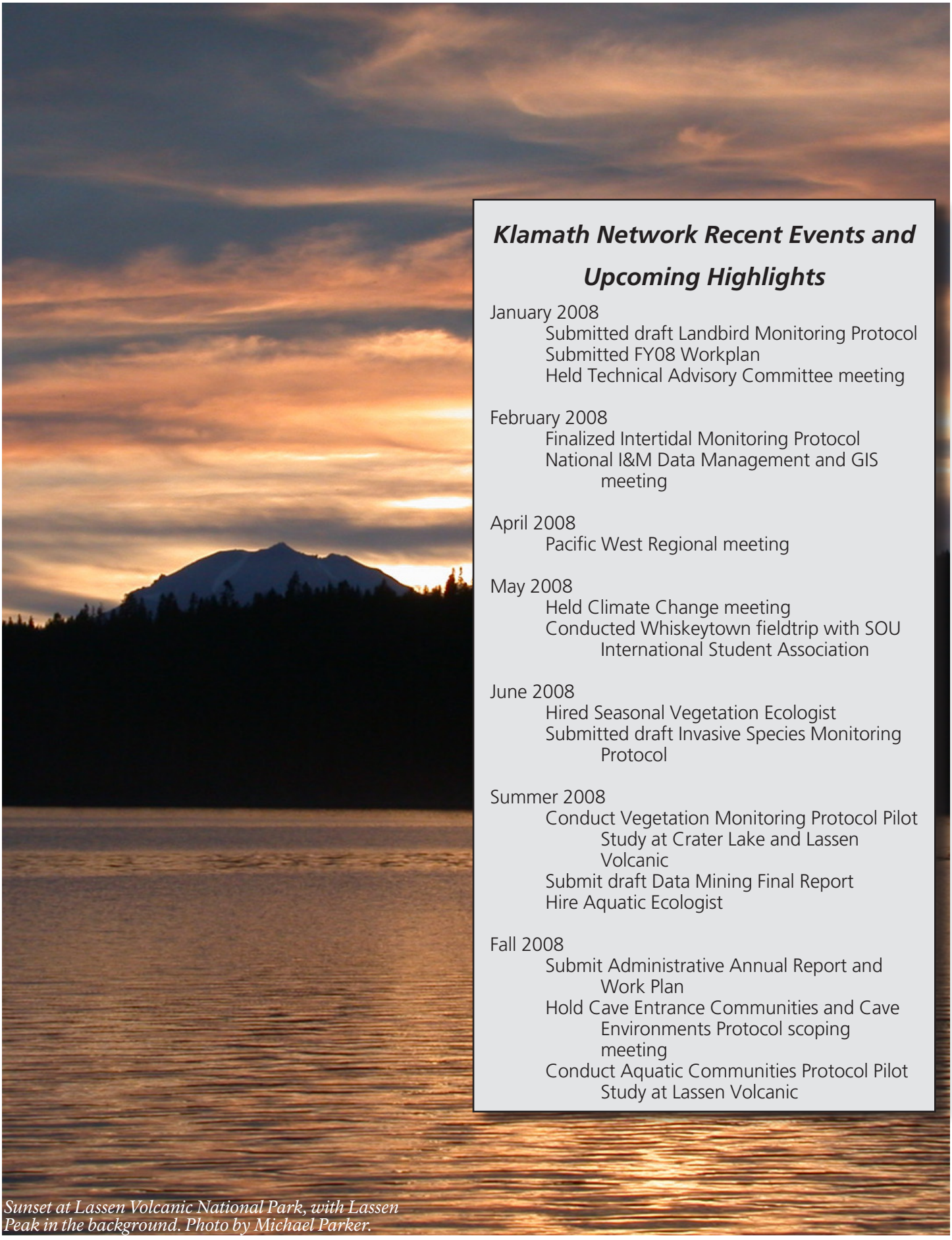
Field crews surveyed 365 water bodies, including wet meadows, ponds, and lakes. Surprisingly, among the 73 larger lakes (>2 m deep), many of which had been previously stocked, only 10 (13.7%) had fish populations and only seven (9.5%) were inhabited by trout. These observations show that in the 30 years since fish stocking ceased, nearly 90% of previously stocked lakes have reverted to their natural, fishless condition. Three trout (rainbow, brook, and brown), five minnow (Tui chub, speckled dace, Lahontan redside, golden shiner, and fathead minnow), and one sucker (Tahoe sucker) species were observed among the 10 lakes. Rainbow trout were found in four lakes and Tui chub in five, making them the most widespread species.

Top: John Speece collecting benthic invertebrates with a D-net.
Bottom: Kate Meier collecting fish with a gill net.

Top: Cascades frog near Juniper Lake. Bottom: Fish from Snag Lake. All article photos by Michael Parker.

Common amphibian species observed included Pacific chorus frog (*Pseudacris regilla*), western toad (*Bufo boreas*), and long-toed salamander (*Ambystoma macrodactylum*). Only four individual Cascades frogs were observed during the survey, all at sites near Juniper Lake. In general, amphibians were less abundant in habitats inhabited by fish. It is unlikely, however, that fish predation is the cause of the Cascade frog's near extinction in LVNP since their steep decline became evident after the cessation of fish stocking when most lakes no longer supported fish populations.

Although the vast majority of lakes currently lack fish, effects of fish predation on lake food webs are obvious within larger, more productive lakes. Large invertebrate predators, such as dragonfly nymphs, predaceous diving beetle larvae, and backswimmers are much less abundant in lakes with fish, and the largest zooplankton species were only found in fishless lakes. These observations show that lake communities are relatively resilient in responding to the loss of fish predators and that the policy to stop stocking non-native fishes into LVNP lakes is allowing some components of the community to recover to pre-fish stocking conditions. Persistent and largely unexplained declines of amphibian populations, however, suggest that factors in addition to non-native fish introductions will continue to plague efforts to sustain the entirety of native biodiversity.



Klamath Network Recent Events and Upcoming Highlights

January 2008
- Submitted draft Landbird Monitoring Protocol
- Submitted FY08 Workplan
- Held Technical Advisory Committee meeting

February 2008
- Finalized Intertidal Monitoring Protocol
- National I&M Data Management and GIS meeting

April 2008
- Pacific West Regional meeting

May 2008
- Held Climate Change meeting
- Conducted Whiskeytown fieldtrip with SOU International Student Association

June 2008
- Hired Seasonal Vegetation Ecologist
- Submitted draft Invasive Species Monitoring Protocol

Summer 2008
- Conduct Vegetation Monitoring Protocol Pilot Study at Crater Lake and Lassen Volcanic
- Submit draft Data Mining Final Report
- Hire Aquatic Ecologist

Fall 2008
- Submit Administrative Annual Report and Work Plan
- Hold Cave Entrance Communities and Cave Environments Protocol scoping meeting
- Conduct Aquatic Communities Protocol Pilot Study at Lassen Volcanic

Sunset at Lassen Volcanic National Park, with Lassen Peak in the background. Photo by Michael Parker.