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INSIGHT

Is Climate Change Influencing Wildfires? Climate Change Effects on Wildfires in the United States

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According to the National Oceanic and Atmospheric Administration (NOAA), climate change-driven increases in temperature, drought, and atmospheric drying have led to an increase in wildfire risk and wildfire burned area in the western United States. It is the assessment of the U.S. Forest Service (FS) that fire area and fire-caused tree mortality will increase under future climate change conditions. This Insight describes changes in wildfire activity in the United States in recent decades and the potential influence of climate change on wildfires under current and projected climate change conditions.

Recent Decades of Wildfire Activity in the United States

Wildfire extent and damage have been growing in the United States since 1983, when federal agencies first implemented current wildland fire reporting processes. Wildland fire statistics from the National Interagency Coordination Center indicate that the number of annual wildfires in the United States is variable but has decreased moderately from 1993 to 2022, while the number of acres burned annually, while also variable, has approximately doubled (**Figure 1**).

The U.S. Global Change Research Program (USGCRP) in the 2017 science volume of the Fourth National Climate Assessment, using a definition of a large fire as greater than 1,000 acres, reported that "The incidence of large forest fires in the western United States and Alaska has increased since the early 1980s (high confidence)." The 2018 volume of the assessment, which covers impacts and risks, states "increasing wildfire is damaging ranches and rangelands as well as property in cities near the wildland–urban interface."

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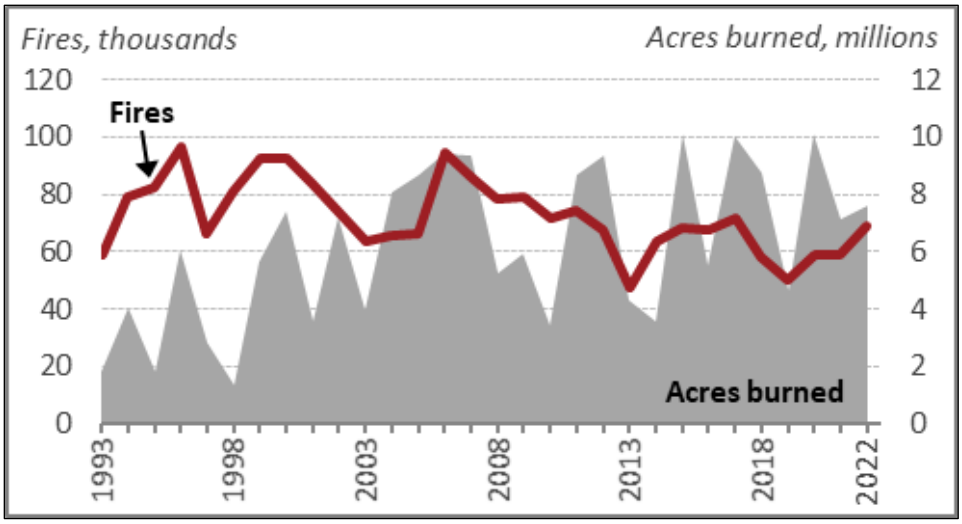
Figure 1. Annual Wildfires and Acres Burned, 1993-2022



Sources: CRS In Focus IF10244, *Wildfire Statistics*. Data from National Interagency Coordination Center, Wildland Fire Summary and Statistics annual reports.

Note: Data reflect wildland fires and acres burned nationwide, including wildland fires on federal and nonfederal lands.

Climate Change Influence on Wildfire

Climate change attribution studies of wildfires seek to quantify and distinguish the influence of human-caused climate change on wildfires from other influences. In the case of wildfires, these other factors may include historic fire suppression that may have increased fuel load, changes in settlement at the wildland urban interface (WUI), and natural climate variability.

Several recent climate change attribution studies suggest that human-caused climate change, independent of other factors, has increased the risk and the extent of wildfire. For example, in 2018, the USGCRP cited an attribution analysis that presents evidence that climate change has been increasing conditions favoring wildfires and the extent of wildfires in some areas of the United States. This analysis found that climate change has driven increases in temperature and atmospheric drying. The resulting drying of wildfire fuels across western U.S. forests during the 2000-2015 period contributed to an average of nine additional days per year of high fire potential relative to a 1981-2000 baseline period. The authors of the analysis also concluded that during the 1984-2015 period, these climate drivers had approximately doubled the area of forest burned in the western United States. In another example, a 2023 attribution study in the Proceedings of the National Academy of Science found that climate change had driven increases in temperature and atmospheric drying of wildfire fuels in California. The authors concluded that almost all of the fivefold increase in the area burned by wildfires in California from 1996 to 2021 compared with 1971-1995 could be attributed to human-caused climate change.

Some modeling studies of future climate change have projected increases in wildfire effects on forests in the United States. In 2020, the FS used climate models to assess the effects of climate change on U.S. forests. This assessment found that increases in fire area and fire-caused tree mortality were expected under future conditions of climate change in all parts of the conterminous United States. A later FS modeling study was included as part of the research basis of the 2022 Office of Management and Budget white paper on the federal government's financial risk exposure to climate change. That FS modeling also found that the area burned by wildfires in the United States is projected to increase under conditions of human-caused climate change. The influence of climate change on wildfire is unlikely to be uniform, as

the USGCRP found that "[i]ncreases in future forest fire extent, frequency, and intensity depend strongly on local ecosystem properties and will vary greatly across the United States."

Considerations for Congress

According to the FS 10-year wildfire implementation plan published in 2022, the increase in the size and severity of wildfires has placed "homes, communities, infrastructure, and natural resources at grave and growing risk," with wide-ranging impacts to local economies and communities, human wellbeing, and the environment. As such, wildfire could affect broad areas of federal activity, including several federal roles related specifically to wildfire. Agencies that manage federal lands are responsible for wildfire management on those lands, including fire suppression, post-fire recovery, and managing the land for wildfire (as it comports with the agency's mission), including reducing its likelihood and severity. The federal government also may provide assistance for wildfire suppression and preparedness on nonfederal land. Lastly, the federal government may provide a variety of post-fire disaster assistance to individuals, businesses, communities, and other groups.

Potential climate change-induced increases in future wildfire frequency and burned area, as well as other factors such as forest and fuels management and development in the WUI, could affect these federal activities in a variety of ways. For example, increases in burned area could increase the number of people and communities affected, potentially increasing demand for federal disaster relief and suppression resources. Some federal spending related to wildfire has increased in recent decades—for example, appropriations for wildfire management increased from 2011 to 2020. Most of this increase was attributable to wildfire suppression spending. Changes in wildfire risk and extent could shape a wide range of congressional debates, from the appropriate level and distribution of wildfire-related federal spending to the management of federal lands to the federal role in disaster response. These changes also could inform debates regarding the federal response to climate change.

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