



Sierra Nevada Monitor

Newsletter of the Sierra Nevada Inventory & Monitoring Network

Rough Fire: Impacts and Learning Opportunities



View of the Rough Fire from Park Ridge in Kings Canyon National Park, looking toward Grant Grove and Sequoia National forest, September 11, 2015. Photo: Tony Caprio.



The Rough Fire typically burned with lower severity in previous prescribed burns, such as this area of Cedar Grove in Kings Canyon National Park. Photo: Tony Caprio.

In August and September, the lightning-caused Rough Fire had a profound impact on Sequoia & Kings Canyon National Parks (SEKI) staff, visitors, and neighboring communities. The fire burned for nearly three months, and was declared 100% contained on November 6th. At 151,623 acres, the fire was the largest in the history of Fresno County, the largest in the state in 2015, and the fifteenth largest in state history. Although largely on U.S. Forest Service lands, the fire burned 9,285 acres in Kings Canyon, which resulted in the evacuation and closure of both Cedar Grove and Grant Grove areas.

The fire, which was a suppression fire from the time it started, destroyed four structures outside of the parks, and twelve firefighters were injured.

In addition to evacuations, the fire had widespread smoke impacts both within the parks and national forest

lands as well as regionally. Smoke impacts and area closures affected field crew schedules and logistics for Sierra Nevada Network monitoring projects (see page 7).

Wildland fire is an important natural process influencing plant and animal communities in the Sierra Nevada. For example, giant sequoia seeds need bare soil where fire has cleared pine needles, sticks, and other fuels, allowing these tiny seeds to take root. When fire kills shade-tolerant firs and other understory trees, more sun reaches the forest floor, favoring the growth of sequoia seedlings that require open, sunny conditions to thrive.

The Rough Fire burned through a variety of terrain and vegetation, from remote, rugged areas that were difficult for firefighters to access to frontcountry areas along roads and near developed areas. Vegetation,

terrain, and weather all affect fire behavior (such as the severity, intensity, rate of spread, and size of the fire). Trees and shrubs killed from effects of a four-year drought were common in many of the areas that burned and likely impacted fire behavior.

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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).

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



Pygmy Nuthatch. Photo: Gary Lindquist.

Data Manager Retiring in January

Les Chow, Sierra Nevada Network (SIEN) Data Manager, is retiring in early January. Les served in this position for seven years, working closely with project leads to ensure data management needs are met for SIEN's monitoring projects and providing data management guidance and leadership to our program. Les's background in wildlife management and research in SIEN parks enabled him to contribute valuable subject-matter expertise and insights to SIEN's biological inventories and monitoring projects. Les was also always willing to help with field crew logistics in Yosemite, where he had long-term experience implementing research projects in remote areas.

Prior to taking the helm of data management for SIEN, Les was a Research Wildlife Biologist with the US Geological Survey Yosemite Field Station for 15 years, and a Supervisory



Les Chow enjoying a wilderness trip in Kings Canyon National Park. Photo: Peggy Moore.

Biological Technician for the Research Office in Yosemite National Park for seven years.

We will miss Les but look forward to seeing him as a volunteer supporting wildlife inventories in SIEN parks — doing the fieldwork that is still his passion.

New Pacific West Region I&M Program Manager

Lisa Garrett returned to the Pacific West Region (PWR) in July 2015 as the new PWR Inventory & Monitoring (I&M) Program Manager. In this role, Lisa supervises most of the PWR Network Program Managers (such as SIEN's Sylvia Haultain) and facilitates collaboration among PWR networks as well as integration with the national Inventory & Monitoring Division in Ft. Collins, CO and other programs in the region.

Lisa served as the Southeast Region I&M Program Manager from 2012-2015, and prior to that was the Program Manager (2003-2012) and the Inventory Coordinator (2000-2003) for the Upper Columbia Basin Network.



Lisa Garrett in a pack raft and personal flotation device, participating in SIEN's lake monitoring field training in Yosemite National Park in July. Photo: Megan Mason.

We are pleased to have Lisa back in the PWR, and appreciate the experience and leadership skills she brings.

Lisa made her first visit to the Sierra Nevada Network in late July, meeting SIEN staff in Yosemite National Park for our lake monitoring field training.

Rough Fire

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Previous Burns Influence Fire Behavior and Effects

Park staff in Sierra Nevada national parks have used prescribed burns (or fires lit by fire management staff under carefully planned conditions) since the late 1960s to re-introduce fire to mixed-conifer forests where fire has historically played a vital role.

Although quantitative studies have not yet been done on the varied ecological effects of the Rough Fire, photographs and observations by SEKI Fire Ecologist Tony Caprio indicate that some of the previously prescribed burned areas show lower severity impacts on vegetation than areas that have not had recent fires.

Pre- and Post-Rough Fire Images:

Prescribed Burn Area (left pair) and Unburned Area (right pair) - All photos by Tony Caprio



Pre-Rough Fire image: Northwest area of Grant Grove in Kings Canyon National Park that had been prescribed burned twice, most recently in 2005.



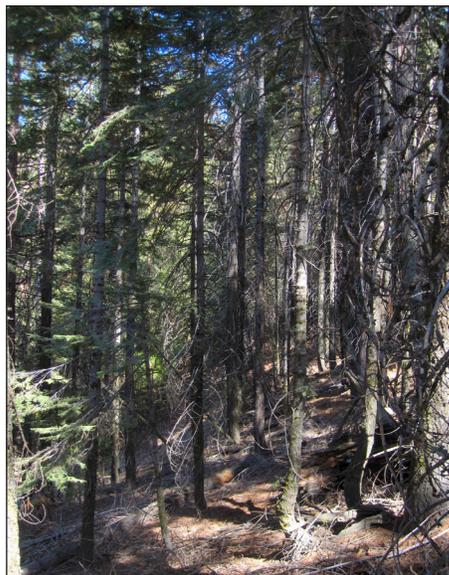
Post-Rough Fire image: Repeat photo of image above. Note that while small trees and shrubs were burned by the Rough Fire, most of the overstory trees remain intact.

Research done in large wilderness and other protected areas in the Rocky Mountains has demonstrated that previous wildland fires limit the spread of subsequent fires in all four areas studied (Parks et al. 2015). This research found:

- 1) *Wildland fire acts as a fuel break and is a barrier to subsequent fire spread; this effect is strongest immediately after a fire and diminishes with time.*
- 2) *The ability of a fire to act as a fuel break varies geographically, lasting 6 years in the warmest/driest study area and 14-18 years in the cooler/wetter study areas.*
- 3) *Extreme fire-conducive weather diminishes the ability of the previous fire*

to act as a fuel break.

Both the 2013 Rim Fire that affected Yosemite National Park and surrounding national forest lands, and the Rough Fire are large-scale events that offer opportunities to evaluate the effects of previous management actions (prescribed burning, managed lightning fires, thinning, logging) on the pattern of subsequent fire spread and fire severity. Site-specific information about the effectiveness of different management activities in limiting the severity and size of future fires would be helpful to those planning prescribed burns or thinning operations in national parks or forests.



The left image (pre-Rough Fire) shows an area in the northwest portion of Grant Grove that had not been prescribed burned. The right image is a repeat photo of the same area after the Rough Fire had burned it. Note the higher burn severity compared to the prescribed burn pair of images to the left: All the overstory trees appear to be killed by the fire, or severely scorched.

Monitoring changes in natural resources and processes over time and research projects designed to answer specific questions are particularly valuable on public lands where managers strive to better understand the effects of fire, climate, and other agents of change, to manage natural resources in ways that mitigate effects of unwanted change, and to interpret what they learn to a variety of public audiences.

Reference cited:

Parks, S.A., L.M. Holsinger, C. Miller, and C.R. Nelson. 2015. Wildland fire as a self-regulating mechanism: the role of previous burns and weather in limiting fire progression. *Ecological Applications* 25(6): 1478-1492.

First Sierra Nevada Network Video Completed

How many scientists and videographers does it take to name a new video? Quite a few, we found out, as we went through numerous iterations of titles for our program's first video, finally settling on:

Seeking Clarity: Tracking Change in Mountain Lakes

Fortunately, we had a talented, patient, and accommodating videographer, Eliza Goode, who graciously welcomed our input and always put people at ease who were in front of the camera being interviewed. Whether editing video for hours at her computer in our Sequoia National Park office, or backpacking to remote lakes to shoot footage of our field crews, Eliza was a joy to work with and taught us a lot about what it takes to make a video!

Eliza was hired as a Geoscientist-in-the-Parks/Geocorps intern through a program supported by the Geological Society of America (GSA) and the National Park Service. She recently graduated with a Master of Fine Arts in Science and Natural History Film-making from Montana State University, thus joined us with strong videography skills and an interest in making videos about national parks.

As Eliza expressed in a report to GSA at the end of her internship:

It's my conviction that even a short video about lake science can, and should, evoke a personal connection to the place it is about. The national parks belong to all



Videographer Eliza Goode films Sierra Nevada Network Physical Scientist Andi Heard in Sequoia National Park. Photo: Amy Brown.



Watch Video: <https://youtu.be/0WDQI4gZmyI>.

of us, and that makes them very special. It's incredibly gratifying to really feel that ownership, and stewardship, of such spectacular natural wonders. And because the scientists who I filmed are so charming and passionate about these places, I knew that viewers of the video would relate to them and care about the parks, too. When they spoke from the heart in their interviews, I was deeply moved.

As Eliza conveys, the field crew members who participated in this video were critical to its success. The four women who worked on our lake crews embraced the concept of the video and willingly participated in interviews, even after long days of field work. They clearly loved their work and spoke articulately about why it is important to them and to the parks. We thank Talia Chorover, Roxanne Kessler, Megan Mason, and Brina Mocsny for their roles in this project, and for helping ensure Eliza could film the field work and get their perspectives.

Our intent for the video was to provide an overview of our lake monitoring project by addressing the following:

- Why lakes are important to the parks and region
- Stressors that impact lakes, with emphasis on air quality issues
- What we monitor about the lakes
- Importance of understanding how the lakes may be changing

and implications for policy, management, and individual choices that can make a difference

- How we do the work
- Why the work is important to the people doing it

Through working with Eliza on this video project, we learned making a video requires pre-planning for objectives, audience, software, and equipment; making

extra time during field work for filming; ensuring enough time for editing and reviewing cuts of the video; and ensuring accessibility requirements (such as closed captioning and audio description) can be met. None of these steps are trivial and they require specific expertise and sufficient time and funding.



Yosemite lake crew members Brina Mocsny and Megan Mason, with Eliza Goode. Photo: Andi Heard. See page 6 for photo of SEKI lake crew members.

We hope to be able to do additional videos on our monitoring projects, as video provides a medium for sharing not just the scientific and management purposes for this work, but also the personal experience of monitoring national park resources and the love for the places and the work that keeps so many returning season after season.

The video is also available at our website: <http://science.nature.nps.gov/im/units/sien/>.

—Linda Mutch and Andi Heard

Documenting Mammals in Devils Postpile National Monument

To effectively manage wildlife and plan for future changes such as climate change impacts, it is critical to know what animals live in a park and what their habitat needs are.

Last August, Devils Postpile NM (DEPO) Superintendent Deanna Dulen initiated an inventory to fill in information gaps about the monument's mammals. Retired UC Berkeley Museum of Vertebrate Zoology Curator Jim Patton and Sierra Nevada Network (SIEN) Data Manager Les Chow conducted the mammal inventory.



Belding ground squirrels are commonly seen in Soda Springs Meadow in Devils Postpile and was a focal species to better document in this inventory. Photo: Katie LaBarbera.

In the ten days of sampling, Jim and Les:

- Documented the presence of four species that were expected to occur but had not been confirmed with voucher specimens: meadow jumping mouse (*Zapus princeps*), montane vole (*Microtus montanus*), bushy-tailed woodrat, (*Neotoma cinerea*), and the least weasel (*Mustela frenata*)
- Added one species to the monument's list of mammals: California, or Beechey, ground squirrel (*Otospermophilus beecheyi*)
- Documented ten additional species already noted as present on the monument's mammal list from previous inventory efforts

U. S. Geological Survey Ecologist Peggy Moore, DEPO Ecologist Monica Buhler, and Carol Patton also assisted with the inventory. While this was a mammal survey, it was also



Jim Patton holds a least weasel captured in the Devils Postpile mammal inventory. Photo: Carol Patton.

an opportunity to look closely at plants. Peggy saw a grass species on a gravel bar she did not recognize and identified it as *Alopecurus aequalis* (common names shortawn foxtail or orange foxtail). This species of grass is newly documented for the monument and is also a new species for Madera County.

The team plans to expand the mammal survey to other habitats and locations within Devils Postpile for Spring and Fall 2016.

Drought and Beetles Increase Tree Death in Sierra Nevada

By late August, U.S. Forest Service aerial surveys estimated that 18 million trees had died in Sierra Nevada national forests and parks. A combination of drought, pine beetles, and wildfires have killed a record number of trees.

In Sequoia and Yosemite national parks, the USGS Sequoia-Kings Canyon Field Station monitors tree growth, death, and birth rates in a network of 30 plots across an elevation gradient from lower mixed conifer to subalpine forests.

This year, in two low-elevation (5,000 ft) ponderosa pine-mixed

conifer plots located in Sequoia NP, Research Ecologists Adrian Das and Nate Stephenson report tree death rates of 12.8 and 19.2 percent compared to average annual rates of 1.6 and 2.2 percent for the previous 22 years of monitoring. Higher elevation forest plots have not shown unusually elevated mortality rates.

To better understand temporal and spatial patterns of forest response to drought, USGS scientists are sampling three plots more frequently during the field season (once per month instead once per season) and are working with university partners to collect remote-sensing data



View of dead conifers from Beetle Rock, Sequoia National Park. Photo: Nate Stephenson, USGS Sequoia-Kings Canyon Field Station.

of the parks' mixed conifer forests. Calibrating remote-sensing data with plot-level ground data will help them determine what portion of these landscapes are experiencing high levels of tree mortality.

Updates from the Field

Lakes

The lakes crews completed the project's eighth field season this year. Crews sampled water chemistry, recorded lake temperature profiles, and conducted shoreline amphibian surveys at 23 lakes throughout Sequoia & Kings Canyon and Yosemite national parks.

Brina Mocsny (crew lead) and Megan Mason, our Yosemite-based crew, had a fantastic season sampling all the Yosemite sites, plus traveled south to sample three lakes in Kings Canyon. Roxanne Kessler (crew lead) and Talia Chorover,

our SEKI-based crew, also had a successful season sampling lakes throughout SEKI.

The crews had to overcome logistical challenges due to smoke and area closures from the Rough Fire and an unfortunate knee strain toward the end of the season. Thanks to the crew's strength and flexibility, and the help of David Soderberg, who came from the Forest crew to assist on the last trip, they stayed on track and completed sampling. Crews implemented water safety standards tested in 2014 and will continue to seek and test new procedures.

Contact: Andi Heard



Roxanne Kessler (left) and Talia Chorover filter water samples at Spring Lake, Sequoia National Park. NPS photo.

Wetlands



Corie Cann measures depth to water at a wetlands plot, Sequoia National Park. NPS photo.

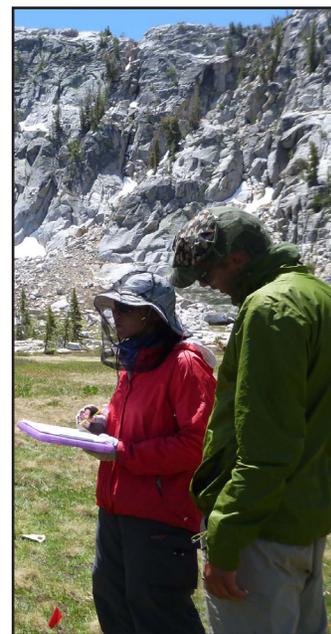
Last summer was the second field season for the wetlands ecological integrity monitoring project, and the first year installing plots in Yosemite National Park (YOSE). The project monitors wetland plant communities, groundwater levels, and macroinvertebrates, and targets two types of wetlands: wet meadows and fens. The Wetlands protocol, submitted in 2014, was approved with minor revisions and a final version is expected to be published in 2016.

For the first half of the season, the crew included: Corie Cann (crew lead), Carl Schwarz, Roxanne Kessler, and Talia Chorover.

Corie and Carl completed the second half of the season, after Roxanne and Talia changed roles to be the Sequoia & Kings Canyon National Parks (SEKI) Lakes crew.

The crew installed and sampled six sites in SEKI, four sites in YOSE, and re-read six plots; including a previously installed index site at Devils Postpile National Monument.

Contact: Jonny Nesmith



Roxanne Kessler and Carl Schwarz collect wetland plot data. NPS photo.

High-elevation Forests

Last summer was the fourth season of sampling for the high-elevation white pine monitoring protocol. This year involved a combination of new plot installations, as well as the first re-measure of plots that had been installed during the first year of the project in 2011.

Crew members for the season were: Sarah Hoff (lead), Sean Auclair, Vlad Kovalenko, and David Soderberg, with

additional help from Liz Bartholomew, Douglas Cox, and Sarah Hendrickson. The forest crew experienced several challenges in 2015, including the Rough Fire, crew injuries, and mid-season changes in crew staffing.

Despite these setbacks, the crew was able to install six new whitebark plots and three new foxtail plots in Sequoia & Kings Canyon (SEKI), and two new whitebark plots in Yosemite. The crew also re-visited seven plots in SEKI and

ten plots in YOSE and scouted five new sites for 2016. Notably, crew members found the non-native pathogen white pine blister rust for the first time in whitebark pine within our monitoring plots in SEKI.

The forest crew also collaborated with U.S. Geological Survey and University of California-Berkeley ecologists to re-survey white pine blister rust plots in SEKI.

Contact: Jonny Nesmith

Field Updates

continued

Rivers

We received the second round of peer-review comments on the protocol this fiscal year. SIEN is addressing peer-review comments and will resubmit the protocol in 2016. In the meantime, SIEN has been working with park staff to implement the protocol at the three SIEN-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 River 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

Birds

As part of a planned rotation cycle, SIEN bird monitoring took a one-year hiatus in 2015 from field work and will resume in 2016. This fall, The Institute for Bird Populations (the cooperating group who leads this project), has produced and submitted a draft synthesis report from the first four years of monitoring. The report is currently under review and will be finalized this winter.

Contact: Sylvia Haultain

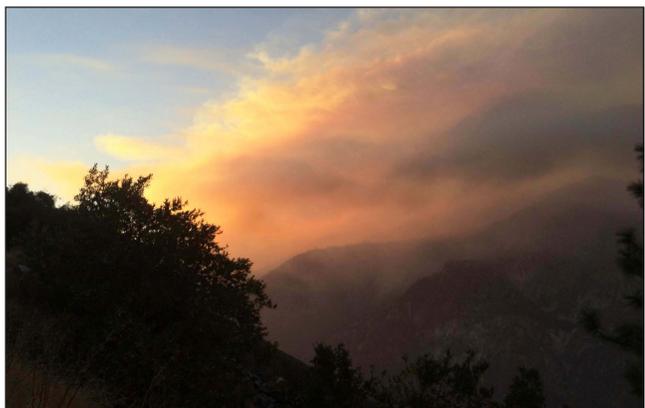


SIEN Physical Scientist Andi Heard and Devils Postpile Student Conservation Association interns take river discharge measurements in the Middle Fork of the San Joaquin River. NPS photo.

Rough Fire Challenges Field Logistics

During August and September, the Rough Fire presented several challenges for our field crews, both due to smoky conditions and area closures (see p. 1-3 for Rough Fire background). It required our staff to continually monitor and communicate smoke conditions to crews in the field and for the project managers and crew leads to have several alternative field itineraries ready to go for subsequent trips. Even with the utmost preparation in choosing routes and schedules most likely to avoid the smoke, the crews experienced smoky conditions and had to constantly adjust their itineraries.

The SEKI Lakes crew was the most intimately affected by the Rough fire. They were forced to evacuate from Sphinx Lake in Kings Canyon a day early when the threat of the fire jumping Highway 180 was expected to close the road within a day. As the logistics technician, I was in close communication with the crew and was able to contact them using a satellite communication device and



Rough Fire creates smoky sunset during evacuation from Cedar Grove. Photo by Roxanne Kessler.

a radio. After discussing several options, we decided the safest plan was for the crew to pack up immediately and hike to the Cedar Grove trailhead, where I would pick them up.

The fire moved faster than anticipated, resulting in SEKI quickly deciding to close the road that night instead of the following day. Luckily, the crew and I reached the trailhead just in time to join the last convoy as the last car leaving Cedar Grove...with five minutes to spare. We were relieved to be heading home, but were also excited to witness the Rough fire at sunset on the convoy out.

Fortunately, working in a network of parks allowed the crews to shift field work to Yosemite (YOSE) when the smoke became too hazardous in SEKI for field work to continue safely. Of course, moving field work to YOSE with very little notice had its own set of logistical challenges: quickly planning new routes, adjusting schedules to include travel, arranging places to stay before and after the trip, and purchasing and packing all new food and gear rather than using caches previously packed into the SEKI ranger stations by mules.

Despite the “roughness” of the Rough fire, the crews were successful in completing a remarkable amount of field work this season because of their diligence in planning alternative routes and schedules, their willingness to adjust their pace as needed, and their remarkable flexibility and positivity. We were very lucky to have them.

—Amy Brown

California Sycamore (*Platanus racemosa*)

“I will learn fifteen types of wind and know the weight of tomorrow’s rain by the rustle of the sycamores.”

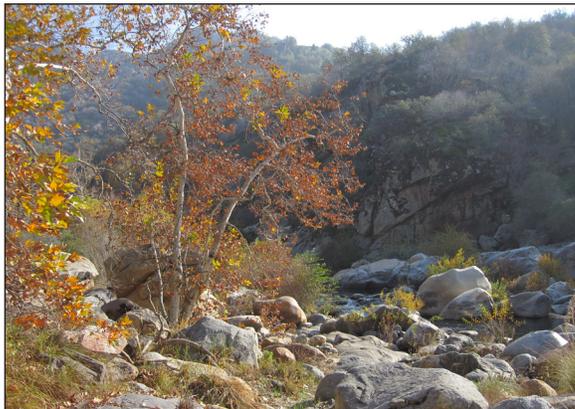
—Claire Keegan

For those who wander along Sierra Nevada foothills rivers and streams, California sycamores calm the senses with their dappled shade, whispering leaves, mottled white stems against blue sky, and sweet leafy smells.

Distribution and Habitat

California sycamore is native to California and Baja California, where it grows in riparian areas, canyons, floodplains, at springs and seeps, and along streams and rivers.

In California, its distribution occurs along the coast from the southern Coast Ranges southward through the Transverse and Peninsular Ranges.



California sycamore is commonly seen along southern Sierra Nevada foothill rivers and streams, such as the Middle Fork of the Kaweah in Sequoia National Park.

To the interior, it occurs along the southwestern side of the Sierra Nevada and along the Sacramento and San Joaquin rivers of the Central Valley, where it grows along the main tributaries up into the Sierran foothills.

Description

This large tree can grow to over 100 feet in height with a trunk diameter of up to three feet. The trunk generally divides into two or more large trunks splitting into many branches. The bark is an

attractive patchwork of white, tawny beige, pinkish gray, and pale brown, with older bark becoming darker and peeling away.

The large lobed leaves may be over nine inches wide and have three or five pointed lobes. New leaves are a bright translucent green and somewhat woolly. A suite of fungi known as Anthracnose live in the vascular system of California sycamores, and during cool, wet springs can cause young leaves to drop. Flowers grow in ball-like clusters, and the fruits they produce fall apart in the winter releasing wind-dispersed seeds.

Conservation Status and Threats

California sycamore is the dominant species in the globally and state endangered sycamore-alluvial woodland habitat. Threats to this species include loss of riparian areas to agriculture, urbanization, and dams.

In the Central Valley, less than 10% of the original riparian cover remains. The rich, alluvial soils of the floodplains are ideal agricultural land.

Grazing of stock in riparian areas results in the removal of palatable plants, eating and trampling of seedlings, invasion of non-palatable weed species, and the degradation of stream banks.

The construction of dams and reservoirs have altered the levels of many streams and inundated valleys once occupied by riparian communities.

Associated with urbanization are efforts to control flooding: Removal of riparian vegetation to speed the movement of floodwaters, dredging, channelization, and enclosing the stream in concrete.

Areas such as national parks where



Winter-deciduous California sycamores lose their autumn gold to orange leaves in the late fall and winter.

riparian habitats are conserved are especially important for species like the California sycamore and other associated plants and animals.



Red female flowers of California sycamore. Photo: Bill Noble (billnoble.wordpress.com).

Who Else Likes Sycamores?

Many small birds, such as goldfinches, feed on the fruit, hawks nest in the large leafy canopies, and several mammals eat the trees’ twigs and bark.

The California sycamore is widely planted horticulturally as a landscape tree in public landscapes and private gardens. New appreciation for how it shades sun in summer and lets sun through in winter has led to its use in green architecture and sustainable design.