U.S. Department of the Interior
Office of Policy Analysis

Brief

Increasing damages from wildfire warrant investment in wildland fire management, but large data gaps exist

Understanding the benefits and costs of wildland fires and their management can inform decisions about how to allocate resources to improve outcomes for people and nature. Available information indicates that wildland fires in the United States impose an annual economic burden in the range of tens to hundreds of billions of dollars, health effects in the hundreds of millions of dollars per year, and a range of other costs for which we do not have reliable estimates. In contrast, annual Federal expenditures and investments on fire management total a few billion dollars in recent years. Additional investments in wildland fire management could be a cost-effective way to reduce the losses associated with wildfire. A more complete accounting of the benefits, costs, and trade-offs of wildland fire management will require additional investment in data collection and analysis to fill gaps in our current understanding.

Wildland fire is a phenomenon and process with significant effects on people and nature, and its management is improved by informed decision-making. Economic analysis can inform decision-making by evaluating relevant benefits and costs, allowing comparisons of tradeoffs among alternatives for wildland fire management (WFM). To better understand the economics of wildfires, especially as relates to the Department of the Interior, we examined estimated annual investments in WFM and the economic damages from wildfires in the United States.

Estimates of the **monetary costs** of wildland fire for various asset categories—such as property damage, loss of life, and healthcare costs—are sparse but consistently high. The National Institute of Standards and Technology carried out a comprehensive study of the economic burden of wildfires on the U.S. economy, estimating that the annual burden was between $71 billion to $348 billion in 2016 dollars ($87 billion to $424 billion in 2022 dollars). Given the expansion of the Wildland-Urban Interface (WUI) and increase in large, intense fires in recent decades, losses after 2016 to today are likely larger still.

A major impact of wildfires on human health is exposure to smoke pollution. One study in California from 2012 to 2018 found that each additional day of wildfire smoke led to over twelve hospital admissions for respiratory or circulatory issues, with associated medical costs of about $189,000 (2020 dollars, equivalent to about $213,000 in 2022 dollars). The average annual cost of wildfire smoke exposure in California was $192 million (2020 dollars, $217 million in 2022 dollars), making up 0.07 percent of California's annual health-care spending. The total cost over the 2012-2018 study period was $1.3 billion for California alone (2020 dollars, $1.5 billion in 2022 dollars).

While property and health costs of wildland fire receive much of the focus in the literature, numerous other categories—such as the costs of treatment for psychological effects, the costs of evacuating people from affected areas, habitat and resource impacts, agricultural losses, and others—are more difficult to quantify. Lack of data, methodological limits, and gaps in knowledge about valuation and drivers of damages are significant barriers.

Non-market impacts of wildland fire include positive effects on wildlife habitat, like increasing habitat heterogeneity by creating clearings, or increasing water availability in wells and springs by reducing vegetation. Other impacts may be negative. For example, in 2020 California wildfires emitted an estimated 127 million metric tons (mmt) of CO_2-e (carbon dioxide equivalent), seven times the 2003–2019 mean. The National extent of these and other non-market effects of wildland fire is likely very large, though we found no estimates as of the time of this writing.

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Federal expenditures Federal expenditures on WFM are substantial; suppression costs alone have exceeded $1 billion annually in most years since 2000 (Figure 1). We found no disaggregated data on Federal expenditures and investments for the full suite of WFM activities (including mitigation, preparedness, fuels treatment, burned area rehabilitation, etc.). Further, we found no National-level estimates of State, Tribal, or private spending on WFM.

Total appropriations for WFM at the **Department of the Interior (DOI)** more than doubled between 2018 and 2022, with supplemental funding from the 2022 Bipartisan Infrastructure Law (BIL) (over $407 million) and 2022 disaster relief supplemental funding ($100 million). The Wildfire Suppression Operations Reserve Fund also provides funding for emergency wildfire response and suppression when needed (up to $330 million for FY 2022). These increases reflect the growing challenges of managing fires of increasing frequency and intensity, particularly in the Western United States. In recent years, fuels management has received an increasing share of annual appropriations, from 19 percent in FY 2018 to 25 percent in the FY 2023 request. BIL includes $1.5 billion for DOI's WFM over 2022-2026, including $878 million for fuels management and $325 million for burned area rehabilitation. For comparison, in FY 2021, DOI spent an estimated $220 million to treat fuels on 1.9 million acres.

In conclusion, the evidence indicates tens to hundreds of billions of dollars per year in wildland fire-related monetary and non-market costs and losses. Even without a complete accounting, costs and losses related to wildland fire are much larger than WFM spending by DOI and the rest of the Federal government. We conclude that additional **investments in WFM could be a cost-effective way to reduce the losses associated with catastrophic wildfire**. This includes investments to develop reliable data sources (and systems to collect, analyze, and store data) on the direct and indirect monetary costs and non-monetized effects of wildland fire, as well as expenditures across the full range of WFM activities. With such data and systems, DOI would be able to link natural systems—fire and ecosystem dynamics—with the Nation's governance and budgetary systems to better manage our relationship with wildland fire.

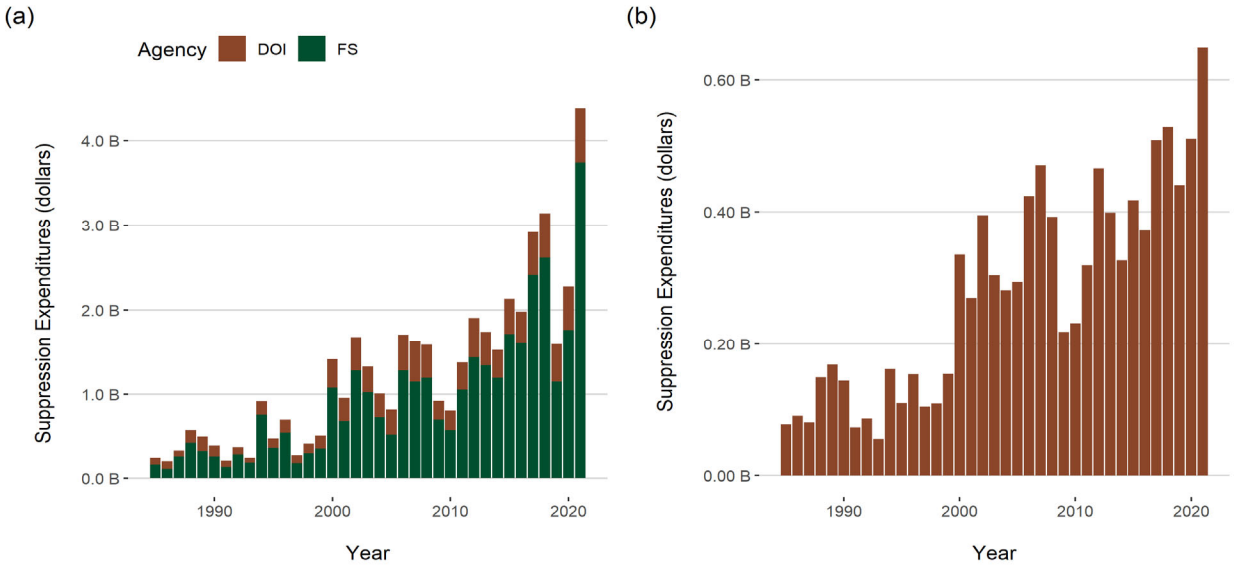

Figure 1. Federal expenditures (a) and Interior's expenditures (b) on wildland fire suppression have increased steadily over the past three decades. Spending by the U.S. Forest Service (Department of Agriculture, green) accounts for most ($\bar{x}$ = 74%) Federal fire suppression expenditures, followed by the Department of the Interior (brown). Source: National Interagency Fire Center data, https://www.nifc.gov/fire-information/statistics/suppression-costs.

For more details: Crowley, C., A. Miller, R. Richardson, and J. Malcom. (2022). Increasing damages from wildfires warrant investment in wildland fire management. Department of the Interior Office of Policy Analysis *Report* R-2023-01. Available at https://doi.gov/ppa

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