February 9, 2021

Los Angeles Times
Attn: Editors
2300 E. Imperial Highway
El Segundo, California 90245

Re: The mischaracterization of wildfire in California

Dear editors of the *Los Angeles Times*:

Over the past year, the *Times* has published numerous articles that either mischaracterize California's wildfires or omit crucial details about the scientific debate surrounding natural or historical fire regimes and proposed activities to reduce wildfire extent and damage to communities. These include recent articles cited below by Bettina Boxall, Anna Phillips, and George Skelton, among others.

As California's preeminent newspaper, the *Times* serves an important role in providing factual, researched, and comprehensive information to the general public on issues that affect the state's residents and ecosystems. Stories about wildfire are often cited in additional publications and can shape how news is covered in other states. Articles in the *Times* are often shared among policymakers, and they can and do influence decision-making at all levels of government in California. Consequently, articles published by the *Times* can have real consequences for ways in which various entities prepare for inevitable wildfire across the state, the allocation of state or even federal funding to mitigation programs, and complex ecosystem stability and functioning.

With this in mind, the undersigned experts in wildfire science, ecology, and conservation detail several issues with recent stories that may leave the reader with an incomplete or incorrect view of wildfire and the efforts being proposed or currently undertaken to mitigate the effects of this natural phenomenon and important ecological disturbance.

Issue #1: The assertion that California's forests are overgrown and more flammable due to a century of fire suppression.

This assertion has been at the core of many stories published by the *Times* in recent years.[1–6] It is often reported as an undisputed fact and typically does not appear as a quote attributed to a wildfire expert. While this concept is accepted by some scientists and land managers—predominantly those that work in or are affiliated with the U.S. Forest Service, Cal Fire, or other land management agencies—the scientific literature reveals that such an assertion has been under intense scrutiny and continues to be subject to significant debate among wildfire scientists and forest ecologists. While this debate has been discussed in some stories, it is generally omitted by the *Times*.

California is home to a wide variety of forest ecosystems, each with varying natural fire regimes, species composition, and structure. There are approximately 27 different types of tree-dominated ecosystems in the state,[7] 16 of which are traditional forest types with a substantial conifer component and a relatively tall overstory in maturity. From coastal redwood forests to subalpine forests, the diversity of these ecosystems and the tree species therein is vast and complex. Regardless, most forest types experience some form of mixed-severity fire regime, meaning that fires—even when large—burn with a variety of effects and leave behind mostly low[a] or moderately burned forest interspersed with severely burned[b] patches. Some forest types, such as closed cone pine-cypress ecosystems that are dominated by species such as knobcone pine or Sargent cypress, even burn mostly at high severity and have done so for millennia.

However, the *Times* does not adequately address this diversity, but rather leaves readers with the impression that forests are generally all the same and are being destroyed by high severity fire. Such an impression is false.

Disagreement about natural and historical fire regimes in the state's forest ecosystems primarily revolves around two general forest types: mixed-conifer and yellow pine forests.[8] These account for much of the low- and mid-elevation non-coastal forests, particularly in the Sierra Nevada, Klamath, and Cascade Ranges as well as in scattered locations across the Transverse and Peninsular Ranges. Yellow pine forests tend to be at drier, low elevation sites and are dominated by ponderosa pine or Jeffrey pine. Mixed-conifer forests are found on drier sites above yellow pine forest areas and are co-dominated by various pine species, white fir, Douglas-fir, and incense cedar.

While there is evidence that some yellow pine forests, particularly in Arizona and New Mexico, have experienced less frequent low-severity fire over the last century due to fire suppression,[9] **this pattern does not apply or is disputed in other forest types that experience different climatic conditions and/or have comparatively fewer dry lightning strikes each year.**[10–16] Even in the Southwest's yellow pine forests, studies have shown that high severity fire (>75% of overstory tree mortality) has long been an important though less frequent component of the natural fire regime.[9,16]

Many forest types in California naturally go long periods without fire, even in the absence of aggressive fire suppression, due to natural variability in their fire regimes.[17] For example, studies have found that coastal redwood forests near Santa Cruz had historical fire rotations of approximately 135 years.[18] The natural occurrence of long fire rotations in forests is an important fact that the *Times* frequently omits.

More importantly, most studies that have specifically addressed the question of whether time since fire increases fire severity found that the most long-unburned and densest forests experience mostly low to moderate severity fire effects.[19–24] This is due to more cooling shade and wetter microclimates that limit fire activity under non-extreme weather conditions. Under extreme weather conditions, the amount of forest vegetation tends to exert little influence on fire severity.

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[a] Low severity fire: <25% of overstory tree mortality. Moderate severity fire: 25-75% of overstory tree mortality.
[b] High severity fire: >75% of overstory tree mortality.

Issue #2: Large wildfires are often deemed to be catastrophic by their size alone, unique to the modern era, and ecologically destructive.

Several articles published during the 2020 California wildfire season implied that large fires are inherently ecologically destructive.[25–27] This is a common theme in many media articles about wildfire, one usually accompanied by the notion that large fires are an exclusively modern phenomenon. However, these stories omit important context about large wildfires and fire history.

In native shrubland ecosystems, large wildfires have long been recognized as historically and ecologically normal events.[28–31] **In various western forest ecosystems, several large (up to 3 million acres) wildfires were documented in the 1800s and early 1900s or have been identified and reconstructed from historical data sources by contemporary researchers.**[32–36] Whether or not large wildfires driven by extreme weather conditions are unusual or unprecedented largely depends on the historical baseline used to make such a determination. Many studies have examined fire size and severity trends using mid- to late-20th century baselines. The widely used Fire Resource and Assessment Program (FRAP) database is considered accurate for larger fires during the period of 1950-present,[37] with fewer and less reliable fire occurrence entries dating back to the late 1800s. Various researchers have noted the issues with using ambiguous baselines and limited data sources in elucidating wildfire trends.[13,38,39]

Another aspect of modern wildfires that is rarely if ever discussed in stories published by the *Times* is **the influence of backfiring or burnout operations on fire size**. Such activities are known to increase fire size substantially in some cases.[40] For example, approximately 20% of the 132,000-acre Soberanes Fire footprint in 2016 was burned during a massive backfiring operation two months after the fire started.[41] This operation was started after a month of fire front inactivity, indicating that it unnecessarily burned a large area that likely would not have burned without the operation. The 2007 Zaca Fire also saw massive backfiring operations that burned "tens of thousands of acres" ahead of the fire in Santa Barbara and Ventura counties.[42]

Moreover, **there is an immense amount of research demonstrating that large wildfires in mixed-conifer, yellow pine, and other forest types in California and elsewhere in the western U.S. occur as mixed-severity fire that creates landscape spatial heterogeneity.**[10,12,13,15–17,34,43] It should also be noted that contemporary large wildfires in California's mixed-conifer and yellow pine forests (as well as other forest types) burn mostly at low to moderate severity.[44,45] Furthermore, researchers have found that the amount of high severity fire or the size of high severity patches within burned forests has not been increasing over the last several decades.[36,46]

Consider that about 83% of the 427,000 acres covered by the Ranch Fire and about 89% of the 153,000 acres covered by the Camp Fire in 2018 burned at low to moderate severity.[45] Other notable large wildfires that occurred primarily in forested areas such as the 2018 Ferguson Fire, 2015 Rough Fire, and 2013 Rim Fire experienced high severity fire effects across less than 20% of the total burned area.[45] Early analysis of fire severity based on soil conditions across the area burned during the August Complex Fire—the largest complex in 2020—indicate that less than 9% of the more than one million acres encompassed in the fire perimeter burned at high severity.[47,48] Likewise, early analysis of the 2020 Creek Fire in the Sierra Nevada indicates that only 12% of the area burned at high severity based on soil conditions.[49]

Unfortunately, articles in the *Times* typically fail to mention these patterns of mixed-severity fire, an important part of forest ecology.

Numerous studies have also demonstrated the benefit of large mixed severity fires in various forest ecosystems on a wide array of species[14,34] due to the creation of complex early successional forest habitat with important biological legacies.[50,51,22,52–54] Bird diversity has been found to increase following large mixed-severity fires.[55–57] Patches of high severity fire in mixed-conifer forests can increase the abundance of various native bat species,[58,59] and native bee diversity has been shown to increase with increasing fire severity in this forest type.[60] Additionally, even large high severity patches where extensive tree mortality occurs have been found to have abundant natural conifer regeneration.[17,61–66] The heterogeneous pattern of natural conifer regeneration following such wildfires can confer resilience to future disturbances such as bark beetle outbreaks.[67,68]

Additionally, some stories published by the *Times* have also indicated that large wildfires in California are massive sources of greenhouse gas emissions that exacerbate climate change.[69] However, recent research has found that carbon emissions from large wildfires has long been overestimated due to inaccurate modelling assumptions. One 2019 study demonstrated that conventional, flawed models widely used by government agencies for carbon budgeting tend to overestimate emissions from California forest fires by 81-103% compared to observation-based estimates.[70] Moreover, the ability for land managers to reduce future carbon emissions from wildfire through vegetation management (see more about issues with the portrayal of vegetation removal activities below) has been shown to be highly limited.[71] In fact, logging activities have been found to be a much greater source of carbon emissions in Pacific states.[72,73]

Issue #3: Dead trees are presumed to play a significant role in fueling large wildfires.

A recent article published by the *Times* suggested that millions of dead trees in the Sierra Nevada could "fuel unprecedented firestorms" and directly tied the presence of dead trees to the 2020 Creek Fire.[27] The article only quoted four people, three of which work for or are affiliated with the U.S. Forest Service and another who leads an organization dedicated to prescribed fire advocacy. All of these individuals appear to support the notion that dead trees increase fire risk in mixed-conifer and yellow pine forests, despite numerous studies that have shown that **the presence of dead trees—principally in large numbers as seen in the Sierra Nevada following the 2012-2016 drought—does not increase the risk of fire occurring,**[74] **the extent of area burned,**[75] **or the risk of high severity fire.**[76–82] In fact some studies have shown that significant tree mortality can reduce subsequent fire severity.[81,82] Several studies have found that fire severity is driven primarily by daily fire weather or topography in areas with widespread tree mortality.[77,82–84]

The recent *Times* story mentioned above does not include any discussion about this preponderance of evidence contradicting the notion that dead trees are a primary cause of wildfire risk and/or severity, nor did the reporter include any quotes from other scientists who specialize in tree mortality-wildfire interactions. Moreover, the story's implication that the 2020 Creek Fire—which was still burning at the time the article was written—was driven by the presence of dead trees is problematic considering that no research had yet been conducted on this particular fire and the factors that influenced its spread and behavior. Other variables such as daily fire weather and topography may have been more important in explaining fire severity and rate of spread, but this has not yet been determined or included in any published research. The story also omits important details about large areas that burned during the first days of the fire (when its greatest rate of spread was observed) that had previously been salvage logged following fires years earlier. These areas dominated by invasive grasses and logging slash may have significantly influenced the fire, though again, no research has yet been published. The end result is that the reader may be left with the perception that dead trees were the primary factor influencing the 2020 Creek Fire, despite a lack of supporting evidence and a substantial number of published studies contradicting this assumption.

It should be noted that at least one older story focused on tree mortality in the Sierra Nevada published by the *Times* in 2017 mentioned the debate surrounding the influence of dead trees on subsequent wildfires.[85] However, that discussion only accounted for approximately 6% of the article (by word count), and it did not adequately convey the paucity of evidence for dead trees exacerbating wildfire risk in western forests. As with many recent stories, the piece included quotes mostly from federal land agency employees or affiliated scientists rather than independent or academic researchers with varying viewpoints about proposed management activities aimed at mitigating tree mortality and/or wildfire.

Furthermore, stories that implicate dead trees and logs for fire size and/or behavior[4,27] omit important information about the ecological importance of these biological structures in forest ecosystems. Standing dead trees (i.e. "snags") provide vital habitat for a wide variety of birds and mammals,[86–89] including iconic or endangered species such as California condors.[90] After falling and becoming logs and other coarse woody debris, dead trees create complex habitat for small mammals, reptiles, amphibians (e.g. various salamander species), insects, fungi, and slime molds that are important for overall ecosystem health.[86,87,89,91–93] As stories published by the *Times* generally portray snags and downed wood as hazardous fuels without discussion of their ecological importance, the reader is likely left with a negative view of such biological structures. This will likely influence how the general public or policymakers respond to an expected increase in calls for post-fire salvage logging across areas burned during the 2020 wildfire season despite the many scientific studies showing negative ecological impacts of such activities.[94–98]

Issue #4: Fuel reduction is portrayed as a primary and effective method of wildfire mitigation without discussion of the ecological impacts of such activities or their efficacy under extreme weather conditions.

Many stories about wildfire in California published by the *Times* contain statements supporting the use of vegetation removal (i.e. fuel reduction) in various ecosystems—particularly forests, though often these statements are vague and only reference wildland vegetation in general—to reduce future wildfire risk.[4,27] Such stories **rarely include discussion of the scientific debate regarding vegetation removal as wildfire risk reduction** nor do they include quotes by experts that do not have affiliations with land management agencies such as the U.S. Forest Service and/or varying viewpoints on the utility of vegetation removal. However, one exception to this was a 2019 story about the low efficacy of fuel breaks under extreme weather conditions.[99]

In native shrublands such as California chaparral, the amount or age of native vegetation has consistently been found to have minimal influence on wildfire extent or behavior under extreme weather conditions.[30,31,100–102] Fuel breaks located in this ecosystem have also been found to be relatively ineffective in slowing or stopping wildfire spread, especially under adverse weather conditions.[103] More generally, areas where vegetation has been removed or manipulated as wildfire mitigation have been shown to have a very low probability of encountering a wildfire during the period when land managers consider them to be effective.[104,105]

Examination of charcoal deposits in the Sierra Nevada have also demonstrated that the impact of Indigenous use of fire in forests on fire extent was localized and generally overridden by climatic factors at the regional scale,[106] indicating that human alteration of fire extent under fire-conducive climate conditions has long been limited.

In many forest types, including mixed-conifer and yellow pine forests, there is debate about the effectiveness of pre-fire vegetation removal as a wildfire mitigation technique. Many studies have found that the amount of vegetation or tree density only weakly affects wildfire extent and severity compared to climate, daily fire weather, and topography, especially under extreme weather conditions.[19,21,22,24,84,107–109] In fact, the largest study to date on the relative amount of high severity fire in unmanaged (e.g. federal Wilderness areas) mixed-conifer and yellow pine forests that are considered to have high levels of biomass and managed forests (e.g. private timberlands) found that unmanaged or protected areas tended to burn at lower severity over the last three decades in the western U.S.[39]

Regardless of ecosystem type or even the efficacy of vegetation removal in mitigating wildfire, there are **well-documented negative ecological impacts associated with these activities that likely outweigh any benefit they may provide during a future wildfire**. For example, mastication of native shrubs to create fuel breaks has been shown to negatively impact numerous native plant species while often promoting non-native plant establishment that can alter wildfire patterns in dangerous ways.[110,111]

Similarly, ecologists have warned against the use of prescribed fire in native shrublands like chaparral—native habitats that are already suffering from overly frequent human-caused fire in areas such as central and southern California—as it can decrease native plant diversity and abundance and promote the spread of highly flammable non-native plants, especially if conducted outside of the normal fire season.[31,112–115] In fact, the National Park Service specifically does not use prescribed fire in the chaparral-dominated Santa Monica Mountains National Recreation Area in Los Angeles County.[116] The *Times* has been at the forefront in describing the risk of high fire frequency in chaparral and the impact of non-native grasses, but these important details are still often omitted or only briefly mentioned in stories on prescribed fire.

In various forest types, tree removal (i.e. thinning/logging) can increase erosion and cause soil damage and prescribed fire can promote flammable non-native plant (e.g. cheatgrass) spread.[117,118] Across forest, woodland, and shrubland habitats in general, fuel breaks can have over 200% higher non-native plant abundance than on adjacent undisturbed areas.[119] These areas can act as conduits for invasive plant spread into wildland areas dominated by native plants,[120] which can have major negative impacts on fire regimes in a wide variety of ecosystems[120–122] as well as wildfire risk to wildland-urban interface communities. Moreover, logging activity can actually lead to increased fire severity in western forests.[39,108]

Considerations for Future Coverage of Wildfire Issues in California

As the *Times* continues to serve as a major news outlet in the state, we urge you to ensure that stories about wildfire and proposed mitigation strategies are comprehensive and reflect the current breadth of the scientific literature on these topics. It is vital that diverse viewpoints are captured in future stories so that readers have a better understanding of the complexities of fire and ecology in California and elsewhere in the U.S. The pool of experts that serve as sources for *Times* stories should be expanded to include more non-governmental scientists and independent researchers as well as conservation organizations that are often working at the intersection of wildfire management and ecosystem protection—all of which are represented in this letter's signatory list.

The purpose of this letter is not to request that the *Times* or its journalists agree with any specific research, practices, or concepts, but rather to encourage more holistic coverage of wildfire-related issues. We understand that in this age of short news cycles and media competition the amount of time and space for any story is limited. However, the *Times*' readers—including members of the general public as well as policymakers—are best served when they are presented with greater context for issues that impact ecosystem health, public lands, and human safety.

Sincerely,

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