National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science
Sierra Nevada Network

DEVILS POSTPILE • SEQUOIA & KINGS CANYON • YOSEMITE

Volume 6, Issue 1
December 2016

Sierra Nevada Monitor

Newsletter of the Sierra Nevada Inventory & Monitoring Network

Bird BioBlitz: César E. Chávez National Monument

BioBlitz participants viewing birds in the oak woodlands of Cesar E. Chavez National Monument.

Google map showing the locations of the April 16th BioBlitz bird observations for César E. Chávez National Monument near Keene, California.

A small, but enthusiastic group gathered at César E. Chávez National Monument (CECH) on April 16, 2016 to survey birds as a BioBlitz event in celebration of the National Park Service Centennial. The effort established the first bird list for the monument, documenting 43 species and over 350 individual birds. Visit the iNaturalist site for an interactive map and more information about BioBlitz results.

Sierra Nevada Network (SIEN) staff coordinated this BioBlitz in collaboration with the CECH Superintendent Ruben Andrade and the Cesar Chavez Foundation. This was a great opportunity for SIEN, Sequoia & Kings Canyon National Parks, and the public volunteers to contribute biological information to this important historical site.

"This was a great event for César Chávez National Monument," said Superintendent Andrade. "Up until this survey, we had no information to share with the visitors about birds at the monument. We now have the start of a bird list for our visitors. It is my hope that we can host an event like this again next year."

CECH was established in 2012 as a national monument by President Obama to mark the extraordinary achievements and contributions to the history of the United States made by César Chávez and the farm worker movement.

In This Issue

Staffing Updates.....2
Data Management Review.....3
What's New at Devils Postpile....3
Project Updates.....4
Botanist Moves on to Utah.....6
Inventories, Next Phase.....6
Foothill Botany Forays.....7
Reports and Publications 7
I&M in Mongolian Parks.....8
New Field Station Director.....9
SEKI Science Symposium.....10
New Millipede Species.....10

Sierra Nevada Network Inventory & Monitoring

As part of the National Park Service's effort to "improve park management through greater reliance on scientific knowledge," a primary role of the Inventory and Monitoring (I&M) Program is to collect, organize, and make available natural resource data and to contribute to the Service's institutional knowledge by facilitating the transformation of data into information through analysis, synthesis, and modeling.

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

Sierra Nevada Network
Sequoia and Kings Canyon National Parks
47050 Generals Highway
Three Rivers, California 93271
http://science.nature.nps.gov/im/units/sien/

Program Manager
Sylvia Haultain (559) 565-3788
sylvia_haultain@nps.gov

Data Manager
Alex Eddy (559) 565-3709
alex_eddy@nps.gov

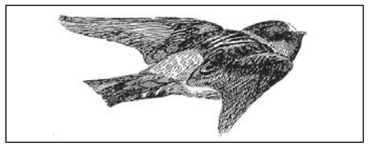
Physical Scientist
Andi Heard (559) 565-3786
andi_heard@nps.gov

Ecologist
Jonny Nesmith (559) 565-3765
jonathan_nesmith@nps.gov

Administrative Assistant
Jenny Matsumoto (559) 565-3787
jenny_matsumoto@nps.gov

Science Communication Specialist
Linda Mutch (559) 565-3174
linda_mutch@nps.gov

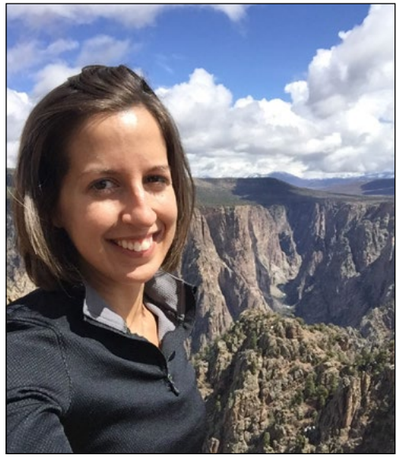
Please distribute this newsletter to any person or group who is interested. Contact Editor Linda Mutch to be added to the mailing list.



Cliff Swallow.

New Data Manager: Alex Eddy

The Sierra Nevada Network welcomes Alex Eddy as our new Data Manager. Her primary interests lie in the nexus between the environment and society — she is specifically focused on leveraging data and technology to support resource decision-making and responsible environmental stewardship.



Alex Eddy, Black Canyon of the Gunnison National Recreation Area, Colorado.

Alex previously worked for the National Park Service as a Cartographic Technician at Sequoia and Kings Canyon National Parks, as well as at Gateway National Recreation Area and the National Parks of New York Harbor. She has also worked in positions at state and local governments, and in several academic environments dedicated to exploring landscape-level environmental issues.

She has a strong foundation in science and geospatial theory provided by her undergraduate and graduate studies at Ohio State University (OSU). She has a B.S. in Geography (with a specialization in GIS and Analytical Cartography and a second major in Geology) and a Master of Arts Degree in Geography (with a specialization in Society and the Environment).

As part of OSU's Glacier Environmental Change group, Alex integrated geochemical and spatiotemporal analysis to evaluate glacier-associated hydrologic systems in the Peruvian Andes.

Alex will be stationed at the Sierra Nevada Network office in Sequoia National Park.

Andi Heard Now Permanent Physical Scientist

Andi Heard on a lake monitoring trip in Yosemite National Park, August 2015.

Physical Scientist Andi Heard, who has worked with the Sierra Nevada Network since 2004, first as a student under a cooperative agreement with Colorado State University, and then as a term and Pathways physical scientist, was hired as a permanent physical scientist in February of this year. Congratulations, Andi!

Andi manages the network's lakes, rivers, and climate monitoring protocols and was involved in all the stages of developing the network's vital signs monitoring plan.

Data Management Review Benefits Network

Sound data management is core to the success of a long-term monitoring program, where information must be accessible both for current managers and scientists as well as those in the future, allowing evaluation of park resource condition for decades to come. The Sierra Nevada Network (SIEN) initiated an evaluation of its data/information management program in February 2016 to help guide the new data manager and other SIEN staff in the coming years.

Peter Lindstrom, Data Manager in Yosemite National Park, conducted the evaluation as a detail funded by the National Park Service Inventory & Monitoring Division (IMD). The SIEN staff is grateful to: Peter for his thorough work and insights, Yosemite National Park for making him available, the IMD for funding the detail and providing helpful input, and all the park staff who responded to survey questions and provided thoughtful input and comments that informed the evaluation.

A brief summary of the evaluation is that SIEN has the infrastructure and Information Technology support its needs and has succeeded in designing and implementing a majority of its monitoring projects, creating procedures for the effective collection and review of data. More attention now is needed on data sharing and product production to mitigate risks to data utility and longevity, and ensure that the information produced is available for years to come. The report will be made available after outside reviews are complete.

Peter Lindstrom, Yosemite Data Manager.

What's New at Devils Postpile?

Two New Mammals Documented

Staff from the Museum of Vertebrate Zoology and the now retired SIEN Data Manager Les Chow continued a mammal inventory initiated in 2015 in Devils Postpile National Monument (DEPO). In June, they trapped a heather vole (*Phenacomys intermedius*), a rare and typically high elevation mammal associated with heather, but at DEPO was found in a Jeffrey pine-lodgepole stand. Another exciting finding was a flying squirrel (*Glaucomys sabrinus*) in dense lodgepole pine in September. This is the first known record of this species for the upper San Joaquin River basin!

Jim Patton, retired from the UC Berkeley Museum of Vertebrate Zoology, instructs DEPO Student Conservation Association Intern Julie Chuong on mammal sampling methods (above). Julie weighs a deer mouse (right). NPS photos by: Monica Buhler.

State of the Park Report Completed

The DEPO State of the Park report was completed in April 2016 and can be accessed at the following site: https://www.nps.gov/stateoftheparks/depo/.

Congratulations to DEPO staff on this effort. Sierra Nevada Network, Yosemite, and Sequoia & Kings Canyon National Parks staff assisted with writing portions of the report and providing subject-matter expertise and review where needed.

From the Field: 2016 Project Updates

High-elevation Forests

This summer was the fifth season of sampling for the high-elevation white pine monitoring protocol. The purpose of this project is to document and interpret changes in community dynamics in forests containing white pine species (whitebark pine, *Pinus albicaulis* and foxtail pine, *P. balfouriana*) within Sierra Nevada Network (SIEN) parks. This protocol is shared with the Klamath and Upper Columbia Basin Networks in order to assess high-elevation white pine population dynamics at a regional scale.

Two crews sampled data for this long-term monitoring project, as well as for a separate project focused on assessing change in white pine blister rust (WPBR) severity and occurrence in Sequoia and Kings Canyon (SEKI) since the mid-1990s. The crew members were leads Sean Auclair and Pete Del Zotto, plus Rosa Cox, Vladimir Kovalenko, Hanna Mohr, and Matthew Mosher. The crews installed three new foxtail plots in Sequoia & Kings Canyon (SEKI), and two whitebark plots in Yosemite (YOSE). They re-visited 22 plots in SEKI and ten plots in YOSE and scouted 14 additional potential sites in SEKI for sampling in 2017.

In collaboration with a USGS crew, the forest crews also completed re-measures of 50 WPBR plots in SEKI. We expect to complete fieldwork for that project in 2017. Observations of WPBR and beetle activity continue to be rare in the subalpine forests, though preliminary results indicate that the incidence of WPBR is increasing.

Forest crew member Matt Mosher measures a lodgepole pine in a Sequoia National Park monitoring plot.

Contact: Jonny Nesmith

Wetlands

Wetlands monitoring crew members Talia Chorover, Wesley Meyers, and Corie Cann assess a soil profile.

Last summer was the third field season for the wetlands ecological integrity monitoring project. The project monitors wetland plant communities, groundwater levels, and macroinvertebrates, and targets two types of wetlands: wet meadows and fens within SIEN parks.

The crew included: Corie Cann (crew lead), Stephanie Bartlett, Talia Chorover, and Wesley Meyers. The crew installed and sampled four sites in SEKI, three sites in YOSE, and re-read an additional 11 plots, including the site at Devils Postpile National Monument. The crew also continued work on the accuracy assessment portion of the YOSE wetland mapping project. The field component of the project is expected to be completed next year.

Other highlights from the 2016 field season included the identification and partial removal of a newly discovered weed population of *Lactuca serriola* in Kings Canyon NP. SIEN staff will continue to assist with eradication efforts in coordination with SEKI staff next year. Another highlight was that while hiking up Blue Canyon in Kings Canyon NP, the crew collected voucher material for ***Ivesia unguiculata***, a species which had previously been recorded as occurring in SEKI, but had been removed from the parks' species list due to lack of both voucher material and observational data of its occurrence. This California endemic, which is categorized as rare by the California Native Plant Society due to its limited distribution, can now be added to the SEKI vascular plant list.

Contact: Jonny Nesmith

Ivesia unguiculata, also known as Yosemite mousetail, now added to the Kings Canyon National Park plant species list.

Field Updates

Lakes

Physical Science Technician Megan Mason collects a water sample from Arndt Lake, Yosemite National Park.

The lakes project completed its ninth field season this year. This season also marks the second round of completion of our monitoring panels, meaning that sites on the rotating panels have all been visited twice now.

Crews sampled water chemistry, recorded lake temperature profiles, and conducted shoreline amphibian surveys at 25 lakes throughout Sequoia, Kings Canyon, and Yosemite national parks. Megan Mason (crew lead) and Jacob Seidel, our Yosemite based crew, had a fantastic season sampling all the Yosemite sites, plus traveled south to sample three lakes in Sequoia and Kings Canyon. Roxanne Kessler (crew lead) and Liz Bartholomew, our Sequoia based crew, also had a successful season sampling lakes throughout Sequoia and Kings Canyon.

Lake monitoring will have a 'rest' season in 2017, where sampling will be limited to annual panel sites.

Contact: Andi Heard

Rivers

The focus of Fiscal Year (FY)16 was addressing peer-review comments for the rivers protocol. The revised version is nearly complete and will be resubmitted in early FY17. In the meantime, we have been working with park staff to implement the protocol at the three Sierra Nevada Network-supported gages: Middle Fork of the San Joaquin in Devils Postpile (DEPO), Tuolumne River at Tioga Bridge (YOSE), and Lyell Fork of the Tuolumne below Maclure (YOSE). DEPO staff collected streamflow measurements on the San Joaquin through the summer and will continue monthly measurements through February when USGS takes over to capture late winter and spring runoff flows. Yosemite staff conducted field monitoring at the Tioga Bridge and Lyell Fork stations from May through September and are incorporating SIEN protocols into their field work and data management procedures.

Contact: Andi Heard

If there is snow, winter measurements of the Middle Fork of the San Joaquin River in Devils Postpile National Monument require skiing to the monument.

Birds

The bird project returned to field sampling this year after a rest and reporting year in 2015. The Institute for Bird Populations (IBP) completed a draft synthesis report following the 2014 completion of the first four years of sampling. The report is in review and will be published later this year.

Liz Bartholomew returned to be the crew lead, and she led the intensive field training of new crew members with assistance from Bob Wilkerson of IBP.

New members of the field team were: Stephanie Bartlett, Madelyn Ore, and Keelan Dann. Liz and Stephanie conducted the YOSE and DEPO sampling, while Madelyn and Keelan did the SEKI sampling. Other IBP contractors and staff provided additional sampling support.

It was a successful season: All 27 YOSE transects, 26 out of 27 transects at SEKI, and all of the points at DEPO were sampled.

A few bird highlights:

Black-backed Woodpeckers, which typically feed in recently burned areas, were found both at numerous burned areas and in several green forest locations in YOSE.

A pair of White-faced Ibises was observed on the first day of training in Yosemite Valley, and a pair was also observed at Hetch Hetchy Reservoir later in April.

Higher-elevation species appeared to have a successful breeding season, and Rufous Hummingbird, on post-breeding southbound migration, was detected on a daily basis starting in early July at high elevation sites throughout SEKI and YOSE.

Contact: Sylvia Haultain

Wetlands Crew Lead Moving on to Utah

Corie Cann, Biological Science Technician and botanist extraordinaire, has led the first three seasons of field sampling for the Sierra Nevada Network's (SIEN) wetlands monitoring protocol. Prior to her work with SIEN, she worked six seasons in Sequoia and Kings Canyon National Parks for the vegetation management and plant ecology programs, working on weed management and meadow monitoring projects.

Corie using an auger to sample a wetland soil profile.

Corie has accepted a permanent, subject-to-furlough (so she still has time for her winter travel adventures) position with the U.S. Forest Service in southern Utah, working with the Forest Inventory & Assessment program.

While Corie looks forward to getting to know a new place and flora, she hopes to return to the Sierra Nevada someday.

"It's really a fantastic community – I've been fortunate to work with so many great people who have taught me so much. Also, the Sierra are so incredible, and my work has taken me to lots of hidden corners of the range…but there is always more to explore," Corie explained.

As for favorite places in the parks' vast wilderness?

Upper Blue Canyon (in Kings Canyon National Park) is a special place that I'm always excited to return to, but I probably have at least another dozen favorite spots. Pretty much everything around the Great Western Divide from Cloud and Deadman canyons to the Kern River headwaters (in Sequoia National Park) is also magical.

For the long-term, Corie "would like to continue studying plants in any job I do."

Corie on a bicycling trip in Cuba, 2015.

And what does Corie do in the winters?

Travel! Usually my husband and I take a bit of time once we're both done for the season to travel around the US and see friends and family- then we take off for an international adventure. This year we will be bicycling around the southern islands of Japan. We've also done bike tours of Chiapas, Cuba, and across the Himalayan foothills of India and Nepal. In South America we have typically done backpacking/ mountaineering trips and have seen most of the length of the Andes.

Park Input for Next Phase of Inventories

The large-scale baseline inventories that were initiated in the 1990s, such as geology, soils, vegetation, and water resources, are approaching completion, and the Inventory & Monitoring Division is planning a scoping process where parks and networks provide input on local inventory needs and priorities.

Purposes for upcoming scoping sessions to take place at regional, network, and park levels are:

- Define what natural resource inventories are needed to support management of park resources;
- Ensure data are relevant and support science-based management;
- Highlight importance of data dissemination and integration;

Park staff can expect to receive a pre-scoping survey that will help to identify current use of existing inventory products and identify new ideas for consideration. Please take the time to complete this survey.

USGS photo by Peggy Moore.

Botanist conducts plant survey in Yosemite.

Local Foothill Outings for Moss Enthusiasts

The Bryophyte Chapter of the California Native Plant Society has scheduled its annual SO BE FREE (Spring Outing; Botanical Excursion; Foray, Retreat, and Escape the Environment) for March 27-30, 2017 in the Sierra Nevada foothills just outside of Sequoia National Park. The main focus of SO BE FREE is bryophytes (mosses, hornworts, and liverworts), but experts on other groups of plants (or complete novices!) are encouraged to participate.

SO BE FREE includes outings to local habitats, which are rich in bryophytes, including areas where the valley fog hits the rock outcrops and oak savannahs. It may be possible to take a group up into the giant sequoia forests. There will be evening slide shows and informal talks as well as bryophyte keying sessions with microscopes.

SIEN Ecologist Jonny Nesmith examining wetland bryophytes near Shorty's Meadow, Kings Canyon National Park. Bryophytes contribute to biodiversity and are important in maintaining hydrological conditions in Sierra Nevada wetlands.

We are excited to help host this event, which will focus many pairs of trained eyes on the bryoflora of Sequoia.

This year, the group especially encourages participation by land management agency staff and welcomes participants of all skill levels.

This event will be based at Saint Anthony Retreat Center in Three Rivers, California. For California Native Plant Society members, there is no cost to participate, and for non-members, there is a $25 fee. Those staying at the retreat will have lodging and meal costs. See http://bryophyte.org for more information and to download a registration form. The regular registration deadline is December 15, 2016. Late registration must be received by February 27, 2017.

New Publications and Reports

Physical Scientist Andi Heard participated in the Air Quality and Ecosystem Services Workshop in Thousand Oaks, CA, February 24-26, 2015. The purpose of the workshop was to identify linkages between the effects of air pollution on natural resources and ecosystem services (i.e., services provided by nature that are valued by society) with the broader goal of informing environmental policy and management decisions. Following is the report that resulted from this workshop:

Blett, T. F., M. D. Bell, C. M. Clark, D. Bingham, J. Phelan, A. Nahlik, D. Landers, C. Davis, I. Irvine, and A. Heard. 2016. Air quality and ecosystem services workshop report: Santa Monica Mountains National Recreation Area, Thousand Oaks, CA – February 24-26, 2015. Natural Resource Report NPS/ NRSS/ARD/NRR—2016/1107.

Other publications include:

Heard, A. M. and J. O. Sickman. 2016. Nitrogen assessment points: Development and application to high-elevation lakes in the Sierra Nevada, California. Ecosphere 7(11): e01586. 10.1002/ecs2.1586. [Part of the Ecosphere Special Feature Issue celebrating 100 years of National Park Service science by highlighting the agency's Inventory & Monitoring Division contributions.]

Mazer S.J., K.L. Gerst, E.R. Matthews, and A. Evenden. 2015. Species-specific phenological responses to winter temperature and precipitation in a water-limited ecosystem. Ecosphere 6(6):98 http://dx.doi.org/10.1890/ES14-00433.1.

Nesmith, J. C. B., A. J. Das, K. L. O'Hara, and P. J. van Mantgem. 2015. The influence of prefire tree growth and crown condition on postfire mortality of sugar pine following prescribed fire in Sequoia National Park. Can. J. For. Res. 45(7): 910-919. dx.doi.org/10.1139/cjfr-2014-0449.

Stuart, T. H. 2016. Effects of snowpack on avian abundance and species richness in Sierra Nevada forests. M.A. Thesis, University of Colorado, Colorado Springs, Colorado.

Inventory & Monitoring Guidance for Yosemite's Mongolian Sister Parks

Yosemite National Park has a sister park relationship with three Ulaan Taiga Specially Protected Areas of northern Mongolia. SIEN's retired Data Manager Les Chow participated in the July 2016 advisory trip to these protected areas, along with Joe Meyer, Physical Sciences Branch Chief for the Resources Management & Science Division in Yosemite and Peggy Moore, Plant Ecologist with the USGS Yosemite Field Station.

Their overarching goal was to identify the steps necessary for initiating an inventory and monitoring program for the three protected areas (which include Horidol Saridag Strictly Protected Area, Tengis-Shishged National Park, and Ulaan Taiga Strictly Protected Area) all managed by one set of staff. Specific goals included:

- Review natural resources and resource issues of Ulaan Taiga Specially Protected Areas
- Identify and prioritize tasks to establish an inventory and monitoring program for the protected areas
- Identify spatial data sets to be included in a geographic information system
- Recommend research efforts that would inform an inventory and monitoring program

Peggy Moore (left) and Les Chow and Joe Meyer (middle) with Mongol Ecology Center staff.

They spent time both in the office with the protected area staff (including the Director, Resource Specialists, and Rangers) as well as time in the field reviewing key resources, information needs, threats, and management challenges. Important threats to natural resources include illegal logging and mining as well as poaching for both subistence (meat) and trafficking of horns and organs.

The group has a draft report under review that provides an overview of the protected area setting, resources,

Joe Meyer with Ulaag Taiga rangers in the Horidol Saridag Strictly Protected Area, with rugged Ibex habitat in the background. Photo: Les Chow.

and issues, and makes specific recommendations for establishing an inventory and monitoring program. The National Park Service Inventory & Monitoring Division's framework and approach informed the recommendations.

Les, Peggy, and Joe came away with rewards and learning experiences of their own from the trip.

A few highlights included:

- Learning about the scale and complexity of the landscape in relation to the limited size of the staff: A total of 30 rangers patrol over 3 million acres of protected-area lands year-round, in an area described as having a 'severe continental climate' with most of the precipitation falling in the summers and winters characterized by very cold temperatures.
- The hosts were warm, welcoming, and committed. Most are local, from herding families, and have a strong connection to community and place.
- The bighorn sheep of Mongolia (known as argali, or *Ovis ammon*) live in very different habitat from the North American bighorn sheep: rolling green hills rather than rugged rocky terrain. Their long legs enable them to run fast, important for escaping their primary natural predator, wolves.
- Siberian larch (*Larix sibirica*) dominates the forest zone (over 70%) and grows predominantly in areas of permafrost soils.

The Trust for Mutual Understanding provided financial support for this effort, and the Mongol Ecology Center provided coordination and assistance for field and travel logistics.

New Sierra Nevada Research Stations Director

Yosemite Field Station office, Wawona area of Yosemite National Park.

In 2006, two Sierra Nevada Research Stations were established in Yosemite and Sequoia national parks as a research partnership among the University of California-Merced, the national parks involved, and the U.S. Geological Survey.

The mission of these stations is to provide acceess to research and teaching in the national parks and adjacent national forests. They also provide public service, engaging the public in science-based activities and facilitating environmental education.

In July 2016, Anne Kelly came on-board as the new Research Stations Director based out of Yosemite, and she explains below her research interests and background, as well as her motivation and vision for this position. The Sierra Nevada Network looks forward to increased engagement with the local field stations and the partnership opportunities they provide.

Why did this position interest you?

The job of a field station director has always been a dream: working with scientists, educators, students, artists, writers; living somewhere beautiful; having the privilege of doing something new and different every day. As the director of UC Merced's Sequoia and Yosemite Field Stations, the popularity of the parks brings an even more diverse set of visitors to the station than most. Station visitors include graphic artists, cultural historians, local middle-schoolers, birdwatchers.... The biggest challenge and opportunity of these stations is to bridge connections between our station visitors and our communities to enhance our understanding and stewardship of our region. The parks are a great nexus for bringing people together, and it's a treat for me to be back in the Sierra, where I've spent so many years trying to understand its forests.

What are your research interests and educational background?

My primary research interests concern ecosystems at the landscape scale. Why do forests grow where they grow, how do they mediate the cycling of carbon and water through our region, and how might the ecosystems around us change with global climate change, and how will the changing ecosystems alter the landscape itself? My background is in astrophysics, and those techniques came in surprisingly handy for my PhD work in the Central Sierra, building on-the-ground forest physiology measurements and relating those to satellite observations.

My undergraduate degree is in astrophysics, but my favorite part was spending time at the observatories on remote mountaintops. After a few years at the NASA Jet Propulsion Lab, I got a high school science teaching credential, and taught for a little while in Los Angeles. When I found out that I could use my astronomy techniques to study plants, I jumped into a masters program, ground-truthing remote sensing of warming tundra in the high Arctic. I moved on to plant surveys in the Mojave, then fire ecology, and eventually my PhD in Earth System Science at UC Irvine.

Anne Kelly, ice-fishing in the La Sal Mountains in Utah.

Other thoughts...

The decades of research out of these parks has been strongly influential on how I understand California's forests. I feel privileged to work with Sequoia, Kings Canyon, and Yosemite, and I hope in my role as station director I can help to build on this important body of work for better stewardship of our region in the face of many complex challenges.

Sequoia & Kings Canyon Host Science Symposium

Research COLLABORATION, monitoring of ecological CHANGE, and COMMUNICATION of findings and challenges. These were the themes that emerged from the Sequoia and Kings Canyon (SEKI) Science Symposium November 9-10, 2016.

In celebration of the NPS centennial, the symposium brought together over 100 scientists, interpreters, and students to share current and long-term research as well as engage the next generation to build on and communicate what we know – and what we need to know.

What the parks learned from the symposium:

- These national parks have a rich legacy of long-term data sets and collaborative research that have informed how we steward park resources and will continue to provide valuable insights into the future.
- Research on response to drought, climate change, the fire suppression legacy, and other stressors is yielding results that we can build upon to inform management decisions now and into the future.
- Collaborative Science is the wave of the future. Land managers need scientists and scientists need input from managers to produce results with relevance to stewardship issues.

Sierra Nevada Network (SIEN) Ecologist Jonny Nesmith presents a lightning talk on high-elevation white pine monitoring. Four SIEN staff gave 5-minute lightning talks along with 11 SEKI staff.

- Science communication is not optional! We need to reach kids and adults from all walks of life in ways that help them see the value of parks as well as open space in their own neighborhoods.

--Koren Nydick , Ginger Bradshaw, and Theresa Fiorino
Sequoia & Kings Canyon National Parks

Park Cave Inventory Yields New Millipede Species

The newest species to be discovered in Sequoia National Park is a tiny millipede with 414 legs, 200 poison glands, and four penises. It is a cave-dwelling creature,discovered in the Marble Fork drainage of the Kaweah River, in a cave not far from the park's well-known Crystal Cave.

Sequoia & Kings Canyon National Parks and Jean Krejca of Zara Enivronmental LLC conducted an initial inventory of cave organisms in the early 2000s, documenting two dozen new taxa. In additional cave surveys from 2006 to 2009, Krejca located this millipede, and a recently published article introduces the tiny threadlike (and leggy!) millipede as *Illacme tobini*, named for NPS cave specialist Ben Tobin, who once worked at SEKI.

Extremely leggy millipede from Sequoia National Park cave. *Illacme tobini* photo by Paul Marek, Virginia Tech.

The millipede specialists who identified this species, Paul Marek and Bill Shear, immediately recognized its significance as "the evolutionary cousin of the leggiest animal on the planet, *Illacme plenipes*", which lives under giant sandstone boulders outside of San Juan Batista, California.

In an on-line news release, article authors Marek, Krejca, and Shear note that "by exploring our world and documenting the biodiversity of this planet we can prevent anonymous distinction, a process in which a species goes extinct before we know of its role in the ecosystem, potential benefit to humanity , or its beauty."

A recent High Country News article by Anna V. Smith about the millipede quotes SEKI Physical Sciences Branch Chief Annie Esperanza - "It's exciting as a scientist that there is more life out there than we even know. It's a continuing story of the biodiversity of these parks and these lands we're protecting."