Sierra Nevada Network Newsletter

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National Park Service

Inventory and Monitoring Division

The Sierra Nevada Monitor

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The Year that Snow Returned to the Sierra Nevada

View from the top of Mt. Rixford (near Kearsarge Pass) in Kings Canyon National Park. Photo taken May 23, 2017 by Sarah Hoff, former Sierra Nevada Network forest monitoring crew lead on a recreational ski from the east side of the Sierra Nevada. The average Snow Water Equivalent for the state on May 30th was 18 inches, which is 193% of the average for this date. The snowpack will limit field crew access to many high-elevation monitoring sites until mid-summer or later.

New Feature: Inventory & Monitoring by Parks

While the Inventory & Monitoring (I&M) Program conducts inventory & monitoring projects in parks with relatively recent (since 2000) funds and projects, the Sierra Nevada Network parks have been conducting their own I&M projects for years. Examples include air quality, fire effects, avian productivity and survivorship, stock use and meadow monitoring, river hydrology, visitor use impacts, geologic and cave surveys, non-native plant surveys, and much more.

Collecting precipitation samples at an air quality station in Sequoia National Park (above). Clipping biomass samples from a meadow (right) to monitor pack stock impacts. NPS photos.

This newsletter begins a new feature: inventory & monitoring projects conducted by park staff or other local scientists, such as the USGS field stations. See page 8 for the first of this on-going series: an article on fire-followers (both special status and non-native plants) by Biologist David Campbell of Yosemite - thank you, David!

Orange-crowned warbler, monitoring avian productivity and survivorship project in Yosemite. NPS photo: Sarah Stock.

What's Inside?

Learn about: Botanists Seeking Small Plants, Staffing Changes, a Grad Slam Win, Assessing Nitrogen in Mountain Lakes, Belding Ground Squirrel Declines, an App for Tracking Lake Algae, Fire-Followers in Yosemite, Project Updates

Small Foothill Plants Draw Enthusiastic Botanists

Where the winter valley fog creeps up to foothill rock outcrops and oak savannahs near and inside the boundaries of Sequoia National Park, bryophytes can thrive, clinging to rocks, trees, and soil. Bryophytes are a group of plants including mosses, liverworts, and hornworts; people who study them are called bryologists. From March 27-30, 65 people came from near and far to attend the 22nd annual SO BE FREE bryophyte foray amongst the bright green and blooming foothills of Three Rivers and the park.

Workshop participant Ashley Haar examines a moss with her hand lens during a field trip. Photo: Sylvia Haultain.

SO BE FREE — a fun acronym for ***S***pring ***O***uting: ***B***otanical ***E***xcursion , ***F***oray, ***R***etreat and ***E***scape to the ***E***nvironment — brings together bryologists, both amateur and professional, for a week during university spring break. Specialists travel from all over the world to the western U.S. to share their knowledge with students young and old.

Example of a moss encountered in the South Fork Kaweah River drainage. Photo: Jonny Nesmith.

Dr. Brent Mishler, Professor of Integrative Biology and Director of the University and Jepson Herbaria at UC Berkeley founded SO BE FREE in 1996, with the goals of keeping bryologists in touch with each other and teaching beginners.

A newly formed Bryophyte Chapter of the California Native Plant Society (CNPS) began coordinating SO BE FREE starting in 2015, under the enthusiastic leadership of Dr. Paul Wilson, Professor of Biology at California State University Northridge. The Sierra Nevada Network Inventory & Monitoring Program (SIEN) joined the Alta Peak Chapter of CNPS to help co-host the foray in Three Rivers.

Denis Kearns (BLM Botanist) and other participants using microscopes. During these afternoon and evening sessions, experts and novices happily worked side by side, examining cross-sections of tiny leaves and other features used to identify these plants. Photo: Sylvia Haultain.

Field trips led by expert bryologists paired with local ecologists explored sites within each fork of the Kaweah River, contributing to surveys on both Bureau of Land Management and National Park Service lands. At last count, participants encountered over 100 different bryophyte taxa.

Paul Wilson also led a field trip for local naturalists and educators in Sequoia National Park, and shared illustrated moss handouts to help with guiding local outings. SIEN staff are looking forward to welcoming Paul and his students back to Sequoia early this summer, to provide training in bryophyte identification for the botanists working on our wetland monitoring project. Photographs of many of the species encountered during the foray can be seen on iNaturalist.

Spring rainstorms prior to the field trips ensured that the mosses, hornworts, liverworts and wildflowers were at their best. Photo: Jonny Nesmith.

In 2018, the Siskiyou Field Institute in Southern Oregon hosts this workshop, close to the Klamath Inventory & Monitoring Network. For more information and to register, visit the CNPS Bryophyte Chapter web page at http://brypohyte.cnps.org.

– Sylvia Haultain

Staffing Updates

Welcome New Logistics Technician: Kristin Weikel

On May 8th, Kristin Weikel joined the Sierra Nevada Network in the role of Logistics Technician, an essential position that provides support to project leads in coordinating field season logistics, involving varied responsibilities associated with field crew safety and support.

Kristin's first National Park Service job was as a 20-year-old Student Conservation Association intern in Great Smokey Mountains National Park working with vegetation management.

"That's where I fell in love with the National Park Service and decided I wanted to build a career working in our nation's parks," Kristin explained.

She returned to her coursework at Virginia Tech, changed her major, and graduated with a B.S. in Forestry with an emphasis on Environmental Resource Management and a minor in Natural Resource Recreation in 2004.

Kristin Weikel, backpackiing in the Tablelands area of Sequoia National Park.

Her first paid job was in Glacier National Park on the invasive weed crew in 2005. By 2006, she was drawn to the Sierra Nevada to work on the USGS forest demography crew in Sequoia National Park. She returned to Great Smokey NP in 2008, where she worked a year as the Exotic Plant Coordinator for one district of the park and was Crew Leader for a satellite vegetation management crew based in Cherokee, North Carolina. She returned to Sequoia National Park to work as the forest demography Crew Lead from 2010 through 2015.

She met her husband Jeremy in Three Rivers, California 10 years ago and they have been married almost four years. They have an 8-month old son named Reid. Kristin enjoys gardening, cooking, traveling, hiking, and backpacking, and is originally from Staunton, Virginia located near Shenandoah National Park and the Blue Ridge Parkway.

"The logistics job is appealing to me because it lets me continue to be involved with field research in the parks, but I can go home every night with my family. It's amazing how your priorities change!" Kristin said.

Amy Brown Moves on to Park Forestry Program

Amy Brown, who worked with SIEN as Logistics Technician the past two seasons, has taken a job with the Sequoia and Kings Canyon Forestry and Hazard Tree Management program as the field crew supervisor. We thank Amy for all her great logistics support and wish her well in her new role.

Joan Dudney Places Second in Grad Slam

How many PhD students would step up to the challenge of explaining their years of research in a 3-minute talk? University of California PhD Student Joan Dudney, who has partnered with USGS, Sierra Nevada Network, and US Forest Service scientists to study white pine blister rust in Sequoia and Kings Canyon National Parks, entered a Berkeley Graduate Division competition, made it to the finals, and came in second (including a cash prize) with her 3-minute talk.

We congratulate Joan on her win, and her efforts to communicate her research in a way that appeals to a broader audience. This competition was part of a UC-wide grad slam also called "Mind-bending Research, Made Simple".

Joan will return to Sequoia & Kings Canyon this summer for another season of sampling white pine forests.

Joan Dudney.

Assessing Nitrogen in Sierra Nevada Lakes

Andi Heard, SIEN Physical Scientist, removes experimental containers (called "mesocosms"), used to quantify the response of algae to increased nitrogen, from a Sierra Nevada lake.

The clear blue waters of Sierra Nevada lakes are featured in many photos of wilderness hikes and camping trips. In addition to their beauty, these lakes provide habitat for native animals such as Sierra yellow-legged frogs, aquatic invertebrates, and numerous terrestrial animals that feed on lake-dwelling organisms. While many of these lakes are in remote wilderness locations, threats such as air pollution cross park boundaries and affect water quality.

Sierra Nevada lakes have evolved with nitrogen as one of the main limiting nutrients, constraining the growth of plants and other organisms. Fossil fuel consumption and agricultural activities are sources of the elevated nitrogen inputs that travel to these lakes via precipitation or dry deposition. A shift from nitrogen limitation to nitrogen excess could alter the balance in these ecosystems, leading to increased growth and abundance of plants and other organisms, a shift from lower to higher productivity, and a cascading set of yet unknown effects on the food web of plants and animals living in and near these lakes.

To determine how nitrogen levels are affecting lake water quality, Sierra Nevada Network (SIEN) Physical Scientist Andi Heard and James Sickman, Professor of Hydrology, from the University of California, Riverside (UCR) developed nitrogen "assessment points" and applied these to evaluate nitrogen levels in lakes monitored across Sequoia, Kings Canyon, and Yosemite national parks. This work was part of Andi's dissertation research, and was published in the special feature issue of Ecosphere: Science for our Parks' Second Century in November 2016.

What are "assessment points"?

Assessment points are pre-selected points along a continuum of values that trigger the assessment of a resource (such as water quality) relative to management goals, natural variation, or potential concerns, such as human or ecological health. Development of nutrient assessment points that are specific to these sensitive lake ecosystems will help managers and policy makers make more informed decisions to protect national parks and other public lands.

How were assessment points developed?

Andi, with UCR and NPS colleagues, conducted experiments in several Sierra Nevada lakes to further understand and quantify the response of algae to increased lake nitrogen inputs. The experiments were conducted in containers called "mesocosms" that were deployed in the lakes. The water in the mesocosms did not mix with lake water they floated in, allowing the researchers to manipulate and monitor the lake chemistry within each mesocosm. The researchers conducted multiple experiments including at two size scales, using small and large mesocosms (See photo above and on next page for examples).

They added different levels of nitrogen to the lake water held in these containers and measured the nutrient concentrations and algal response over time. Algal growth response is measured using the concentration of chlorophyll a as an indicator. They used relationships between nitrogen concentrations and algal nutrient uptake and algal growth (or a "dose-response" approach) to calculate effective doses of nitrogen in relation to algal response levels. The assessment points are based on the dose levels and are defined as:

- 10% dose = initial response level (algal growth present)
- 50% dose = level where rapid growth of algae is likely to occur
- 90% dose = saturating level of nitrogen where it is no longer the growth-limiting nutrient in the system

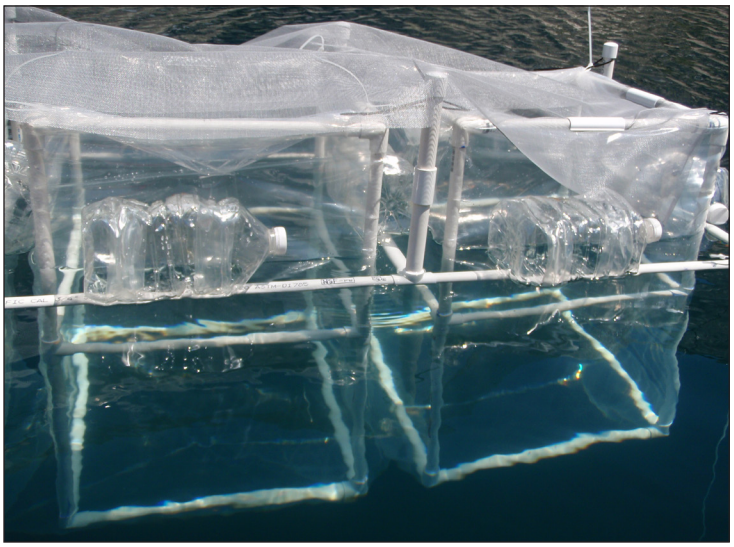
They used the dose response models to calculate the 10%, 50%, and 90% assessment points for nitrogen.

Assessing Nitrogen in Lakes *(continued from page 4)*

They calculated assessment points for early in the hydrologic season when snowmelt and subsequent runoff have a strong influence on lake processes and late in the hydrologic season when runoff and watershed hydrology have less influence on in-lake processes. The researchers found that the 10, 50, and 90 doses occur at relatively low concentrations of nitrogen (ranging from 0.33 to 18 µmol/liter) (Table 1).

Table 1. Nutrient assessment points for the early and late season time periods.

Season	10% Dose µmol/L	50% Dose µmol/L	90% Dose µmol/L
Early	0.89	4.0	18
Late	0.33	1.0	3.1



Close-up view of the larger mesocosms floating in a lake. These were made from polyethylene bags pulled over a PVC pipe skeleton. Smaller mesocosms were made from cubitainers.

How were these assessment points used to assess nitrogen in park lakes?

The data collected at 75 lakes between 2008 and 2011 by the SIEN lake monitoring program in Sequoia, Kings Canyon, and Yosemite national parks were compared against the 10% (low), 50% (moderate), and 90% (high) assessment points for early and late season time periods (Table 1 and Figure 1). A substantive portion of the lakes exceeded the derived assessment points: 28-37% of lakes exceed the 10% threshold indicating an early warning of initial change and up to 21% exceed the 90% threshold where nutrient saturation occurs and nitrogen is no longer the nutrient limiting growth.

What lakes are most sensitive to nitrogen deposition?

The most sensitive lakes and ones most likely to exceed the assessment points are located at higher elevations closer to the Sierra Nevada crest and in watersheds that have minimal vegetation and are north-facing with steep slopes. Vegetation takes up and stores nitrogen and also slows its flow downslope, reducing nitrogen reaching downslope streams and lakes. North-facing slopes are colder environments with less vegetation and shorter growing seasons; steeper slopes increase overland flow and have less vegetation.

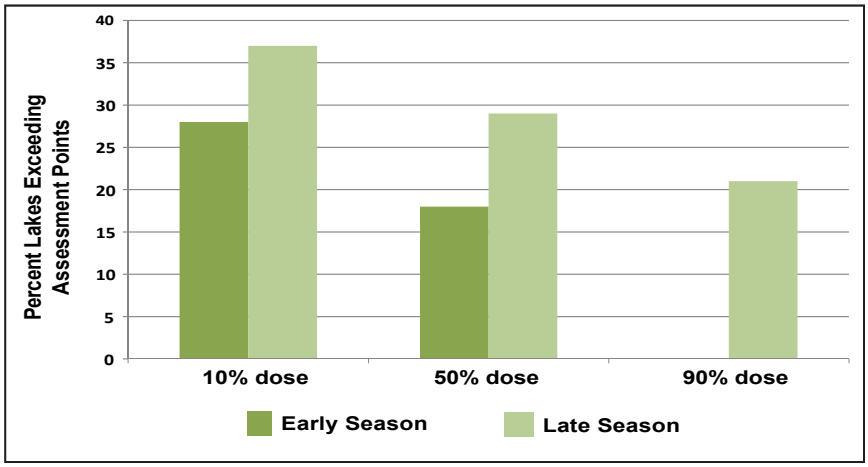


Figure 1. Percentage of lakes in Sequoia, Kings Canyon, and Yosemite that exceed early and late hydrologic season assessment points.

Nutrient limitation is a fundamental property of an ecosystem and thus a shift in the limiting nutrient represents a significant ecological change that affects productivity and the number and type of plants and animals that live in aquatic systems.

Management application of assessment points

Nitrogen assessment points are used to evaluate lake monitoring data to assess the status of sensitive high-elevation lakes in national parks and observe how this status changes over time. Managers can incorporate these into resource condition assessments and can use them to communicate the status of lakes to the public and policymakers who make decisions affecting air and water quality.

Stocking Lake, Kings Canyon National Park. NPS photo.

Belding's Ground Squirrels Declining

Study suggests strong impacts of climate change on these montane squirrels, but human land-use changes that provide supplemental food or water may buffer climate impacts in some places.

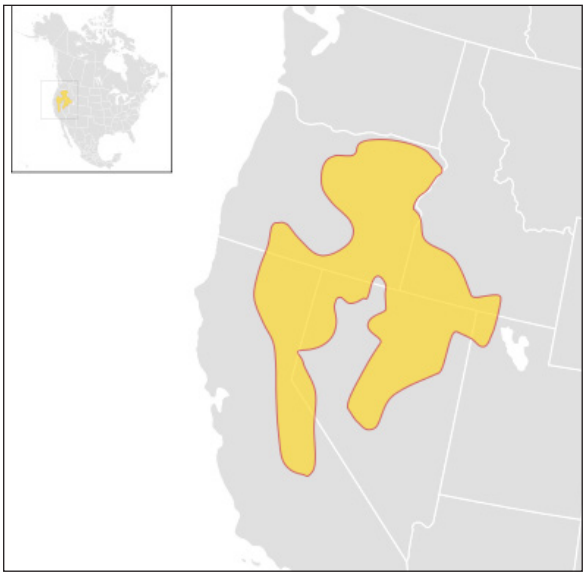
If you've approached a Sierra Nevada meadow and heard several shrill, short whistles in quick succession, and perhaps seen a house-rat sized squirrel near a burrow, or sitting upright eating plants or seeds, you probably have seen a Belding's ground squirrel.

These squirrels typically inhabit meadows between 6500 and 11800 feet in the central Sierra Nevada (as well as in several other western states - see range map to right). They also can be found in sagebrush flats, brush/grass areas, and cultivated areas. While called "often locally abundant" in Sierra Nevada meadows and grasslands in a 1963 Sierra Nevada Natural History field guide, recent research by Toni Morelli and colleagues (2012) has documented the loss of these squirrels from 42 percent of 74 sites where they once occurred.

Old datasets provide valuable baseline

It is only possible to quantify extirpation (local extinction) of a species if historical data exist as a baseline for comparison. Morelli and co-authors collected historical occurrences (1902-1963) of Belding's ground squirrels from detailed field notes at the Museum of Vertebrate Zoology at University of California, Berkeley. This time period predates the majority of evident impacts of anthropogenic climate change in California.

Belding's ground squirrel (*Urocitellus beldingi*) in Yosemite National Park. Photo by Yathin S Krishnappa (Own work) [CC BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons.



Belding ground squirrel distribution. By Map: NuclearVacuumEdits: Gaff - Map: File:BlankMap-North America-Subdivisions.svgData:IUCN Redlist iucnredlist.org/details/42464/0, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=38658060

In addition to surveying 74 sites where ground squirrels were historically documented, they also surveyed 47 sites where the squirrels were not previously documented but could be potential areas for colonization. They also surveyed short-grass areas like fields, meadows, campgrounds, and parks that could provide favorable habitat near the historic sites.

Remarkable rate of loss

This study found a "remarkable rate of extirpations (42%) without any concurrent colonizations in the previously surveyed range of the Belding's ground squirrel". The disappearance of this species "from much of its known California range in less than a century is alarming, as it is an important prey species for raptors and other carnivores and a potential indicator of meadow habitat" (Morelli et al. 2012).

Higher temperatures (during both the warmest and coldest times of the year) and wettest quarter precipitation were negatively correlated with persistence of Belding's ground squirrels. More study is needed to determine whether the range reduction was directly related to increased temperature and precipitation effects or indirectly from ecological impacts caused by climate change.

Belding's Ground Squirrels *(continued from page 6)*

"Anthropogenic Refugia"

Human modifications of habitats such as campgrounds and cultivated sites at low elevations provided "anthropogenic refugia" or areas where humans have modified the landscape in a way that has increased food or water availability (or both) for these animals. So while the natural range has contracted, human-modified sites have helped populations persist in some areas.

Belding's in Sierra Nevada parks

Belding's ground squirrels occur in Devils Postpile National Monument (DEPO), Sequoia & Kings Canyon National Parks (SEKI), and Yosemite National Park (YOSE). They are considered common in DEPO and YOSE and uncommon in SEKI.

One reliable place to see them is in Soda Springs Meadow not far from the DEPO Visitor Center. Superintendent Deanna Dulen said she plans to initiate an observation-based monitoring project with guidance from Jim Patton of the University of California Museum of Vertebrate Zoology.

"Observing the populations of Belding's ground squirrels at DEPO is useful because they are so accessible here and we can get so many observations," said Monica Buhler, Natural Resource Program Manager for DEPO. "This is a good place to test a monitoring protocol, refine it, and then make it available to apply at more sites in the Sierra Nevada."

Belding's ground squirrels often sit up on their back paws to watch for predators or eat plants. Photo by: Katie BarBera.

References:

Morelli, T. M., A. B. Smith, C. R. Kastely, I. Mastroserio, C. Moritz, and S. R. Beissinger. 2012. Anthropogenic refugia ameliorate the severe climate-related decline of a montane mammal along its trailing edge. Proceedings of the Royal Society B (2012) 279: 4279-4286.

Storer, T. I. and R. L. Usinger. 1963. Sierra Nevada Natural History. University of California Press, Berkeley and Los Angeles, California.

Tracking Algal Blooms in Mountain Lakes

If your hiking plans include passing by or camping at mountain lakes, consider downloading the app WATR2016 for your smartphone. This app allows you to take pictures of algae growing in shallow waters along the shores of the beautiful lakes that are destinations for many Sierra Nevada hiking trips. The algae are of interest to the Colorado State University and USGS scientists who developed this app, because they may indicate changes related to air pollution or climate change.

Scientists are seeing this in a few lakes in Colorado and California, but cannot watch all of the lakes.

These images will help scientists understand where, how, and when wavy green algae are appearing. To learn more, visit http://tiny.cc/WATR2016. You can download the WATR2016 app at the App Store.

Example photos of algae in water and on rocks.

Monitoring Fire-Followers: Special Status and Invasive Plants in Yosemite National Park

by David Campbell

Biologist, Yosemite National Park

Wildfires are natural and common in Yosemite National Park. Recent fires include the third largest in California history, the Rim Fire in 2013. While many people see the obvious change in the landscape and lament the destruction left behind in fire's wake, many are unaware of the subset of our flora that actually benefits from fire. Unfortunately, non-native invasive plants can also capitalize on newly exposed resources.

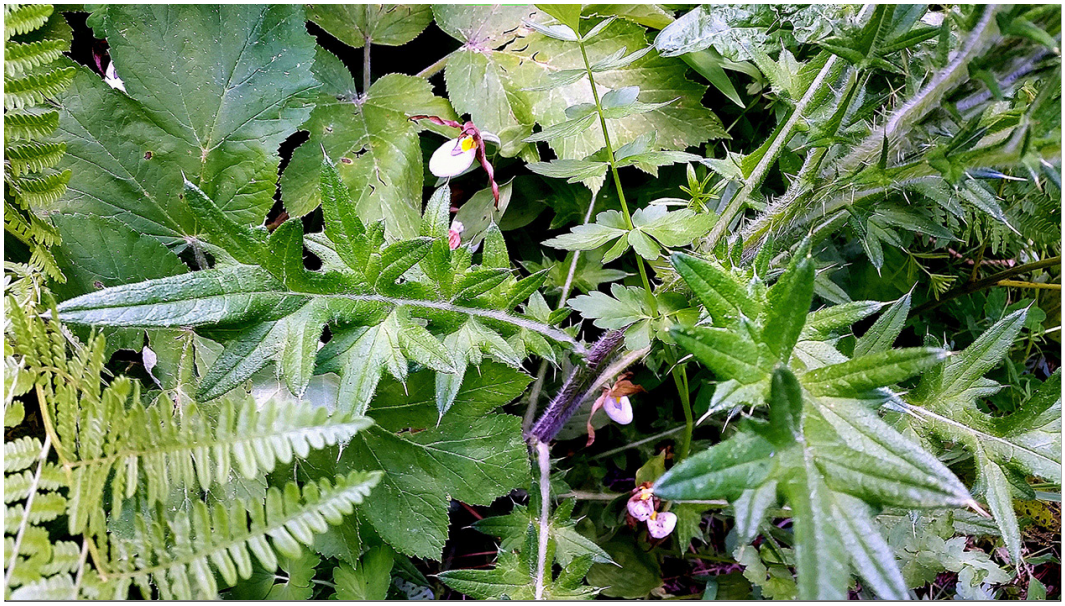
Following the Rim Fire, Yosemite National Park implemented targeted surveys to discover populations of special status, fire following plants and non-native, invasive plants. These projects were funded by the Yosemite Conservancy and Burned Area Rehabilitation.

Fire followers are typically annual species that respond to environmental cues from fire, such as smoke, heat, and nutrients, or simply an increase in water and light, to trigger their germination and growth. They rapidly expand from persistent populations or germinate where they've lain dormant for decades. Some are rare endemics with a limited distribution in both space and time.

We surveyed 5,290 acres and found 32 species of special status plants covering 253 acres. We documented new occurrences of two California state listed rare plants and found a species that hadn't been documented in the park before. We discovered 338 acres of invasive plants and treated 200 acres.

Invasive plants can occupy the same post-fire ecological niche as special status fire followers and they out-compete species that don't respond favorably to fire. Special status fire followers are also vulnerable to disturbance while dormant and unnoticed between fires. Continued treatment of high priority invasives, monitoring the success of those treatments, and surveying and monitoring special status plant populations in this critical time frame is the only way to discover their true range and ensure their long term survival. To protect them, we must first know where they are.

The pansy lipped monkeyflower, *Mimulus pulchellus*, exploding the first year after the Rim Fire. This special status plant is endemic to just a handful of counties in the central Sierra Nevada.



This is a newly discovered population of the uncommon mountain lady's slipper orchid, Cypripedium montanum, a special status plant more characteristic of cool wet habitats, and not a fire follower. Directly competing against it is the non-native bull thistle, *Cirsium vulgare,* which aggressively invades burned areas.

Fire followers are annual plants that respond to cues from fire, such as smoke, heat, and nutrients, or simply increase in water and light, to trigger their germination and growth. Invasive plants can occupy the same post-fire ecological niche as special status fire followers.

Monitoring Project Updates

Birds

The Institute for Bird Populations (IBP) has returned to the Sierra Nevada Network parks for the 6th season of bird monitoring. This year we are excited to welcome two members of the North Coast Cascades Network (NCCN) bird research community to the Sierra Nevada. Mandy Holmgren, Staff Biologist with IBP, is stationed in Sequoia as the SIEN crew lead. Mandy has been part of the North Coast Cascades Network (NCCN) bird monitoring program since 2006, where she leads the research teams that track nesting birds in Olympic, North Cascades, and Mt. Rainier national parks. Mandy is joined by teammate Rosa Cox, who has spent the last several summers working on aquatic restoration and forest monitoring projects in SEKI and SIEN.

The Yosemite crew is being led by Graham Montgomery, now in his fourth year of working with IBP. He and Charlotte Cumberworth, who also worked with IBP in the Tahoe region last summer, will spend the season visiting transects in YOSE and DEPO.

This will be a particularly challenging season, as the record snowpack at high elevations will likely make it difficult to access the highest and most remote sites during the bird breeding season.

Bird crew members (left to right): Charlotte Cumberland, Mandy Holmgren, Rosa Cox, and Graham Montgomery. Photo: Graham Montgomery.

How are these data being used? SIEN is part of a collaborative project with IBP and NCCN ecologists to analyze bird and high elevation forest monitoring data from North Cascades, Mt. Rainier, Yosemite, Sequoia, and Kings Canyon national parks. Apparent declines in Clark's Nutcracker and an important host tree, whitebark pine, in the NCCN parks led to the initiation of a multi-network project to evaluate the relationship between these species, using data from two of our long-term monitoring projects.

Contact: Sylvia Haultain

Rivers

The SIEN River Hydrologic Monitoring Protocol received final approval this past winter after undergoing an arduous peer-review process. Although SIEN has been working with the parks to monitor hydrology at existing river gaging stations for several years, we are looking forward to our first season fully implementing a finalized protocol! The protocol reports on 14 gages in and near Sequoia, Kings Canyon, Yosemite, and Devils Postpile. Eleven of these gages are operated by cooperators that will share data with SIEN on an annual basis. The remaining three gages are operated collaboratively by SIEN, USGS, YOSE, and DEPO and include the Middle Fork of the San Joaquin in Devils Postpile, Tuolumne River at Tioga Bridge, and Lyell Fork of the Tuolumne below Maclure. Devils Postpile staff and the USGS maintain the gaging station and conduct monthly streamflow measurements year round at the Devils Postspile gage. Yosemite staff operate the two Tuolumne River sites and conduct monthly site visits during the snow free season. We anticipate a later start than usual this season due to the large snowpack which will limit early season access to Tuolumne Meadows and these more remote sites. SIEN will be providing technical guidance to the parks and taking the lead on data management for the Yosemite sites. USGS manages the data for the Devils Postpile gage.

Contact: Andi Heard

Davis Lake, Kings Canyon National Park. Photo: Bob Meadows.

Project Updates *(continued)*

Lakes

2017 is a planned "rest" year for lake monitoring, which occurs approximately every four years in sync with completion of a full panel rotation. SIEN uses rest years as a budgeting and resource strategy for long-term program sustainability. A rest year for lakes does still include a limited monitoring effort. We will have a crew sampling water chemistry at the outlets of the eight annual panel sites, which are located across Sequoia, Kings Canyon, and Yosemite national parks. This is reduced from the typical 25 sites per season and there will be no mid-lake sampling or amphibian surveys. Sampling will occur throughout the months of August and September. Our primary crew member will be Liz Bartholomew who is returning from last year. In addition to her previous lake monitoring experience Liz has also worked on the SIEN bird and forest crews and will be working the first part of her 2017 season with the Yosemite owl crew. Liz will be joined by Rosa Cox, former SIEN forest and bird crew member, on the SEKI trips and by a Yosemite Physical Sciences field technician on the YOSE trips. SIEN forest and wetland crews will also help out and sample a couple lakes in Kings Canyon that are near their plots.

Contact: Andi Heard

Wetlands

This is the 4th season that the wetlands monitoring protocol will be conducted in SIEN parks. The project focuses on assessing weland ecological integrity measured by multiple metrics including groundwater hydrology, soil characteristics, plant species composition and abundance, terrestrial and aquatic macroinvertebrate composition and abundance, and other measures of wetland function and stressors. The crew lead is Roxanne Kessler (4th season on SIEN crews, including lakes and forests) and she will be supported by Wesley Meyers (2nd season) in an assistant crew lead role. They will be joined by Stephanie Bartlett (2nd season) and a Geologists in the Parks intern Keven Griffen (1st season). The crew will be visiting plots in Yosemite, Sequoia, and Kings Canyon national parks as well as a site in Devils Postpile National Monument. The crew will also be finishing field based accuracy assessment of the Yosemite wetland map that was completed in 2014.

Contact: Jonny Nesmith

High-elevation Forests

The forest crew is embarking on the 6th season of monitoring high-elevation white pines. The crew will be led by Sean Auclair (4th season) and joined by Hanna Mohr (2nd season), Tressa Gibbard (2nd season), and Sam Zuckerman (1st Season). They will be joined by Jenny Cribbs (1st season), who will be assisting with selected field work as well as working to help wrap up an ongoing project focused on white pine blister rust occurrence and severity in Sequoia and Kings Canyon National Parks. The high-elevation forest project is a multi-network monitoring project designed to assess current status and trends of forest structure, demography, and incidence and severity of disease and insects occurrence in several white pine species.

Contact: Jonny Nesmith

Sierra Nevada Network

The Sierra Nevada Network is one of 32 National Park Service inventory and monitoring networks that monitor vital signs to assess the condition of park ecosystems and contribute to a body of scientific knowledge that informs park management decisions.

Parks in the network are:
César E. Chávez National Monument (CECH)
Devils Postpile National Monument (DEPO)
Sequoia & Kings Canyon National Parks (SEKI)
Yosemite National Park (YOSE)

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Whitebark pine stand, Yosemite NP. Photo: Brianne Permar.