



A NEW STRATEGY FOR ADDRESSING THE WILDFIRE EPIDEMIC IN CALIFORNIA

Michael Wara | April 2021





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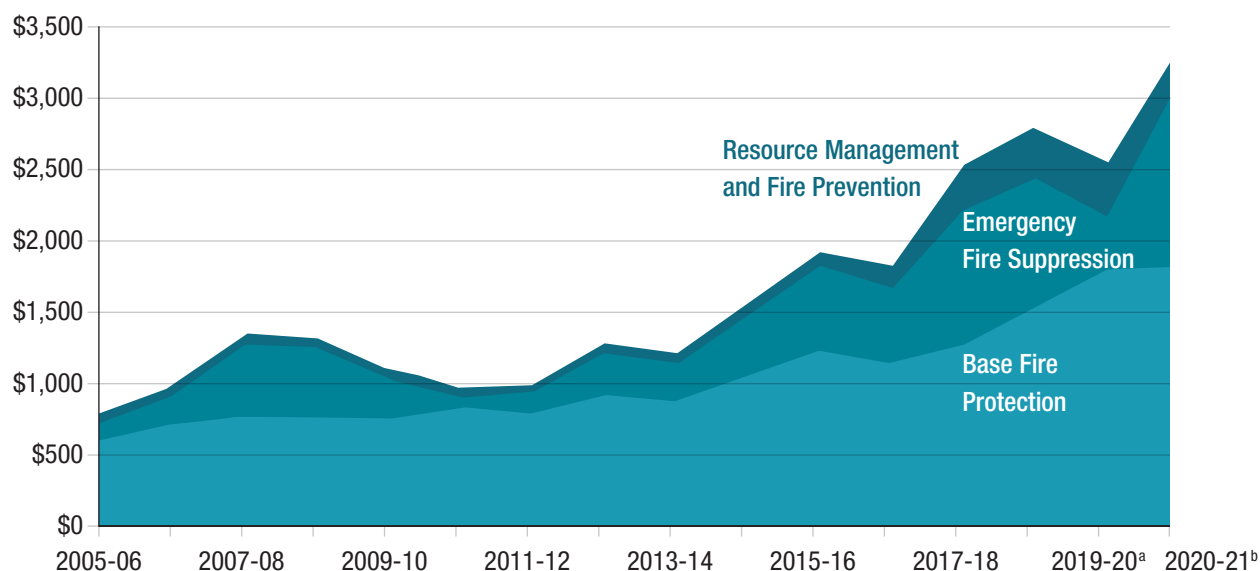


INTRODUCTION

Fire is a normal and often essential event for most California ecosystems. But land management and land use practices over the past century, combined with the effects of climate change, are producing unacceptable impacts from one kind of fire — wildfire — for the state of California and increasingly the western United States. The epidemic of wildfire that California has experienced over the past 5 years has caused enormous losses. Dozens have been killed by exposure to the fires while hundreds to thousands have likely been killed or sickened due to smoke exposure. Hundreds of thousands have been evacuated — many more than once. Negative impacts on mental health from wildfire are not well quantified but evidence suggests that they also may be significant. Tens of thousands of homes have been destroyed in regions where housing is already scarce and often unaffordable. Home owner's insurance is becoming less available in many fire prone communities and where still available, less affordable. Electricity bills are increasing all over the state due to the need of investor and publicly owned utilities to invest heavily in ignition prevention even as the largest IOUs have implemented widespread and highly disruptive Public Safety Power Shutoffs. All of these impacts fall most heavily on low- and moderate-income Californians who already struggle to manage housing insecurity and are more likely to work outdoors or live in older housing and so be exposed to unhealthy air quality caused by smoke. California is in the midst of a wildfire crisis.

It is becoming increasingly clear — particularly during the unprecedented 2020 fire season — that there is no way for CalFire in combination with local and federal firefighting agencies to firefight the state out of this crisis. CalFire has seen continuous budget growth — almost all directed at fire suppression activities — that has been maintained despite intense budget pressure due to the COVID-19 related recession. Currently, CalFire's suppression budget (before Emergency Fire Suppression or E-fund) is \$1.7 billion and after E-Fund will total above \$3.6 billion this year. In other words, 2020 state fire suppression costs will total more than 2% of general fund expenditures. But it's not at all clear that doubling or tripling the fire suppression outlay would lead to better outcomes for California communities. By contrast, California spends about 1/10 of the CalFire suppression budget on activities related to forest health that also have positive impacts for fire risk. In 2020, Governor Newsom proposed spending 1/30th of the CalFire suppression budget on a first-of-kind home hardening program but the program was zeroed out due to COVID-19 related budget impacts. This year, Governor Newsom's January budget proposal includes a large one-time \$1 billion appropriation aimed at wildfire prevention with a heavy focus on fuels management and community scale fire breaks. The legislature and the Governor recently reached agreement on spending \$536 million this year on a variety of wildfire risk reduction projects with additional spending likely in FY21-22. But there is no sustained funding pathway targeting wildfire risk reduction. CalFire developed, in collaboration with CalOES, a strategy for 2020 to minimize both firefighter and evacuee risks during the COVID-19 pandemic: to go back to the past by aggressively attacking all fires no matter how small in order to minimize the chances of fire escaping initial attack. That plan did not work. Furthermore, it has become apparent that the most destructive fires in terms of loss of life, property destruction, and smoke impacts, often occur during weather conditions where fire suppression is largely or even totally ineffective.

Figure 1. CalFire Expenditures on Base Fire Prevention, Emergency Fire Suppression, and Resource Management and Fire Prevention activities, 2005-2020 (in millions)



^a Estimated.

^b Based on enacted budget and administration's preliminary estimates of emergency suppression costs.

LAO, State Spending on Wildfire Prevention and Mitigation, October 20, 2020.

California needs a new overarching strategy for how to approach wildfire.

Here, I propose a very different strategic vision for managing the risks posed by landscapes that burn in California. This proposal is intended as a launching off point for discussion. Not a final answer or fully articulated plan. It is an attempt to stimulate more active discussion on the part of traditional stakeholders in the fire conversation — from CalFire to forest landowners including the federal government to environmental NGOs — as well as non-traditional stakeholders who have a lot to gain from better approaches to fire management in California. These non-traditional stakeholders include advocates for urban and suburban air quality and public health concerned by the rapidly deteriorating air quality situation in California; rural counties and local governments whose fiscal health is threatened by real estate market impacts of the wildfire epidemic; the insurance and reinsurance industries that want to continue to write policies in the largest real estate market in the United States; builders seeking to meet the desperate demand for new housing in the state; tribes that are seeking to (re)implement fire management strategies on their lands that served them well for millennia; and water agencies that are increasingly concerned about the impacts of wildfire on supply and water quality; and others.

Any plan for managing fire in California needs to take account of the enormous regional ecological, climatic, and land use diversity in California. These factors have enormous implications for the risks from fire and for the types of wildfire most likely to prove dangerous. Coastal Northern and Coastal Southern California share heavily developed suburban wildland urban interface (WUI) but possess very different climate and fire evolved ecology that have important implications for fire behavior and risk. The Sierra Nevada has its own unique challenges because of heavy federal land ownership

and a history of fire suppression aimed at protecting timber resources. In coastal California, the most dangerous and destructive fires tend to be wind driven. In the Sierra, catastrophic fire tends to be fuel driven. Nuance and context matter. There can be no one-size fits all solution for a state as large and diverse as California. But a comprehensive strategy that relies on a basket of approaches applied in a spatially and contextually appropriate manner is urgently needed.

The time is long past for small scale pilot programs implemented over years. California urgently needs solutions at scale that will materially impact the challenges posed by wildfire. Many of the solutions proposed in this report are not new. They are well known and have been implemented at relatively small scale and considered for larger scale implementation for decades. They were never scaled because of political and economic barriers that made their real or perceived costs greater than their potential benefits. But unlike in the past, communities far beyond the WUI are impacted by wildfire. Statewide markets — in insurance and real estate — that are central to the health of our economy, are being undermined. The rationale for changing our strategy has never been stronger. The magnitude of the impacts today are qualitatively and quantitatively different than even the worst wildfire seasons of the 20th century. Large parts of California are becoming unlivable because we are failing to conduct risk reduction activities at sufficient scale to make a substantial difference to the problem. Until we do, because of the ever-worsening impacts of climate change, the fraction of the state disrupted by wildfire will expand and continue to deteriorate in condition.

A NEW STRATEGY IN FOUR PARTS

This proposal outlines three elements of a strategy to better manage fire in California and makes a proposal for institutional change to enable it. First is a major investment in structure hardening to make California buildings much more resistant to ember driven ignition. Second is a program to enhance community level protections from wildfire so that fire fighters can have a better chance of keeping wildfire out of communities. Third is a return to managing public and private landscapes at sufficient scale using ecologically oriented fuels management with the goal of reestablishing low-intensity prescribed fire in ecosystems where it reduces risk and improves ecological function. Different elements of this strategy will be contextually more or less important in different parts of California. But all elements will likely play some role in most areas of the state exposed to wildfire risk. Last is a suggestion of how to restructure responsibilities for fire management to create clear accountability for execution of the different elements of the overall strategy and increase the likelihood of sustained fiscal commitment at sufficient scale to make a difference for California. Scale is crucial to the success of this — or any other strategy for California. Many of these approaches have been proposed — and actually implemented — in limited ways in California and other jurisdictions. Nowhere have they been implemented at the scale proposed here and in combination. These “pilot” level experiences have led many in the firefighting, land management, and home insurance communities to strongly endorse them, including for California. But that has not led to their adoption at a scale sufficient to materially reduce wildfire risk to California. This report is a first attempt to define what that scale might be and what funding is needed to achieve it.

Table 1. Three Plus One: Elements of a Risk Reduction Strategy for Wildfire Response in California.

Risk Reduction Scale	Risk Mitigation Strategy	Treatment Goal	Annual Rate of Treatment	Target budget
1. Structures	Home hardening retrofit: Develop a robust home retrofit program to ‘inoculate’ the already built environment to ignition. Embedded community home hardening personnel in all counties.	1,000,000 homes	100,000 homes/y	\$1 billion/y
2. Communities	Community fuel breaks and fire preparation: acquire rights to and construct strategic fuel breaks for all communities in California at highest risk of wildfire with the goal of slowing entry of fire into developed areas. Embedded community wildfire prevention planners in all counties.	Address all communities in Very High Hazard Fire Severity Zones in SRA, FRA, and LRA	10% of census designated places (or larger) per year	\$0.5 billion/y
3. Landscapes	Reintroduction of prescribed fire: prepare and then burn sufficient quantity of acreage annually so that all acreage in California that can benefit receives treatment before it requires re-treatment (typically in 10 to 20 years).	10 million acres	1 million acres/y	\$1 billion/y
Wildfire Resilience Department	Coordinate implementation of the 3 strategies and risk-target spending: Develop state level expertise in wildfire risk modelling and assessment so that all three interventions can be calibrated and targeted for maximum risk reduction and cost effectiveness. Coordinate with UC Extension fire personnel in implementing strategies.			\$0.5 billion/y
Total Cost				\$3 billion/y

PART 1. LOWERING IGNITION RISK

Many stakeholders, particularly those associated with the insurance and reinsurance industry and with firefighting, say that the “wildfire problem” in California might be more accurately described as a “home ignition problem.” There is also a clear consensus that while land use decision making for new development is a critical contributor, existing homes in high fire threat areas — particularly in older communities whose street grids expanded upon existing logging and ranching roads and whose structures were built prior to the implementation of Section 7A building codes¹ — are a massive problem. It’s not hard to understand the rationale for this perspective given the number of existing structures at risk and the rate of overall housing production in the state of California. Currently, between 150,000 and 200,000 new units of housing are built in each year in California. Of these, only a fraction are in high or very high threat areas. By comparison, while estimates vary, somewhere between 700,000 and 1.3 million homes have already been built in high or very high threat areas. And most of these homes were constructed long before the advent of the WUI building code. It is this “fleet” of existing homes that presents the greatest challenges for firefighters. Loss experience has shown that these un-hardened homes are far more likely to be lost in conflagrations such as those that occurred in Santa Rosa in 2017, and Paradise in 2018.

Figure 2. A demonstration of how differences in housing construction impact home ignition. The Institute for Building and Home Safety regularly constructs homes with different materials inside its wind tunnel and then subjects them to ember storms similar to what occurs in wind driven wildfires. Unhardened home at left, hardened home at right. (IBHS, 2019).



¹ Section 7A of the California Building Code mandates a set of construction standards aimed at reducing wildfire risk in mapped wildfire hazard areas that are “State Responsibility Areas” – the responsibility of CalFire. Many local governments also enforce the 7A building codes in “Local Responsibility Areas” where local fire departments are responsible for safety. The 7A building codes were designed in response to the 2003 Southern California wildfires and were phased in for applicable structures starting in 2009. Construction built in 2008 and earlier did not have to meet these stricter requirements. Loss experience from both 2017 and 2018 wildfire seasons suggests that while Section 7A codes do not guarantee survival, they dramatically increase the odds.

Addressing problems associated with existing homes is something that we have some experience with in California because of seismic risk. The California Earthquake Authority (CEA), in collaboration with CalOES, has long administered a “bolt-and-brace” program to retrofit existing homes in high seismic risk areas. In 2019, the program retrofit approximately 12,000 homes, with 80 percent of the funding supplied by FEMA pre-disaster grants and the balance (the State match) provided by homeowners themselves. This program began in a small set of jurisdictions identified by CEA as the highest concentration of risk in the state and has gradually spread to others as well as gained scale in terms of numbers of retrofits conducted per year. It’s a model for what California should attempt with respect to wildfire hardening.

But wildfire hardening is a more complex and less well understood challenge than seismic retrofit. There are numerous interventions that appear to matter for structure ignition risk. These include attic vents, closed soffits, fire resistant roofing and siding material, creation of a 5-foot noncombustible zone, and creation (and ongoing maintenance) of defensible space. And the combination of features specified for new construction in the Section 7A building code may not all be necessary or cost-effective to substantially reduce ignition risk. In addition, because of the spatial heterogeneity of wildfire risk, identifying the most cost-effective homes to harden requires sophisticated modelling tools. There are early attempts to quantify the value of these interventions at the structure level — and the state of knowledge is advancing rapidly.²

But California cannot afford to wait for perfect information on this issue. A better strategy would be to begin with low cost and highest likelihood interventions in a large enough suite of homes in high risk areas and then to continue to modify and improve the program as loss experience accumulates for the universe of treated and untreated homes. The scale and the density of intervention is important for improving the effectiveness of home hardening. Evidence from catastrophic fires indicates that house-to-house ignition is an important source of fire spread in conflagrations such as the Carr Fire, the Tubbs Fire, and the Camp Fire. If enough homes are hardened, this chain of ignition can sometimes be broken. But individual homes hardened in a neighborhood of vulnerable structures are less likely to survive. In other words, home hardening works best as an ignition reduction strategy when there is herd immunity. Just as with COVID, wearing a mask isn’t nearly as effective if others in your community choose not to.

This effort needs to be undertaken at a scale that is large enough to actually matter. I define this scale as of sufficient size to significantly harden the universe of homes currently exposed to elevated wildfire risk within 10-years. This implies an intervention approximately ten times as large as the current bolt-and-brace retrofit program — or approximately 100,000 homes per year. A reasonable goal would be to begin this program with a goal of hardening 10,000 homes in its first year in extremely high-risk communities and then working up to the 100,000 homes per year goal within 3 years. Such a program could collaborate and build on the many FireWise communities that exist in high risk areas to help maintain defensible space once created. Especially for older homes, creation of defensible space as an initial matter can be complex and costly, but maintenance is more straightforward and less costly once greater safety is achieved. Finance of the program might be modelled on the bolt-and-brace program for moderate- and upper-income home owners who would pay the state match of costs. Low income home owners would receive financial assistance from the state, FEMA

2 See e.g. NAIC, RMS and IBHS, Application of Wildfire Mitigation to Insured Property Exposure, November 15, 2020, at https://www.rms.com/system/files/content/paragraph/form-with-asset/private/2020-12/CIPR_Report_Wildfire-Mitigation.pdf?flush=1611870394.

pre-disaster assistance could pay for the balance of costs. Upfront costs to homeowners could be further reduced by adopting a PACE-like structure whereby costs are financed and homeowner repayment occurs via property tax bills. By creating these funding mechanisms, the politics of requiring home retrofit could be altered to require that all homeowners do their part to keep communities safe. It may be possible to use sticks once there are carrots to offer in conjunction with them.

Hardening of existing homes is critical to avoiding some of the most disruptive impacts of wildfires in California. If communities could survive intact — or at least more intact, costs of wildfire would be far lower for individuals, vulnerable populations, taxpayers, and electricity ratepayers. Wildfire smoke would be less toxic because it would not contain heavy metals and other compounds created by home combustion. This solution will take time to scale and implement, and isn't cheap. But because of the magnitude of costs imposed on the state and its residents by structure losses, and the proven ability to reduce those losses by proper application of known strategies, it is worth pursuing. Notably, Governor Newsom's current January budget proposal would allocate \$25 million dollars to a one-time home hardening pilot. This might be an important start so long as targeting is precise and interventions are carefully selected.

PART 2. COMMUNITY-SCALE RISK REDUCTION

Especially for lower intensity fires, fuel breaks — areas around a community that are maintained at lower (but not zero) fuel densities — can allow firefighters to stop forward progress of wildfire. A recent successful example of the use of a fuel break was in the CZU Lightning Complex Fire where an extensive fuel break investment by UC Santa Cruz allowed firefighters to hold the advance of the wildfire at the north side of campus, preventing what would have been a potentially massive and irreparable loss to the UC system physical plant and educational mission.

Paradise, California is exploring, in collaboration with The Nature Conservancy, creation of a fuel break that would serve to protect the town from risk of future wildfire. Creation of this fuel break requires purchase from willing sellers of parcels on the outer edge of the town for creation of green space that can serve as a meadow-like park during normal times but serve this critical function during wildfire. Fuel breaks may not stop fires from entering a community, but they can buy precious time for residents to evacuate and create a space for firefighters to safely stage defensive operations, thus reducing risk and loss of both life and property.

Fuel breaks need not be constructed on publicly owned land to be effective. Montecito's successful defense during the Thomas Fire in 2017 (3 homes destroyed) was in part due to the systematic creation of fuel breaks. Their creation was financed by public funds — a local parcel tax — but occurred on both private and public lands. A special district hired personnel who worked in the community, building trust and assisting homeowners in preparing for wildfire while also crafting agreements for well-designed fuel breaks to traverse private and public property. Firefighters were given standardized information prepared by the special district as the Thomas Fire approached so that they had good

information on where to stage operations in the community and how to fully utilize the fire protection infrastructure that the community had invested in and prepared³.

These kinds of community interventions require investment in both personnel to facilitate community engagement and to actually carry out activities that provide protection (such as fuel reduction projects that provide community benefits). Firewise communities are the main actors in this space at present but their level of activity is limited by available funds and by the effectiveness of all-volunteer organizations. Montecito and the UCSC campus are demonstrations of what is possible when funds are available to plan and conduct systematic risk reduction interventions that provide benefits to an entire community. All local communities with assets at high or very high risk of wildfire should have an obligation to plan at the community scale for projects that can reduce the risks and cost of wildfire defense when it is required. But these planning obligations will be both less resisted and much more effective if the state provides resources and expertise to assist resource-limited local and county governments in achieving better outcomes. Community scale buffers will also facilitate reintroduction of fire on adjacent natural and working lands by lowering the risk and consequence of escape into developed areas.

An effective statewide community scale risk reduction program would identify at risk communities, impose an obligation to plan risk reduction efforts, but also provide critical assistance in the form of planning and implementation grants to communities including for full-time personnel to work within the community on fire risk reduction. Such a program should begin by targeting the most at-risk populations in the state for implementation assistance and scaling as funds become available. FEMA Building Resilient Infrastructure and Communities (BRIC) funds could be utilized for cost-share as available, reducing the cost to the state of California for these efforts. Further state funding and state agency expertise could be utilized to assist local and county governments in applying for BRIC funding. This would help to level the playing field between at-risk communities with differing levels of resources. The UC Extension Program could be a locus of expertise and community-level engagement to perform this critical role in high wildfire risk communities.

Costs are the least certain for this aspect of the Wildfire Strategy proposal but a major effort, with a significant State cost-share, is likely required for success. I propose \$500 million per year as an annual targeted expenditure. This would be sufficient to put a large number of community resilience personnel in the field in high risk but resource poor communities while also funding many of the activities that they would help to plan and organize.

The Newsom Administration's recent budget proposal includes \$325 million in one-year appropriations dedicated to community scale wildfire risk reduction projects such as fuel breaks. \$180 million would be dedicated to community-level safety and fuel reduction projects while \$155 million would be dedicated to staffing needs that might be dedicated towards these projects or used for prescribed fire and wildfire suppression as needed.

3 Crystal A. Kolden and Carol Hensen, A Socio-Ecological Approach to Mitigating Wildfire Vulnerability in the Wildland Urban Interface: A Case Study from the 2017 Thomas Fire, *Fire* 2019 2(1), 9; <https://doi.org/10.3390/fire2010009>.

Figure 3. What adequate resources can accomplish to protect communities from wildfire. Images from Kolden and Henson (Fire, 2019, <https://doi.org/10.3390/fire2010009>) illustrating community scale interventions taken in Montecito prior to the Thomas Fire.



Examples of fuel reduction activities undertaken in Montecito: **A** a shaded fuel break on private property with Wildland Fire Specialist, **B** understory clearing and thinning on private property, **C** roadside fuel reduction, and **D** chipping equipment in use as part of the Neighborhood Chipping Program. Photos courtesy of Montecito Fire Protection District.

PART 3. LANDSCAPE-SCALE FUELS MANAGEMENT

Climate change and population growth are key accelerants to the wildfire crisis in California. But as important, especially for fuel driven fires that occur most often in the Sierra Nevada, are alterations in the fire regime over the past 150 years. These occurred due to forcible removal of native Americans who practiced cultural burning followed by policies of fire exclusion by state (CalFire) and federal (USFS) firefighting agencies. In general, the assumption made by many implementing actors that fuel reduction efforts should pay for themselves, in combination with the obligation to comply with numerous permitting and liability requirements, has limited the reintroduction of prescribed fire and other fuels management tools in California. As a result, fuel accumulation on both federal and private lands has far outpaced efforts to manage fuels leading to catastrophic fire outcomes such as the Rim Fire (2013) and Creek Fire (2020).

Recent experience shows how important and effective reintroduction of prescribed fire can be. Even given the extraordinary fire behavior observed on the Creek Fire, where that fire encountered lands owned by Southern California Edison that incorporate an active fire management program including regular application of prescribed fire, burn intensity was dramatically reduced. SCE owns approximately 20,000 acres within the Creek Fire perimeter and these private lands provide a graphic demonstration of the value of an active fire management approach. The potential benefits to landscapes by application of modern adaptations of cultural burning are far reaching. Reduction in the intensity of prescribed fire approaches also has potentially far reaching public health implications.

Smoke from Sierra Nevada wildfires has caused the worst air pollution over heavily populated areas of California in several decades. These “smokewaves” are estimated, to cause substantial premature morbidity and mortality in distant but heavily populated areas of California and the Western US. The deaths caused by air pollution impacts of wildfire is 10 to 100 times larger than loss of life directly caused by catastrophic fire.⁴ The benefits of avoiding these increasingly common regional air pollution impacts are of a magnitude — tens of billions of dollars per event⁵ — that easily justifies much larger investment in an active fire management regime so long as that regime has smaller smoke impacts than the no-action, all-wildfire alternative.

Restoring an active fire management regime requires substantial investment in both preparation of forests for reintroduction of fire and in application of prescribed fire. The Forest Carbon Plan and the Little Hoover Commission study on forest health and wildfire estimated that a scale of 1 million acres per year would be required to have some prospect of reducing the incidence of fuel driven catastrophic wildfire in California forests. The idea behind a 1-million acre target for California is relatively simple — there are between 10 and 20 million acres of forested landscapes in California that historically burned at much higher frequency. Reintroduction of prescribed fire at a scale of 1 million acres per year would insure that all acres received fuel treatment once every one to two decades. This would ensure that an area would be retreated with sufficient frequency so that fuels did not reaccumulate to dangerous levels. The recent MOU between CalFire and the USFS contemplates a planning process to achieve 500,000 acres per year on state and 500,000 acres per year on federal lands a more than a ten-fold increase above current levels.

4 See, Burke, Heft-Neal, and Wara, *Managing the Growing Cost of Wildfire*, SIEPR Policy Brief, October 2020, at <https://siepr.stanford.edu/sites/default/files/publications/PolicyBrief-October2020.pdf>

5 See, Wang et al., *Economic Footprint of California Wildfires in 2018*, *Nature Sustainability* (2020), <https://doi.org/10.1038/s41893-020-00646-7>

Recently enacted federal legislation funds planning but not implementation of the MOU. The Little Hoover Commission estimated that reintroduction of fire might cost \$1000/acre. Thus treating 1 million acres per year implies a state and federal combined investment of \$1 billion per year. Given the magnitude of public health impacts due to wildfire smoke, this investment is likely to be highly cost-effective. The real challenge would be scaling a program and workforce. In order to achieve scale, sustained political, regulatory, but most importantly funding support for prescribed fire is essential.

Governor Newsom's January 2021 budget proposal takes a major step forward towards this goal by including \$512 million for "Resilient Forests & Landscapes" This one-time appropriation would be spread across CalFire, State Parks, and the Sierra Nevada and Tahoe Conservancies to improve forest resilience to wildfire. It's an essential down payment and an important beginning.

Figure 4. Creek Fire aftermath on Sierra NF (bottom) and SCE owned and managed (top) lands. SCE allows tribes to actively manage its lands in the Creek Fire footprint using cultural burning practices.

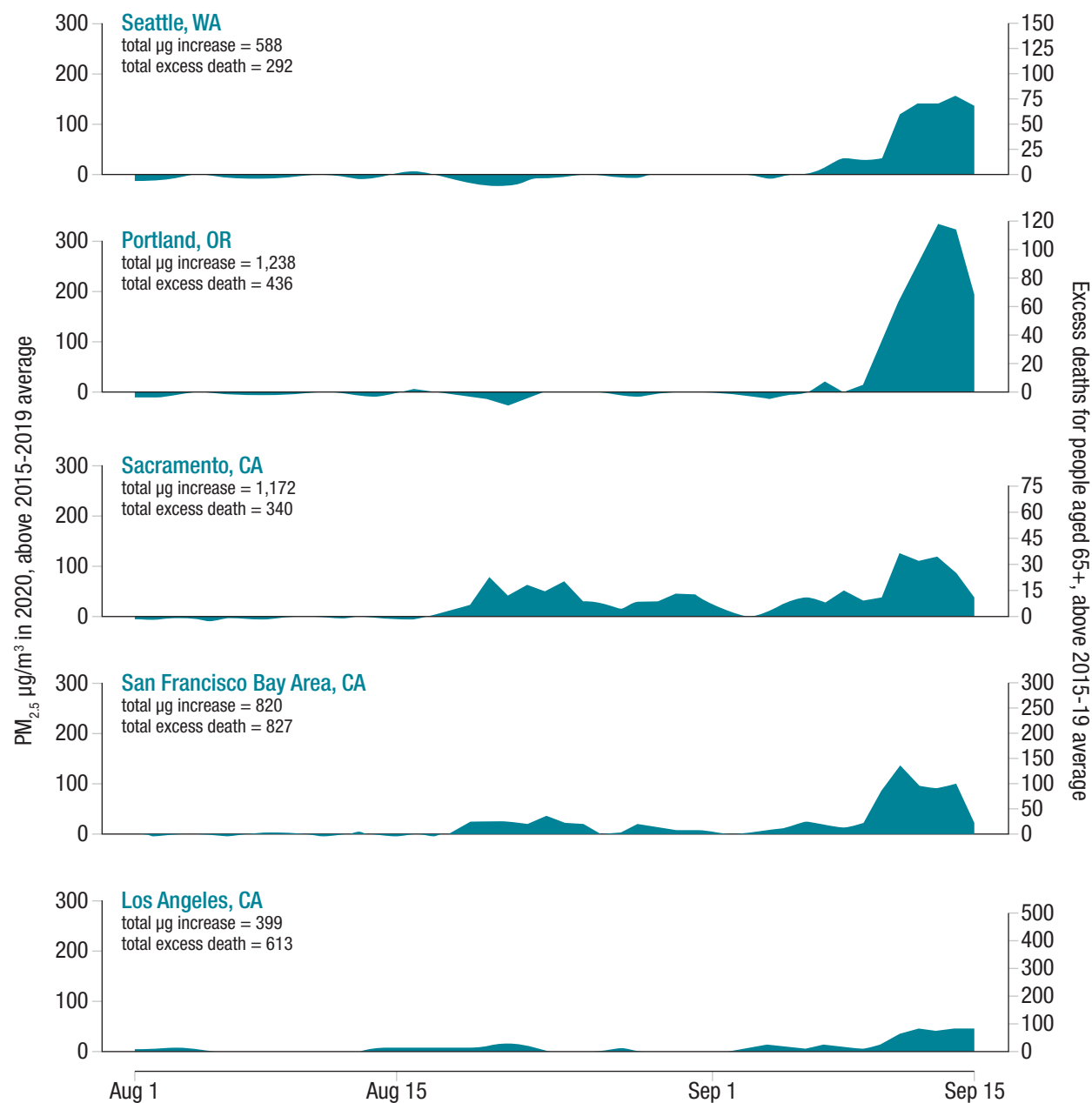


Photos by Jared Dahl Aldren.

A major challenge for better fire management on forested lands in California is the fact that only a tiny fraction of these lands are owned by the state (3%) while most are in either federal (57%) or private (40%) hands. A successful fuels management strategy therefore requires agreement between state, federal, and private landowners on approach and a funding mechanism that fairly apportions the burden of paying for the work that needs to be done. The recent CalFire-USFS MOU goes a long way towards identifying a planning strategy of sufficient ambition to achieve the goals outlined in this section. But it leaves unsolved the problem of how the actions in the field will actually be permitted, organized, implemented, and ultimately paid for. Traditionally, landowners have been responsible for funding fuels treatments on their lands. This has led to efforts to make these treatments pay for themselves — including allowances for limited high value tree removal. This in turn has generated strenuous opposition from environmental groups who perceive, sometimes correctly, logging in the guise of fire risk reduction.

In general, the beneficiaries of a project should pay for it. Unrecognized in prior fuels management discussions is the potential benefit to state-wide, indeed western US-wide, air quality of improved fire management on forested lands in California. Ultra-fine particle emissions (PM 2.5) from Sierra Nevada wildfires are causing deterioration in air quality in heavily populated regions of California, with consequent health impacts including large numbers of premature deaths. Given the benefits to these regions of an improved fire management regime, it is reasonable to suggest that a much larger area than has previously been considered as beneficiaries of fuels management should be considered for financial contributions to the effort. This in turn may substantially ease the burden of finding adequate revenues to cover these ongoing costs. A key step forward then is to better document both the current public health impacts of a wildfire dominated smoke regime and alternative scenarios in which smoke impacts are lessened and altered by aggressive reintroduction of prescribed fire on forested lands in California.

Figure 5. Wildfires beginning in mid-August in CA, and early September 2020 throughout the West Coast, led to levels of PM_{2.5} that were >100ug higher than normal across cities in CA, OR, and WA. Daily excess PM_{2.5} was calculated by averaging across monitors in Core Based Statistical Areas (CBSA) for 2020 and subtracting 2015-2019 averages for the same day-of-year. CBSAs represent “metropolitan areas” and encompass wider geographical areas than the cities that anchor them. Excess mortality was estimated for each CBSA using the estimates in Deryugina et al 2019 combined with population data from the ACS, and are for individuals aged 65+ (Burke, Heft-Neal, and Wara, 2020 at <https://siepr.stanford.edu/research/publications/managing-growing-cost-wildfire>).



PART 4. INSTITUTIONAL CHANGE AND FISCAL COMMITMENT

A final step in developing a strategic plan to address wildfire is to ask the question, “why don’t we already have one?” I argue⁶ that California should consider creation of a new fire preparedness institution as an important component of a broader wildfire prevention strategy. Such an institution would complement — not replace — the efforts and focus of state and federal governments on fire suppression. A key message is that we need institutions focused on fire management and prevention that are of the same scale and capacity as those we have that are focused on suppression. Climate change means that the fire seasons we are experiencing today (2017, 2018, 2020) are not the worst we can expect. Instead, absent major policy changes in our approach to fire, these terrible years may come, later this century, to seem like average or even below-average fire seasons. The firefighting institutions we have built in the state are going to be essential. But additional, purpose-built institutions are needed so that firefighters can focus on the incredibly difficult challenges they will face while others can focus on the aspects of the wildfire problem that involve preparation, risk reduction, and prevention.

CalFire currently spends more than \$3 billion per year on fire suppression. The USFS spends a similar amount on fire suppression related activities, a substantial portion of which is expended in California. There has been widespread acknowledgement since at least 1980 that forest management — in particular the practice of fire exclusion from fire evolved landscapes — is an important cause of the problem. And yet practices and fuels management budgets have not really changed. It is still the case, just as it was when the first Tall Timbers meetings occurred, that prescribed fire mostly occurs in two states — Florida and Georgia — and to a lesser degree in the Sierra Nevada National Parks. Likewise, support for and enforcement of the actions required for individual homeowners and communities to become more resistant to wildfire is strapped for funding and is dependent on a grant-oriented approach that tends to funnel money towards affluent communities that have resources to apply for grants rather than to where it is most needed. Ever since the Tunnel Fire in 1991, we have known that home and community hardening are essential to creating resilient communities, but except for a small subset of California municipalities, we have not marshalled the resources to take sustained action for public safety.

Currently, wildfire preparedness responsibilities are spread between a number of agencies and offices including CalFire, CalOES, the California Public Utilities Commission, ARB, Office of Planning and Research and volunteer organizations like FireWise and Prescribed Burn Associations. The agencies with both the most authority to take actions to reduce risk and the largest resources to do so — CalFire and CalOES — are both understandably focused in terms of leadership attention and new resource requests on disaster response and fire suppression. CalFire’s 2020 budget, before e-fund expenditures was for \$2.2 out of \$2.5 billion to be spent on fire suppression while the remaining \$300 million was spread across a variety of responsibilities from timber harvest plan administration to fuels management. More than this,

6 Michael Wara, Concrete Steps California can take to prevent massive fire devastation, Los Angeles Times, Sep. 16, 2020; <https://www.latimes.com/opinion/story/2020-09-17/california-state-agency-fire-preparedness>.

leadership attention is inexorably focused by the increasingly long and complex wildfire season. Just one recent example of this has been delays in the Forest Management Task Force process due to deployment of key CalFire personnel to the field to fight wildfire. And this is a good thing! We cannot afford as a state for CalFire and CalOES to be distracted by other activities during increasingly long fire seasons involving multiple 100,000+ acre wildfires. Nor can we afford to underinvest in the critical resilience and preparedness activities with which these agencies are also currently burdened.

A solution to this problem might come from creation of a Wildfire Resilience Department or Office within the Natural Resources Agency that has lead responsibility for planning, coordinating and taking actions necessary to reduce the negative consequences of wildfire in California. These actions span the three substantive areas outlined in parts 1, 2, and 3 of this proposal. Such an agency could assume or could simply build upon and increment elements of the CalFire and CalOES mission related to fire preparedness — in particular aspects of the State Fire Marshal's and CalFire's responsibilities that are oriented at reducing losses from wildfire; or elements of the CalOES mission oriented at home and community hardening. It could form a partnership with the Air Resources Board, local Air Quality Management Districts, and Prescribed Burn Associations to facilitate greater utilization and funding for fuel treatments including prescribed fire. This might include planning for and use of Clean Air Act "exceptional events" declarations for prescribed fire and coordination of CEQA compliance. It could serve as a coordinating and facilitating body for design and implementation of community and homeowner risk reduction projects. It could partner with the Wildfire Fund administrator in ways similar to the way that CalOES currently partners with the California Earthquake Authority on home hardening. And it could subsume — or perhaps be created by expansion of the utility wildfire safety division created by AB1054 when it moves from the CPUC to the Resources Agency, increasing coordination and cost-effectiveness of actions taken by utilities to reduce wildfire risk with those of other public and private investments. It could also add to the capacity of OPR to think and propose constructive solutions to land use and development in and near the WUI. Finally, a Wildfire Resilience Department could develop critical, but currently lacking expertise and capacity in the quantification of wildfire risk mitigation that would allow targeting of spending under all of these strategies on a regionally specific and risk-oriented basis.

Creating a new entity within state government entails significant costs as well as the benefits described above. It will require additional budgetary resources and increase headcount. A reasonable estimate of costs might be \$500 million per year — smaller than the Air Resources Board but larger than the Energy Commission at present.

Creation of a new entity within state government may also engender resistance from departments that currently have responsibility for some aspect of wildfire preparedness and want to maintain that role. It may take time. All of these are valid concerns. But the key issue for all stakeholders to consider is how to improve the preparedness situation in the state in a fashion that is significant enough to stabilize what is a rapidly deteriorating situation and in the context of a warming climate. At critical moments in California's past, we have stepped up to create such agencies — most notably in the environmental protection space when we created the Energy Commission and the Air Resources Boards to deal more effectively with the energy crisis and the air pollution crisis.

We need to honestly acknowledge that whatever organizational structure we have — whether it is the current one or the one recommended here — significantly more money than devoted at present is required on a sustained basis in order to stabilize the current situation, let alone make it better. We are going to need to maintain the current levels of CalFire capabilities while we also attack the problem of wildfire from a preparedness approach. Climate change in the 21st century is very likely to make the fire seasons of the past several years look normal, not extraordinary. This means that the current approach in California with respect to wildfire is not sustainable. And the interests at stake — in particular affordability of homeowner's insurance and growing air pollution impacts — are going to mean that costs will rise substantially, one way or another — the only real question is how. The Newsom Administration's recent budget proposal, or a bond or the electric ratepayer fee extension proposed late in the prior legislative session can provide an initial and important infusion of resources to start working through a backlog of deferred work. But the investment and effort will need to be sustained in order to just hold the wildfire situation where it is now. We need to make a big “down payment” as soon as possible but we also need to accept the reality that many California homeowners do of very high mortgage payments for the foreseeable future.

More personnel are going to need to be hired on a permanent basis — both on the suppression and on the preparedness side. The only real question is what mix of preparedness and suppression will minimize the expenditure of state resources. Those who argue for continued focus on suppression resources and headcount should have the burden of explaining how this strategy will reduce overall costs for the state. Creation of a department focused on wildfire preparedness creates a formal structure within the budget process to focus this new and urgently needed expenditure and to evaluate how much is required from the limited resources available. At present, such a structure does not exist. The result is a strong bias towards ever increasing investment in fire suppression and disaster response rather than a balanced approach that aims to minimize the growth in overall state expenditures related to wildfire.

A number of stakeholders have suggested that the current balance is so skewed, that a formula for funding preparedness relative to suppression should be considered. This recommendation, predicated on funding formulas for FEMA disaster assistance (4:1), would require that a fixed proportion of any outlay for suppression (normal budget or e-fund) be channeled into preparedness investments. Others found this suggestion problematic because it requires a determination of funding priorities and levels before needs are well defined. This proposal suggests that at least for the time being, investments in fire suppression should be stabilized at \$3 billion while investments in fire prevention and preparedness are scaled to roughly that level. In essence, that California should spend as much on fire prevention and resilience as we spend on firefighting.

In order to support this spending, California also needs an organization that is much more focused on preparation for wildfire and on reducing the impacts of wildfire where and when they occur. Our state also needs a sustained commitment to funding this function at levels that are sufficient to reduce harm to communities, public health and welfare, and ecosystems. Current institutions burdened with this responsibility face incredibly difficult challenges fulfilling their primary objectives — disaster response and fire suppression — let alone this expanded role. And we cannot afford to distract their leadership from those mission critical objectives. Further, decades of experience with CalFire and USFS indicate that fire suppression will remain the dominant response to the challenge of wildfire in California from these entities. We need our firefighters more than ever, to be firefighters. And we should not expect them to have second careers as resilience builders. To get that mission done, we need a new state entity whose sole objective is securing and channeling investment towards the creation of wildfire prepared homes, communities and landscapes.

CONCLUSION

A strategic vision to address wildfire risk in California must identify needed interventions and the scale at which these actions must be taken to meaningfully reduce risk. Such a vision should also address the incentives actors have to fully implement recommended approaches at scale. In this proposal, I make the case for three pillars of a substantive strategy to meaningfully reduce wildfire risks and losses for California — home hardening, community preparedness, and restoration of the fire regime in California forests. I also argue that institutional reform — creation of a Department of Wildfire Resilience within the Natural Resources Agency focused on fire preparedness and risk reduction is necessary to create the focus and attention to see these goals accomplished. We urgently need a substantial home hardening program, a major planning and investment effort in community protection, and a comprehensive strategy, in collaboration with tribes and the federal government, to address fuels and better manage the forest and other wildlands in the state. All of this will require substantial investment — probably on a scale at least as great as current expenditures on suppression and on a sustained basis. Particularly given the COVID-19 induced recession, it's not clear where the money to execute on this strategy might come from. The Newsom Administration's bold budget proposal is an important first step in the right direction but it is not a sustained strategy. The challenge we face as a state is in recognizing that failure to take meaningful, substantial and sustained action on wildfire ultimately threatens the underpinnings of the 5th largest economy in the world.



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