Testimony to the Senate Budget Committee

Hearing on "A Burning Issue: The Economic Costs of Wildfires"

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Chairman Whitehouse, Ranking Member Grassley, and Members of the Senate Budget Committee, thank you for inviting me to testify today on the issue of the costs of wildfire to California, my home state, and the broader West. It is a privilege to appear before you. I am a researcher at Stanford University who, for the past 5 years, has been focused on the issue of wildfire. I served on the California Commission on Wildfire Cost and Recovery as well as on the oversight board of the California Wildfire Fund, a utility wildfire insurance mechanism created by California in 2019. I have also served as a consultant to the California Senate on issues related to the PG&E utility bankruptcy and currently serve as a consultant to the California Public Utility Commission and California Office of Electric Infrastructure Safety on issues related to utility wildfire risk modelling. I was the Steering Committee Chair of the California Council on Science and Technology Report entitled, "The Costs of Wildfire in California." Finally, I have served on the Citizen's Oversight Council for the Marin Wildfire Protection Authority and currently serve on my local planning board, the Tamalpais Design Review Board, helping to make local land use decisions in an area with very high and in places extreme wildfire risk. I am deeply honored to appear before you today to offer a perspective on the costs of wildfire in California and the west.

Causes of the Wildfire Crisis: Fire Suppression, Logging of Old Growth, Climate Change, and Population Growth

The wildfire crisis confronting western states, including California, is the product of multiple decisions made by humans over the past 150 years combined with the growing effects of climate change on western forests. While many of the challenges I will discuss are common across many western states, my statements today are primarily derived from my experience working in California on wildfire issues.

Prior to Spanish and American conquest of western North America, native Americans actively stewarded the land on which they lived by burning it to create safer, healthier, more productive ecosystems for their hunting, foraging, and cultural activities. Lightning also played an important role in producing a forest environment in the Sierra Nevada and coastal ranges of California in which wildfires typically burned an area at least once a decade and often more frequently. We know this from records of burn scars recovered from long-lived trees in California.[1]

The removal of most native Americans from California forests in the mid 19th Century combined with laws passed to make burning illegal – itself a means to remove natives from the lands they had stewarded for millennia to make way for mining, logging and settlement by white settlers – led to a material change in the fire regime and gradual accumulation of fuels in California's and other western states' forests.

After the Big Blowup of 1910 – a catastrophic wildfire in Montana that killed 87 people and burned close to 3 million acres in just 2 days, the United States Forest Service instituted its modern fire suppression policy that, by attempting to extinguish all fires when they are small, unintentionally further increased risks.[2]

[1] https://nature.berkeley.edu/stephenslab/wp-content/uploads/2015/04/Stephens-et-al.-CA-fire-area-FEM-2007.pdf. See also https://www.pnas.org/doi/10.1073/pnas.2116264119 for a recent integration of Traditional Ecological Knowledge with analyses of fire proxy records.

[2] For compelling images of this difference, see Gruell, Fire in Sierra Nevada Forests: A photographic interpretation of ecological change since 1849 (2001). For a comprehensive history, see Stephen Pyne, Between Two Fires: A Fire History of Contemporary America (2015).

At the same time, commercial logging systematically targeted the most valuable timber: large diameter old growth trees that were highly resistant to wildfire. After removal of these trees, replanting of monoculture plantation forests often led to even aged stands of much younger, smaller diameter trees that were much closer together. That combination makes them much less resistant to wildfire.

The net result at the end of the twentieth century was a transformed forest. Early US accounts of the Sierra Nevada landscape describe an open parklike woodland with sparse, very large trees where frequent, low-intensity fires were both safe and an important tool to maintain the forest. One could run or ride a horse through the forest without needing to stay on a trail. Today's forest, where it has not been subject to wildfire in the recent past, is composed of densely packed small trees with understory vegetation in close contact with the more mature trees and the canopy. It's a tinderbox. It's also a forest where many small trees are in intense competition with each other for water and nutrients, leaving them more vulnerable to drought.[3]

Added to that tinderbox has been the transformative effect of climate change on the western atmosphere, not well understood until the last few years. Simply put, climate change is making the atmosphere thirstier. Scientists have identified the seasonal average "vapor pressure deficit" which can be understood as the difference between the amount of moisture the air can hold as compared to what it does hold, as a key factor in increasing wildfire risk.[4] Elevated vapor pressure deficit is caused by warming temperatures that increase the ability of the atmosphere to hold water vapor. As a result, trees and shrubs must evaporate more water through their leaves to stay healthy, water evaporates from soils and lakes more readily, and the overall forest dries out more than one would expect from temperature increase alone. Seasonal vapor pressure deficit is a good predictor of a number of variables tied to wildfire

[3] An excellent discussion of these issues can be found in a recent paper by Malcolm North et al., https://northlab.faculty.ucdavis.edu/wp-content/uploads/sites/195/2022/01/Operational-resilience-FEM-2022.pdf

[4] https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2019EF001210

including acres burned, prevalence of large fires and particulate matter associated with wildfire smoke.[5] Vapor pressure deficit has increased over the last two decades due to climate change and consistent with climate models. It is projected by the same models to continue to increase over coming years such that the average fire seasons of the next few decades are likely to be similar to the worst fire seasons we have experienced to date. By 2040, the fire seasons of the 2010s may come to seem as quaint and manageable as the fire seasons of the 1960s do today.[6]

This vulnerability has had important consequences over the past two decades as the West has experienced the most significant drought in the historic and paleo-proxy based record.[7] While it is accurate to say that we are experiencing the most intense drought in California and the southwest in the past 1200 years, this to some degree under emphasizes the severity of the situation – the reference to 1200 years comes not from the fact that a drought in the record was more severe at that point but from the fact that reliable records of precipitation only date back that far. It is also important to note, as California and other parts of the west are blanketed in abundant snow cover as of this writing, that we have also had other record snow seasons (especially 2016-17) that punctuated this drought but did not in the end break it. We cannot be confident that this year's abundance will signal an end either. An end will require multiple seasons of average or above average precipitation. The causes of drought severity are tightly coupled to atmospheric drivers, described earlier in my testimony, that have also driven wildfire extremes – a warmer, and hence thirstier atmosphere.

At the same time, the forest structure – with many young trees competing intensely with one another for both water and nutrients – has exacerbated the impacts from drought. Tree die-off in the Southern Sierra was a major concern in the early phases of the drought – and led to a state declaration of emergency by then Governor Brown. The sustained drought has led tree die off has spread north into the central Sierra region around Lake Tahoe. The result of tree die-

[5] VPD and Acres burned and large fires: https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2021GL097131; VPD and PM2.5: https://www.nber.org/papers/w30882.
[6] https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2019EF001210
[7] https://www.nature.com/articles/s41558-022-01290-z

off in the Southern Sierra was fire intensity of unprecedented levels when fire weather combined with ignition sources in later years. In particular, the fire behavior observed on the Creek Fire in 2020 was unlike anything most wildland fire management professionals had encountered in their careers and has been analogized to the Tokyo Fire Bombing rather than a wildfire.

Climate change, combined with a century of forest management that left western forests vulnerable to drought and attack by beetles, is significantly contributing to this growing tail risk throughout western forests and rural mountain communities. Just as for flood, climate change makes the 1-in-100-year wildfire more likely to occur once a decade or perhaps more relevantly, once in a 30-year mortgage. And it makes the 1-in-1000-year wildfire event a real possibility rather than a vanishingly unlikely occurrence that can mostly be ignored. The interaction between climate change, forest management, drought, beetle infestation, and wildfire cannot be ignored in an accurate estimation of risk in California forests. The combination and feedbacks between these factors are what create the situation we are in. But this also suggests, as I will discuss below, that by modifying these interactions, we may be able to at least lower risk relative to where it might have been due to the combination of fire suppression, land management, and the worsening impacts of climate change.

I want to be clear that there is no way to "adapt" our way out of this problem. In the end, the science is quite clear that wildfire will be a significant and lasting impact from climate change – not just in the west but around the world. Truly stabilizing the situation will require both adaptation to climate change and meaningful reductions in emissions. If we do not cease to emit large quantities of greenhouse gases into the atmosphere over the next several decades, and even take meaningful steps to remove greenhouse gases we have emitted in the past, the wildfire problem will continue to get worse. It's like being on a treadmill that's constantly increasing in speed. With better fitness and technique, one may be able to "adapt" to the higher speeds, but at some point, as the speed increases, even the fittest runner will get spit off the back of the machine. Climate change has magnified risks we were already taking in the 20th

Century with our land management policies to the point that, two decades into the 21st, they are no longer acceptable. The situation will continue to worsen until we treat both the symptoms, including wildfire, as well as the underlying disease – greenhouse gas emissions.

A last and important cause of the growing losses from wildfire is the simple fact that our assets exposed to risk are growing. This growth in exposure occurs both because of the growth of population in the West and especially because of the growth of development in the wildland urban interface (WUI).[8] This rapid growth has two effects – it means that more people and structures are potentially vulnerable to wildfires that start on or near wildlands and rely on biomass as fuel. It also means that more wildfires are ignited because people are the most important cause of wildfire ignition and growth in population where fuels are abundant leads to higher incidence of wildfire.[9] While land use planning by communities is changing to take account of wildfire, change is limited mostly to new development and is typically balanced against other near-term financial incentives, particularly for local governments and developers.

Thus, the situation we are in with respect to wildfire in California and the broader west is not stable – it will predictably grow worse – with the worst years of recent memory coming to seem routine by the 2030's. Unless we take evasive action now.

The Costs of the status quo are large and growing

If we fail to act, we can be confident that a set of consequences will predictably follow. Fire suppression costs will continue to increase even beyond current, unprecedented levels. Structure losses will continue to accelerate, potentially threatening California's and other state residential insurance markets and through them residential real estate markets. The cost of western electricity will rise significantly, making it less affordable for low-income and especially rural residents of western states. Ecosystem loss will accelerate – California has lost 25% of the

[8] https://www.pnas.org/doi/10.1073/pnas.1718850115
[9] https://pubmed.ncbi.nlm.nih.gov/29229850/

remaining Giant Sequoia groves over the past 5 years. Carbon stored in western forests will be released to the atmosphere at rates far in excess of the ability of ecosystems to absorb it. A warmer, drier Sierra may not support regrowth of forest, turning large stretches from forested landscapes to brush fields. Air pollution impacts from wildfire will continue the process they have already begun, of undermining hard fought and meaningful gains in western and mid-western air quality. And we will lose many more small, rural communities, like Grizzly Flats, Paradise, Greenville, and others that are an important part of the character of the rural American west. These costs dwarf any reasonably foreseeable value of timber extracted from federal lands in the west. At this point, given the contribution of timber management decisions over the past century to wildfire risk today, and the limited value of timber extracted from federal lands relative to just the quantifiable costs described above, commercial harvest should be considered a secondary priority to wildfire risk reduction for western states. A nice to have if it coincides with science-based risk reduction.

Wildfire response costs

Congress worked hard to solve the problem of USFS wildfire response costs eroding investments in other areas. The "Fire Funding Fix" from just a few short years ago was intended once and for all to solve the problem of USFS using non-wildfire components of its budget to backfill essential expenditures on wildland firefighting. Since the Fire Funding Fix was implemented three years ago, all additional money authorized has been consumed by firefighting in the year it was set except for last year. Budgets in both 2020 and 2021 for USFS firefighting were approximately $4 billion with $2 billion coming from funds appropriated to fire suppression and $2 billion coming from the Fire Funding Fix. CalFire, the state agency charged with fire response in most unincorporated parts of our state has similarly seen a massive acceleration in its fire suppression and emergency expenditure budget – with budgets (including e-fund) in 2017-2022 averaging $2.3 billion with a strong upward trajectory. The impacts of climate change – realized through higher summer temperatures and lower seasonal vapor pressure deficit - mean that these numbers are not going to fall. Instead, they are going

to predictably increase. And if the relationships between vapor pressure deficit and wildfire acreage and intensity hold, then these numbers will increase substantially. Behind these growing costs is a growing human toll in our wildland firefighting workforce as well. The workforce is being asked to take fight more intense wildfires, for longer wildfire seasons, and this is taking a real human toll on the workforce that pay raises will help to make more manageable but will not solve. Maintaining force readiness in the face of 21st Century wildfire is likely going to require fundamental structural change in wildland firefighting that will increase costs at the state and federal level even beyond where they are now.

Structure loss – direct and indirect costs

California, Oregon, Colorado, and other western states have lost truly unprecedented numbers of structures to wildfire over the past 5 years. California alone has lost close to 40,000 homes. These losses have important knock-on effects that impact the federal budget and create systemic risk for the national economy. Housing markets in California and the west are tight and housing affordability is a kitchen table issue – maybe *the* kitchen table issue. In any region where a wildfire occurs, these issues become supercharged. In the Santa Rosa area after the 2017 Napa-Sonoma Fire Siege, housing prices surged for a very simple reason – an already tight supply of housing saw an overnight reduction of 5500 units. Low-income residents were rapidly priced out of rental housing by wildfire victims whose insurers covered the cost of rental housing after a total loss. Similar dynamics have played out in Butte County after the Camp Fire and essentially all large WUI fire recoveries. These impacts are most intense in smaller rural communities where housing availability is already an issue. These housing market impacts amplify the impacts of wildfire on those who are least able to afford it.

These housing impacts are mostly private costs at this point but have important market effects. Recent work by my colleagues at Stanford has demonstrated real estate market impacts in areas that are impacted by wildfire.[10] As more areas are hit by catastrophic wildfire, these

[10] https://journals.plos.org/climate/article?id=10.1371/journal.pclm.0000087

impacts will cumulate across broader regions. Our own work, in preparation for publication, relying on machine learning based causal inference methods, indicates that broader market effects may already be occurring even in high wildfire risk areas that have not yet experienced wildfire. All of these mortgages are ultimately insured by Fannie and Freddie. It is possible that a truly catastrophic wildfire season akin to the 2019-2020 Australian Bushfire Season in which 60 million acres burned in Australia, could cause a massive dislocation in western real estate markets. A key difference from tropical storm risk in the Southeast is that wildfire risk in the west tends to be correlated across broad regions. This means that a bad season in Southern California is likely to be a bad season in Northern California and Southern Oregon as well. As climate change supercharges the wildfire risk via vapor pressure deficit changes and associated drought, these correlations create systemic risk.

Underlying all residential real estate markets in the United States are residential insurance markets. 30-year mortgages are impossible without homeowners' insurance coverage that includes fire as a covered peril. Insurance protects both the lender and the homeowner from potential losses. Failure to obtain insurance coverage by the mortgagor is a technical default on the loan but is often handled by the mortgage servicer purchasing very expensive substitute coverage. As losses have accelerated due to wildfire, insurers and reinsurers are reevaluating their exposure, raising prices to the degree that regulators allow it, and limiting underwriting when they can't fully price the risk. Industry estimates indicate that the 2017 and 2018 losses wiped out more than two decades of profits in the California homeowners market.[11] Partly as a consequence of these rapid changes in perceived risk, California faced a dramatic growth in the number of homes covered by its FAIR plan after the Camp Fire.[12] Year-on-year increases in allowed premiums, moratoria on non-renewals that have delayed non-renewals in fire-impacted counties, and the absence of another major overnight loss of several thousand homes since 2018 has stabilized the market. But this situation is stable only so long as one believes

[11] https://us.milliman.com/en/insight/trial-by-wildfire-will-efforts-to-fix-home-insurance-in-california-stand-the-test-of-time

[12] https://www.rff.org/publications/issue-briefs/insurance-availability-and-affordability-under-increasing-wildfire-risk-in-california/

that such an overnight loss of thousands of homes is unlikely to recur. The absence of investments in mitigation of sufficient scale at the structure, community, and landscape level to dramatically reduce wildfire risk cannot give one confidence that such a loss will not occur.

Electricity costs and risks to rural utility systems

The cost of electricity has risen dramatically since a spate of utility-caused wildfires began in 2017. These wildfires devastated the balance sheet of Pacific Gas & Electric, leading to its second bankruptcy filing in 2019. To restore the creditworthiness of PG&E and preserve the investment grade credit ratings of southern California utilities, the state created a $21 billion Wildfire Insurance Fund in 2019. More importantly, utilities in California have been and will continue to invest heavily in wildfire mitigation activities in their systems. In 2022, total planned investment from the investor-owned utilities exceeded $10 billion and will likely continue to grow in future years. It is worth emphasizing the sheer magnitude of the utility wildfire risk mitigation investments in California compared to other mitigation investment. At $10 billion per year, these expenditures dwarf both federal and state fuels management investments to date and are very likely to be sustained over at least the next decade. Since electricity rates are regressive in comparison to income taxes, and the investment in known landscape and community level protection from all (not just utility-caused) fires is so much less, one is left to wonder if greater investment from the state and federal governments could allow utilities to spend less, potentially reducing the overall cost burden and especially the disproportionate burden on low-income residents of utility wildfire mitigation costs.

The risks to smaller, municipal utilities and rural electric cooperatives across the west from wildfire are substantial and growing. This is because a single ignition from a distribution line can cause losses in a rural community that are difficult if not impossible for such a system to support in rates. One example of this is the Helena Fire, which occurred in 2017 and destroyed 72 homes and burned 21,000 acres. The Helena Fire was caused by power lines owned by the Trinity Public Utility District. While the losses are by no means extreme by California standards,

they resulted in a settlement agreement that had a material impact on Trinity PUDs finances, caused Trinity PUD to lose its access to insurance and necessitated a significant rate increase.[13] A number of other rural municipal utilities and Co-Ops have also faced large damage claims in recent years.[14] The challenge for these smaller utilities is that even small wildfires caused by their equipment can generate losses in excess of their ability to pay.

Ecosystem losses and the loss of ecosystem services

While low to moderate intensity fire is necessary for healthy forests in California, high intensity fire, which has become a larger and larger share of wildfire acreage in the state, can be highly damaging to ecosystem integrity. This is particularly true given the intensity of drought in recent years, which reduces the ability of previously forested lands to bounce back from fire. Consequently, many areas in the Sierra Nevada that have burned at high intensity over the past decade are not recovering as forest but are instead regrowing as brush fields. One notable example of this phenomenon is in the Rim Fire burn scar in the Stanislaus National Forest. The Rim Fire burned 257,000 acres, much of it at high intensity, in 2013. Recovery from the fire has been hampered by the fire's intensity, which killed seeds and sterilized soils, by a warming climate, and by drought. The result is that 10 years later, the area has high wildfire risk from a very different fuel type than it did in 2013 – brush. And it has the potential again to transmit wildfire very rapidly and at high intensity, in much the same way that the burn scar from the Butte Complex Fires of 2008 transmitted fire from a failed PG&E transmission line more than 10 miles away to the town of Paradise just hours after ignition during the Camp Fire.

Fire threatens not just ecosystems but the services they provide. High intensity wildfire causes important changes in soil characteristics that may cause pollution of reservoirs, debris flows that silt reservoirs, and can intensify runoff, potentially forcing water agencies to make painful tradeoffs between storage and flood control. In the recent New Year's storm event in

[13] http://www.trinityjournal.com/news/local/article_8f27d4d8-553b-11eb-9b7e-63cf0428ddb3.html
[14] https://wildfiretoday.com/2020/04/24/electric-co-op-in-oregon-reaches-settlement-to-pay-1-1-million-for-suppression-of-fire-that-killed-three-firefighters/

California, runoff to Folsom Dam on the American River above Sacramento was much faster than for other similarly situated reservoirs in the Sierra Nevada, forcing large discharges to maintain safe operating levels. A key reason may have been that Folsom is directly downstream from the Caldor Fire (2021) footprint.

Concerns regarding wildfire and water supply are particularly acute for smaller, more isolated water systems in California. For example, Marin County and Santa Cruz County's water supplies are highly dependent on forested watersheds that have little fire history. The Santa Cruz water supply was directly threatened when the 2020 CZU Lightning Complex Fire came perilously close to spreading into the watershed for Santa Cruz County's water with potentially devastating consequences. Marin County has not had a fire on its heavily fuel loaded watershed since the 1940s and is situated just south of areas that have burned repeatedly in the 2017-19 fire seasons. A warming climate means that what happened just inland of Marin, in Napa and Sonoma Counties, is increasingly likely to also occur on wildlands and the heavily populated Wildland Urban Interface in Marin.

Air pollution impacts from wildfire smoke

Californians and many other westerners have grown used to the impacts and limitations on their day to day lives posed by wildfire smoke since 2017. It was in that year that a continuous trend of improvement in particulate emissions over multiple decades was reversed in many parts of the west by wildfire smoke.[15] Conditions have continued to worsen since then. A growing body of epidemiological evidence proves that wildfire smoke, like other fine particulate air pollution such as that derived from diesel and coal combustion, is a serious threat to public health.[16] Studies have shown significantly increased risk of out of hospital cardiac arrest,[17] of

[15] https://www.pnas.org/doi/10.1073/pnas.2011048118
[16] See Feo et al., Ch. 5 and references therein: https://ccst.us/wp-content/uploads/The-Costs-of-Wildfire-in-California-FULL-REPORT.pdf
[17] https://www.ahajournals.org/doi/full/10.1161/JAHA.119.014125

acute asthma attacks,[18] and of premature birth due to wildfire smoke exposure.[19] Wildfire smoke is known to raise the risks of complications due to COVID infection.[20] New research conducted by my Stanford colleagues even shows that wildfire smoke also lowers test scores in children whose schools lack adequate air filtration.[21] My and colleagues work suggests that wildfire smoke is the most important and fastest growing source of air pollution in the United States.[22] And our comparisons of PM2.5 concentrations observed in major metro areas during 2020 with accepted dose-response curves for PM2.5 suggest that hundreds of seniors may have died prematurely due to smoke exposure.[23]

Valuation studies of sickness and premature death caused by wildfire are still relatively few in number but all indications are that, especially for wildfire events that cause smoke exposure in heavily populated areas, the costs are potentially as large as the structure losses. One study focusing on the 2018 fire season in California estimated that value of morbidity and mortality related to smoke at $32 billion in California – more than the value of all structures lost that year ($28 billion), a year that included the Camp Fire and Woolsey Fires.[24] As climate change accentuates the drying of the atmosphere over western ecosystems, driving larger and more destructive wildfires, the public health impacts from smoke are very likely to worsen.[25] While the budget implications of these worsening trends for the air that seniors, a key population vulnerable to smoke, breathe have not been fully quantified, all evidence suggests that they could be substantial.

Comparison of these costs to the value of timber extracted from federal land

[18] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8745685/
[19] https://pubmed.ncbi.nlm.nih.gov/34403668/
[20] https://www.science.org/doi/10.1126/sciadv.abi8789
[21] https://web.stanford.edu/~mburke/papers/WenBurke2022_smokelearning.pdf
[22] https://www.nber.org/papers/w30882
[23] https://siepr.stanford.edu/publications/policy-brief/managing-growing-cost-wildfire
[24] https://www.nature.com/articles/s41893-020-00646-7
[25] See Figure 4 in https://www.nber.org/papers/w30882

An important consideration for many federal land managers is their obligation to manage lands for multiple benefits. Limited budgets have tended to favor, all else equal, timber harvest as a means to generate revenues. The total value of all commercial timber harvest from federal lands is less than $300 million annually.[26] One takeaway from this presentation of costs is that this is a small fraction of costs imposed by wildfire. At this point, the priority should not be timber harvest if a full consideration of federal budgetary costs and risks is considered and certainly if a broader consideration of societal costs is included in a cost-benefit calculation. For the time being, timber harvest should be deprioritized relative to the obligation that federal land managers have to steward their lands in a way that reduces cost and risk to the overall federal budget and to society at large.

Is it worth it? An ounce of wildfire prevention is worth several pounds of cure

It is common to suggest that a dollar invested in disaster mitigation pays at least six dollars in reduced losses when catastrophe strikes. There is a strong case to make that wildfire risk mitigation may be even more cost effective than this FEMA rule of thumb. Take the case of Grizzly Flats, a small community in the mid-elevation Sierra southwest of Lake Tahoe. In the early 2000s, the USFS identified Grizzly Flats as a community at extreme risk of wildfire. Due to various delays, mostly associated with a lack of funding, a plan for the USFS to manage fuels to the west of Grizzly Flats was not completed until 2017. The project, known as the Trestle Project, was designed to reduce the risk of high intensity wildfire impacting the community through a mix of commercial thinning combined, hand thinning, and prescribed fire. Budget limitations meant that as of summer 2021, only the commercial thinning – which provides limited benefit without subsequent application of prescribed fire on the same acres – had been completed. The commercial thinning got done because it could mostly pay for itself and given limited resources, the El Dorado National Forest undertook this component of the project.

The estimate total cost of the entire Trestle Project was $12 Million

[26] https://sgp.fas.org/crs/misc/R45688.pdf

On August 17, 2021, the Caldor Fire blew up and raced up steep, heavily wooded slopes toward Grizzly Flats. In a single night, 440 out of 646 homes in the community were burned to the ground. The town also lost its school and post office. The median value of a home in El Dorado County, California in August of 2021 was $650,000.

The approximate value of real estate lost that night was $286 million

The majority of these losses were borne by insurers, but underinsurance is a chronic problem in California and so a significant fraction were also borne by the homeowners themselves.

After a fire, the ashes left by homes are hazardous because of the large quantity of plastics used to construct and furnish a modern home. Before a home can be rebuilt, the ashes must be carefully removed and disposed of in a hazardous waste landfill. FEMA covered most of this cost for Grizzly Flats.

Hazardous waste removal from destroyed structures cost $96 million

The Caldor Fire burned far past Grizzly Flats. It ultimately crossed the Sierra Divide and was only fully contained in late October when precipitation ended the fire season in California. Firefighting resources were dispatched to do structure defense on the US-50 corridor – a major recreation area on the approach to South Lake Tahoe. They also fought to contain the fire from encroaching onto the Kirkwood Ski Area to the south. Ultimately the fire crested Echo Summit, burned down into the Tahoe Basin, crossed it, and was contained on the far side of the Sierra Crest. Had the Trestle Project been completed, it is quite possible that the fire could have been caught at Grizzly Flats as a low to moderate intensity burn with beneficial effects on a landscape that had received much needed fuel treatments. Where the Caldor Fire did encounter USFS and private investments in fuels mitigation – in the Caples Lake Ecosystem

Restoration Project and in Meyers and Christmas Valley, flame lengths decreased rapidly, and firefighters were able to effectively and safely make a stand.

Total fire response costs for the Caldor Fire were $271 million

These costs do not include either the impacts to community integrity, to ecosystems, to water quality, to the summer recreation industry in the Sierra – Tahoe recreation was devastated by smoke from the fire, or perhaps most importantly, the public health impacts of Caldor Fire smoke on vulnerable populations – the elderly, children, pregnant women, and asthma sufferers.

The bottom line is that had the USFS had the resources prior to 2021 to complete the Trestle Project – a $12 million investment in forest health downhill from Grizzly Flats, the federal budget could have avoided an expenditure of $367 million (30x mitigation cost) and society could have avoided estimated losses in excess of $652 million (54x mitigation cost) plus significant unquantified losses. Because of the significance, especially of wildfire smoke health impacts, we can consider these benefit-cost comparisons as a lower bound on the value of mitigation in this circumstance.

There are only 16 ounces in a pound. In the case of the Caldor Fire and the Grizzly Flats community an ounce of prevention was worth quite a bit more than a pound of cure; more like 3.375 pounds and probably significantly more if one includes unquantified losses.

It is heartening to see the rapid change at both Federal and State levels that is occurring due to the rapidly accelerating wildfire crisis. In recent years, both California and the Federal Government have made a significant down payment on deferred maintenance of critical infrastructure in the west – our forests – but we all must be honest that recent expenditures are just a down payment. Federal funds invested due to IRA and IIJA total approximately $3 billion. California has, for the past three years spent approximately $600 million per year on

fuels management on state and private lands. This is an unprecedented scale up of support for better forest stewardship and fuels management in western forests. Still, the USFS, in its release of the recent 10-year strategy, Confronting the Wildfire Crisis, candidly noted that fully achieving the objectives in that report on federal lands would cost $50 billion over 10 years. Resolving the issues on state and private lands will involve similar levels of investment. We have made a down payment but now we need to pay the mortgage.

Conclusion

A mix of fire suppression, land management decisions, climate change and population growth in the WUI is causing enormous costs to western states and large impacts on the federal budget. There is a better way. Sustained investment in fuels mitigation with a focus on protecting communities is a highly cost-effective strategy for reducing the impacts of wildfire. Doing so requires not sustaining but growing the level of recent investments. It also requires making sure that appropriated resources are targeted based on accurate risk assessment that incorporates the growing risks due to climate change, spent effectively, and that funded activities are based on best available science. That science shows that a combination of home hardening, community investments and reintroduction of fire are the most important steps to reducing wildfire risk and costs. These steps are transformative and yet they are only really a type of short-term damage control for a situation that is rapidly worsening. Ultimately, eliminating increases in human-caused climate change and even taking substantial steps to remove greenhouse gases from the atmosphere will be required to return to historic levels of wildfire (and drought) risk in the American west. Only by taking these transformative steps can we avoid creating massive and growing costs for both the federal government and western states including California.