Scientists investigate fire, long-term resilience

By Sherri Eng

As the state recovers from devastating fires in the north and south, a team of California-based scientists is taking a deeper look at forest resilience in the face of future fires.

A collaborative team of multidisciplinary researchers from the California Academy of Sciences and the U.S. Forest Service's Pacific Southwest Research Station are investigating a forested Northern California watershed—and its birds—to determine how prescribed fire may contribute to healthier forest ecosystems and reduce the risk of high intensity wildfires. By surveying birds and local conditions in a forest targeted for prescribed fire, the team will capture a multi-year picture of what fuel-heavy ecosystems look like before a fire, how they respond to prescribed fire in the near-term, and how they might change if a wildfire occurs down the road.

"California forests are treasures to the wildlife and people of our state," says Durrell Kapan, senior research fellow at the California Academy of Sciences and a co-leader of the resiliency project. "There couldn't be a more important time to research the impacts of forest fires—especially the role of supervised, prescribed fires to reduce the risk of extreme burns. Our group is interested in understanding how to manage forests in a healthy way so we can avoid the devastating megafires that often follow drought and disease."

The first survey results point to the importance of regular prescribed burns to keep healthy forests thriving and nearby communities safer from catastrophic wildfires. The five-year scientific survey and outreach program, which launched this past spring on the 20,236-acre Caples Creek watershed along

the South Fork of the American River, will continue in spring 2018.

Fire, climate, and a 'study' forest

The frequency and intensity of the West's wildland fires is increased by global climate change. Earth's changing climate has contributed to more variable bouts of extreme wet or drought, which can include drier soils and longer fire seasons—conditions that increase the likelihood of intense, more dangerous fires that are difficult to control. Combined with our country's long history of suppressing fire in our forests, current conditions are making way for severe, record-breaking wildfires up and down California.

In the face of climate impacts, widespread regional tree death, and longer, more catastrophic fire seasons across the state, scientists from the academy and PSW teamed up to identify a study region that might be used as a stand-in for forests elsewhere. Unlike some forests in its nearby neighbor, the Lake Tahoe Basin, much of the forest land in the Caples Creek watershed has been fire-free for more than 80 to 100 years, meaning the forest floor has a large amount of "fuel"—dead trees and layers of vegetation built up over time—and is susceptible to major fires in the future.

"The Caples Creek watershed has a long history of fire suppression, but otherwise it has not been significantly altered by people," says Pat Manley, PSW's Conservation of Biodiversity research program manager. "It has incredible natural resources, biodiversity, and a variety of forest types that are a great fit for this type of study of how to use prescribed fire to maintain and enhance forest resilience."

Birds as ecosystem indicators

In summer 2017, scientists from the Academy—including Kapan and Jack Dumbacher, curator of ornithology and mammalogy—joined PSW in surveying the birds of the Caples

Creek study area before any scheduled prescribed burns. The team is interested in how birds currently depend on the watershed's diverse habitats, as well as how they will respond to future fire. Eighty-three study sites throughout the 20,236-acre watershed were chosen both inside and outside the area planned for prescribed fires. Over the course of the first summer survey, the team detected 45 bird species (from 1,700 individual birds) and measured vegetation at each site to see how fire changes ecosystems over time.

"There's a method to the madness of surveying forest birds," says Dumbacher. "We spend 10 ultra-quiet minutes in each site, and watch and listen for any birds around us. When we look at the data from the first pre-burn survey, we see that different birds depend on all different parts of a healthy forest to survive. We'll return to these sites to see what changes in the years to come as prescribed burns roll out and the ecosystem changes."

A five-year plan
One way to reduce severe fires is to decrease fuel wood by reintroducing smaller fires to the forest at the right time of year—during times when the forest floor and woody vegetation have a lot of moisture from rain or snow. This past fall, the Forest Service launched its five-year project of prescribed fire in the Caples Creek watershed with hand tools and careful planning. Managers take into account winds, moisture, and temperature to minimize the risk of burning more than accumulated forest fuel.

"Forests need fire to thrive and keep our human communities safer," says Kapan, "but we need a better understanding of how certain management techniques impact wildlife. Forest managers, scientists, private landowners, and communities, you name it—we're all adapting to a new climate and fire reality in California. Forests are always cycling and changing, and we want to help identify the most natural, cost-effective path to lasting resilience."

Following a pre-survey this spring, academy and PSW scientists will return for the second year of bird surveys during late spring. The academy, an institution with a history of more than 150 years of California biodiversity research, and the team from PSW hope to continue monitoring the impacts of multi-year fuel reduction on the forest ecosystem—birds, trees, and more—through 2022.

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