



To: Members of Congress
From: House Committee on Natural Resources Staff; Aniela Butler (Aniela@mail.house.gov) and Brandon Miller (Brandon.Miller@mail.house.gov)
Date: April 25, 2022
Subject: Bipartisan Oversight Forum on “Save Our Sequoias: The Impact of Catastrophic Wildfires on the World’s Most Iconic Trees.”

Committee on Natural Resources Ranking Member Westerman will host a bipartisan forum to examine the threat of catastrophic wildfire and its impact on our iconic Giant Sequoia groves on Arbor Day. The forum will be held on **Friday, April 29, 2022, at 10:00 am** in Room 217 of the Capitol Visitors Center and online via Zoom.

Member offices are requested to notify Baylee Seeman (Baylee.Seeman@mail.house.gov) **no later than Wednesday, April 27, 2022, at 4:00 pm** if their Member intends to participate in person in the forum room or remotely from his/her laptop from another location. To continue hearing from local stakeholders and rural Americans who lack the resources to travel to Washington, D.C., we will provide a virtual option for witnesses via Zoom.

Please contact Bailey Mailloux (Bailey.Mailloux@mail.house.gov) should any technical difficulties arise.

I. KEY MESSAGES

- On this Arbor Day, our Giant Sequoias are facing an unprecedented and existential threat.
- Giant Sequoias, which can live for more than 3,000 years, are among the most fire-resilient tree species on the planet. Yet in the last few years, catastrophic wildfires have decimated nearly one-fifth of the world’s Giant Sequoias.
- We have reached a tipping point. Decades of inadequate forest management, combined with worsening drought conditions and rising temperatures, have created an environment that is killing these trees at an alarming rate never seen before in history.
- Fewer than 75,000 Giant Sequoias remain and without drastic intervention, this crisis will only worsen.
- Science-based management to restore natural conditions on the ground is vital to ensuring future generations can enjoy these iconic and majestic trees.

II. WITNESSES

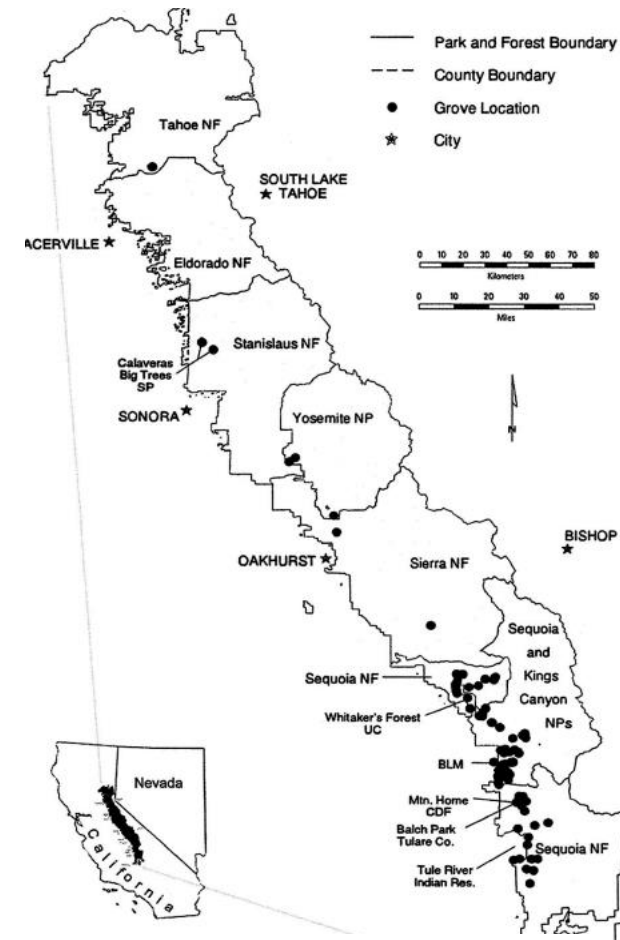
- **Mr. Kevin Conway**, State Forest Program Manager, CALFIRE
- **Ms. Denise England**, Grants and Resources Manager, County of Tulare, California
- **Mr. Steve Brink**, Vice President of Public Resources, California Forestry Association
- **Dr. Joanna Nelson**, Director of Science and Conservation Planning, Save The Redwoods League
- **Dr. Stephen Sillett**, Professor and Kenneth L. Fisher Chair in Redwood Forest Ecology, Humboldt State University
- *Additional witnesses TBA*

III. BACKGROUND

Overview of Giant Sequoias

Sequoiadendron giganteum (Giant Sequoias) are the largest trees on Earth and are solely found in roughly 70 distinct groves across approximately 37,000 acres in the Sierra Nevada Mountain range in central California.¹ Giant Sequoias are world-renowned for their majestic size and ancient lifespan. For example, the largest Giant Sequoia ever measured was over 36 feet in diameter and 311 feet tall.² For comparison, the Capitol Dome, including the Statue of Freedom, rises 288 feet above East Front Plaza.³ The world's current largest tree by volume is the iconic General Sherman Tree in Sequoia and Kings Canyon National Parks, which is 275 feet tall, 36 feet in diameter, and weighs an astonishing 2.7 million pounds.⁴ An extremely resilient species, Giant Sequoias can live for thousands of years and the oldest known Giant Sequoia was dated at roughly 3,266 years old.⁵

Giant Sequoias owe this size and longevity to a set of unique characteristics that make them highly resilient to fire, insects, and disease. Giant Sequoias possess a very thick and spongy bark, that typically ranges from 6-10 inches but can be up to two feet thick, which provides strong protection against wildfire and insects.⁶ The immense height of the Giant



Source: Douglas Piirto and Robert Rogers, 2002

¹ Sillett, et al., "Structure and dynamics of forests dominated by *Sequoiadendron giganteum*," *Forest Ecology and Management* 448, June 15, 2019, pages 218-239.

² Shive, et al., "Ancient trees and modern wildfires: Declining resilience to wildfire in the highly fire-adapted giant sequoia," *Forest Ecology and Management* 511, February 2022.

³ Architect of the Capitol, "Dome By-The-Numbers," <https://www.aoc.gov/what-we-do/projects/dome-restoration-project/by-the-numbers>.

⁴ National Park Service, "The General Sherman Tree," Sequoia and Kings Canyon National Parks, December 31, 2021, <https://www.nps.gov/seeki/learn/nature/sherman.htm>.

⁵ *Id.* Shive et al.

⁶ National Park Service, "Description of the Giant Sequoia," February 2, 2007, https://www.nps.gov/parkhistory/online_books/cook/sec1.htm#:~:text=Padilla%20Photo,-.The%20bark%20of%20the%20giant%20sequoia%20is%20one%20of%20its,even%20be%202%20feet%20thick.



The historic General Sherman Tree, seen here wrapped in space blankets during the KNP Complex Fire in 2021.
Source: Los Angeles Times, 2021

Sequoias and their branches also means that, historically, fires have had difficulty reaching the crown (top) of the tree, thus reducing overall damage to the tree. Because of this, when Giant Sequoias died in the past, it was largely due to falling over or after experiencing several severe fires over their long lifespans. According to research from the National Park Service (NPS), Giant Sequoia deaths due to fire events were “relatively rare” and standing death unrelated to fire was “almost never observed by scientists who had spent decades working in the Sierra Nevada.”⁷

Giant Sequoias are important ecologically, scientifically, and culturally. Giant Sequoias provide abundant recreation opportunities and millions of visitors’ flock to these forests annually to marvel at these majestic trees. The Giant Sequoia is an iconic symbol in nature and is featured prominently on the official logo for NPS.⁸ For thousands of years, these trees also “provided healing, shelter, and warmth” to Native Americans, including the Tule River Tribe.⁹ Like many other forests, Giant Sequoias also provide clean air and clean water, store archaeological and historic resources, and serve as important wildlife habitat. Additionally, Giant Sequoias are extremely important for carbon storage, as certain Giant Sequoia forests are second only to coastal redwoods in “carbon storage per hectare globally.”¹⁰ Notably, Giant Sequoias have “little monetary value” for wood products due to their brittleness and large weight.¹¹

⁷ National Park Service, “Giant Sequoias Face New Threats,” February 24, 2022, <https://www.nps.gov/articles/000/giant-sequoias-face-new-threats.htm>.

⁸ National Park Service, “History of the NPS Arrowhead,” May 15, 2019, <https://www.nps.gov/glac/learn/news/history-of-the-nps-arrowhead.htm>.

⁹ Quote from William Garfield, Chairman of the Tule River Tribal Council, “Giant Sequoia Lands Coalition Formed to Protect Iconic Trees from Threats of Climate Change and Catastrophic Wildfire,” National Park Service, July 19, 2021, <https://www.nps.gov/seeki/learn/news/giant-sequoia-lands-coalition-formed-to-protect-iconic-trees-from-threats-of-climate-change-and-catastrophic-wildfire.htm>.

¹⁰ *Id.* Shive et al.

¹¹ Save The Redwoods League, “Giant Sequoia,” <https://www.savetheredwoods.org/redwoods/giant-sequoias/>.

Management: History, Jurisdictions, and Current Practices

Federal interest in the protection and management of Giant Sequoias can be traced back to 1864, in the midst of the Civil War, when President Abraham Lincoln signed legislation transferring the Mariposa Grove (now located in Yosemite National Park) to the State of California “upon the express conditions that the premises shall be held for public use, resort and recreation.”¹² This is considered the first piece of legislation setting aside lands for public use and future enjoyment, preceding the creation of the first national parks. Nearly three decades later, in 1890, Congress created Sequoia and Yosemite as the second and third national parks, respectively, to, in part, protect the Giant Sequoias.¹³ In 1903, Teddy Roosevelt’s famous camping trip in the Mariposa Grove, which he dubbed “a temple greater than any human architect could by any possibility build,” inspired him to expand protections for Giant Sequoias, eventually leading to the creation of the Sequoia National Forest in 1908.¹⁴ Nearly one century later, in 2000, President Clinton designated 328,315 acres in the Sequoia National Forest as the Giant Sequoia National Monument.¹⁵ Along with this designation, sequoias are now largely under the most restrictive land designations, including 808,000 acres of wilderness and 29,500 acres of proposed wilderness in Sequoia and Kings Canyon National Parks and 314,448 acres of wilderness in the Sequoia National Forest. As such, with the exception of a fairly robust prescribed burning program within NPS, many Giant Sequoia groves are not regularly managed with fuels reduction treatments such as prescribed burning or mechanical thinning.

Although the geographic distribution of Giant Sequoias is relatively confined, the groves today cross a multitude of different jurisdictions. The majority of groves are managed by the federal government, although the following entities all have a current ownership interest in at least one Giant Sequoia grove:

- *Federal Lands:*
 - *U.S. Forest Service (USFS):* Sequoia National Forest (including the Giant Sequoia National Monument), Sierra National Forest, and Tahoe National Forest.
 - *NPS:* Sequoia and Kings Canyon National Parks and Yosemite National Park.
 - *Bureau of Land Management (BLM):* Case Mountain Extensive Recreation Management Area.
- *State and Local Lands:* Several groves are owned and managed by Tulare County and the State of California, including the Mountain Home Demonstration State Forest.
- *Tribal Lands:* The Tule River Tribe of the Tule River Indian Reservation owns and manages a Giant Sequoia grove.
- *Private Lands:* Several private groves are owned by organizations such as UC Berkeley and Save the Redwoods League.

¹² Glass, Andrew, “President Lincoln creates Yosemite Park, June 30, 1864,” Politico, June 30, 2016, <https://www.politico.com/story/2016/06/president-lincoln-creates-yosemite-park-june-30-1864-224818>.

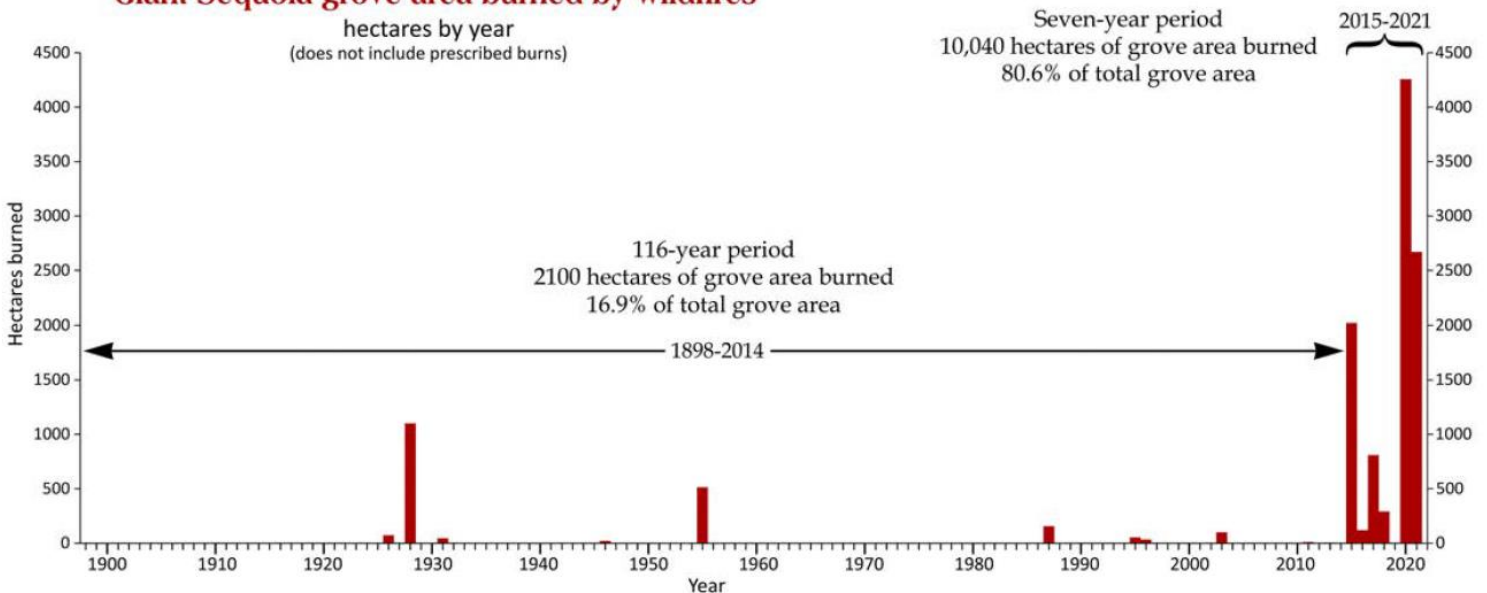
¹³ *Id.*

¹⁴ National Park Service, “Roosevelt, Muir, and the Grace of Place,” August 26, 2021, <https://www.nps.gov/yose/learn/historyculture/roosevelt-muir-and-the-grace-of-place.htm>.

¹⁵ U.S. Forest Service, “The Giant Sequoia National Monument,” <https://www.fs.usda.gov/detail/sequoia/home/?cid=stelprdb5394941>.

While each agency manages Giant Sequoias in their jurisdiction differently, for the most part, fire has largely been excluded from these landscapes by federal land managers for well over a century. Due to their long lifespans, scientists can trace the fire history of Giant Sequoias through several millennia. For the 1,000-year period dating from 800-1800, groves experienced an average of 30.6 fires per century.¹⁶ This coexistence with low-intensity fire was extremely important for the health and longevity of Giant Sequoias, which have semi-serotinous cones, or cones that need heat to open and begin the process of regeneration.¹⁷ These low-severity fire intervals also helped clear undergrowth, thin out shade-tolerant species, and enable seedlings to take root and receive the necessary sunlight to fully develop.¹⁸ In contrast, as depicted on the chart below, from 1898-2014, only approximately 17 percent of groves experienced wildfire, meaning some went untouched by fire for more than a century.¹⁹ This exclusion of fire created a massive build-up of surface fuels.

Giant Sequoia grove area burned by wildfires



Source: Professor Robert Van Pelt, 2021

Compounding excessive fuels build-up is the devastating drought experienced throughout the West and rising temperatures. In particular, the drought period from 2012-2016 killed an enormous amount of pines, incense-cedars, and firs around the Giant Sequoias, creating a significant amount of ladder fuel that could go into the forest canopy and affect the Giant Sequoias.²⁰ Due to “very low relative humidity and higher than average temperatures,” that fuel also became exceptionally dry and allowed fires to burn day and night.²¹ For the first time in

¹⁶ Van Pelt, Robert, “Annual Summary of Permanent Research Plots in Old-Growth Giant Sequoia Forests as Part of the Redwoods and Climate Change Initiative (RCCI), 2021, page 35.

¹⁷ *Id.* Shive et al.

¹⁸ The Guardian. “It could be a big tree in 1,000 years’: tiny seedlings of giant sequoias rise from ashes of wildfire” November 2, 2021. <https://www.theguardian.com/us-news/2021/nov/02/california-giant-sequoias-wildfires-climate-change-trees>.

¹⁹ *Id.* Van Pelt.

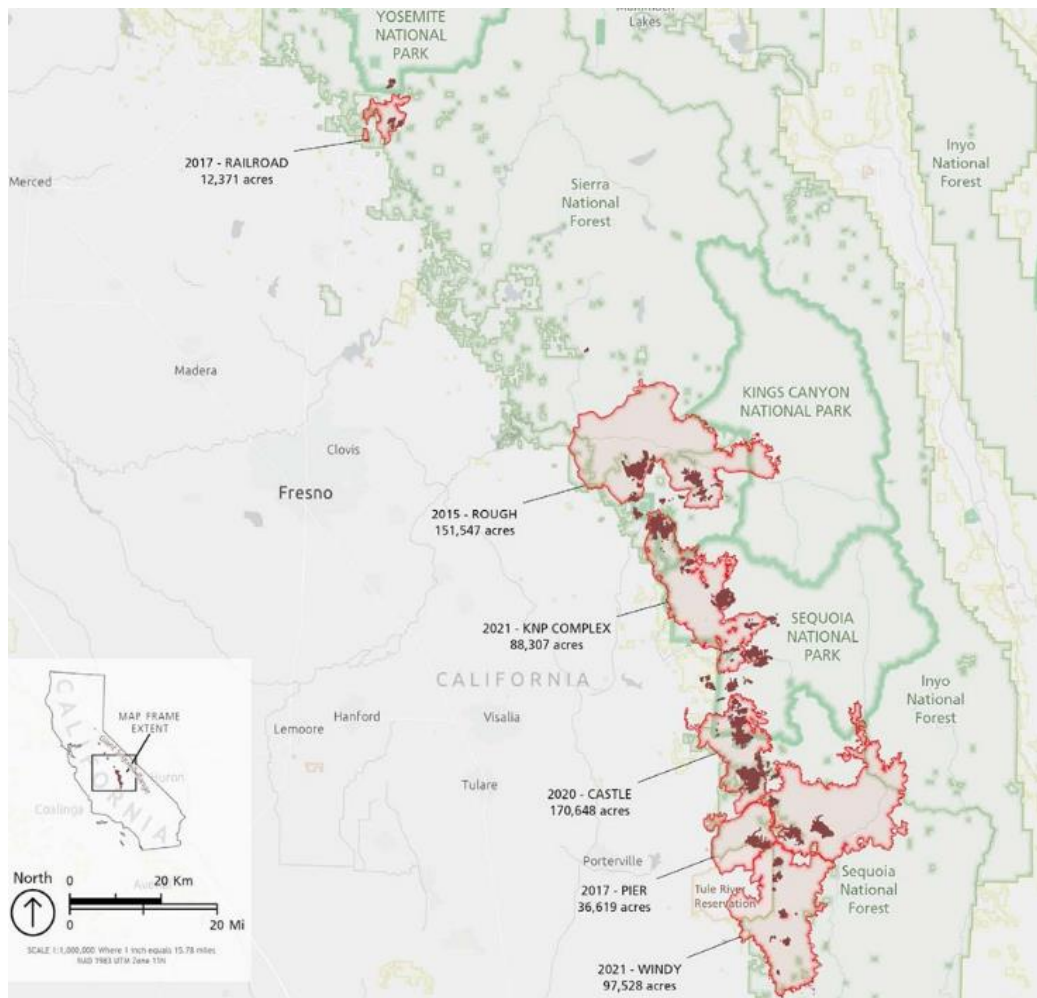
²⁰ *Id.*

²¹ *Id.* National Park Service.

recorded history, scientists also observed mortality in 33 standing Giant Sequoias as a result of bark beetle infestation, thought to have been the result of drought-related conditions.²²

Current Wildfire Crisis

The past decade marked a significant turning point in the health and resiliency of Giant Sequoias. According to NPS, “prior to 2014, scientists recorded only subtle, long-term changes in forest health. During and after the drought, they observed large, abrupt, and novel changes to forests, including ... unprecedented numbers of large sequoias dying in severe wildfires, Giant Sequoias dying from bark beetle attacks, and acute foliage dieback as a short-term adaptation to drought.”²³ Since 2015, the combination of excessive fuels build-up and drier conditions caused several wildfires to wreak unprecedented destruction. As stated above, while only 17 percent of groves burned over the 116-year period



Source: NPS, 2022

ending in 2014, six fires in the past six years have burned over 85 percent of groves.²⁴ Unlike low-severity fires of the previous millennia, these fires had a higher severity and were incredibly deadly to Giant Sequoias. Studies suggest that groves that experienced high-severity fires had average mortality rates of 84 percent, with some groves experiencing 100 percent mortality.²⁵

These high mortality events began with the 2015 Rough Fire, which burned 151,547 acres of USFS and NPS land and killed over 100 Giant Sequoias.²⁶ In 2017, the Pier and Railroad Fires had a combined total footprint of 48,990 acres and killed 110 Giant Sequoias, including 31 larger than 10 feet in diameter.²⁷ Truly unprecedented levels of devastation began in 2020 when the

²² *Id.* National Park Service.

²³ *Id.* National Park Service.

²⁴ *Id.* National Park Service. The six-year period referred to is 2015-2021.

²⁵ *Id.* Shive, et al.

²⁶ National Park Service, “Wildfires Kill Unprecedented Numbers of Large Sequoia Trees,” February 25, 2022, <https://www.nps.gov/articles/000/wildfires-kill-unprecedented-numbers-of-large-sequoia-trees.htm>.

²⁷ *Id.* National Park Service.

Castle Fire (also referred to as the SQF Complex Fire) burned 170,648 acres, including 9,530 acres of Giant Sequoia groves across federal, State, local, and private lands.²⁸ The Castle Fire devastated Giant Sequoias at a scale previously unheard of, killing between 7,500 and 10,600 large Giant Sequoias, or roughly 31 to 42 percent of the Giant Sequoias within the Castle Fire’s footprint. This also amounts to 10 to 14 percent of the world’s Giant Sequoias killed by a single fire.²⁹ While scientists have not yet determined precise ages, they estimate that Giant Sequoias “killed by the Castle Fire may have ages ranging from hundreds to as much as 2,000 to 3,000 years.”³⁰ Just one year later, the KNP Complex and Windy Fires wreaked similar devastation across 185,835 acres, including 27 Giant Sequoia groves. Scientists initially estimated that “2,261-3,637 sequoias over four feet in diameter [were] killed or will die within the next three to five years” due to these two fires.³¹ Combined with the data from the Castle Fire, this means that an estimated 13 to 19 percent of the world’s Giant Sequoias were killed over the course of two years.³² Concerningly, these are conservative estimates that could increase. Sadly, five of the 13 largest trees known in the 21st Century died during these fires, including the Boole Tree (6th largest) in 2015, Stagg Tree (9th largest) in 2020, Genesis Tree (10th largest) in 2020, Ishi Giant (12th largest) in 2015, and King Arthur Tree (13th largest) in 2020.³³ The deaths of these trees are particularly significant, as named trees are often singled out for protection during fire response.

Unfortunately, these fires burned at such a high severity that “only minimal seedling establishment has been observed” in impacted groves.³⁴ This means that fires burned so intensely, the Giant Sequoia cones incinerated, even those high up in the canopy typically untouched by fire. After the KNP complex fire, NPS estimated that 436 acres were “vulnerable to total sequoia loss” without some level of replanting.³⁵ Similar to mortality estimates, these are conservative estimates of the true scope of reforestation that will be required. Importantly, while high-severity fires did cause significant destruction, some groves that experienced low- to moderate-severity fires over this period did see benefits from the re-introduction of fire.

Saving Our Sequoias: Conclusion and Next Steps

There is perhaps no greater example of the severity of the wildfire crisis facing the West than the fact that Giant Sequoias, which have withstood innumerable fires, droughts, and other natural disasters for thousands of years, are now succumbing to fire at such a rapid rate. With an estimated 75,000 trees remaining, the need to move quickly to protect these iconic trees as part of the broader effort to better manage our nation’s forests cannot be overstated.³⁶ Land managers are now recognizing this alarming, unprecedented destruction as a call to action to expedite scientifically-sound forest management practices to improve the health and resiliency of groves. These entities formed the newly established Giant Sequoia Lands Coalition, which aims to:

²⁸ *Id.* National Park Service.

²⁹ *Id.* National Park Service.

³⁰ *Id.* National Park Service.

³¹ Shive, et al. “2021 Fire Season Impacts to Giant Sequoias,” National Park Service, November 23, 2021, <https://www.nps.gov/articles/000/2021-fire-season-impacts-to-giant-sequoias.htm>.

³² *Id.* Shive et al.

³³ *Id.* Van Pelt.

³⁴ *Id.* Shive et al.

³⁵ *Id.* Shive et al.

³⁶ PBS News, “Wildfires torched up to a fifth of all giant sequoia trees,” November 20, 2021, <https://www.pbs.org/newshour/nation/wildfires-torched-up-to-a-fifth-of-all-giant-sequoia-trees>.

- “Increase wildfire resilience through research and monitoring;
- Increase [the] pace and scale of forest treatments to reduce forest fuels through prescribed burning and restorative thinning; and
- Increase efficiency through partnerships aimed at policy changes that allow for more swift action.”³⁷



Dead Giant Sequoias in Homer's Nose Grove, managed by NPS, after the 2020 Castle Fire. **Source:** NPS

In a recent study, scientists concluded that untreated Giant Sequoia groves “are likely to facilitate intense fire behavior with resultant high severity burns unless fuel loads are reduced through restoration treatments such as prescribed fire and mechanical thinning.”³⁸ The study further found that imminent action is vital to protecting the remaining Giant Sequoias, stating: “recent trends in wildfire activity suggest that managers have a *narrowing window of opportunity* to protect the remaining legacy trees from severe fire via ecological restoration.”³⁹ Data collected after the KNP Complex Fire further suggested that fuel reduction treatments “positively affect[ed] fire behavior and allow[ed] fire suppression in Giant Forest and other groves impacted.” This same report later stated that “prescribed fire and thinning treatments can reduce fire severity and provide fire fighters with opportunities to safely control and manage wildfires” in Giant Sequoia groves.⁴⁰ Increasing the pace and scale of these treatments will involve empowering stakeholders to increase collaboration, removing burdensome regulatory hurdles that are delaying or cancelling vital treatments, and addressing funding and staffing shortfalls.

³⁷ *Id.* National Park Service.

³⁸ *Id.* Shive et al.

³⁹ *Id.* Shive et al. Emphasis added.

⁴⁰ *Id.* Shive et al.