



Research Brief for Resource Managers

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Human and climatic influences on wildfires ignited by recreational activities in national forests in Washington, Oregon, and California

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Fire is strongly linked to outdoor recreation in the United States. Recreational uses of fires, whether in designated campgrounds or the backcountry, include warmth, cooking, and fostering a comfortable atmosphere. However, through inattention, negligence, or bad luck, recreational fires sometimes ignite wildfires. From 1992 through 2020, such ignitions accounted for an estimated 12% of human-caused wildfires and 8% of the area burned by those wildfires in California, Oregon, and Washington. 76% of the recreation-caused ignitions occurred on public lands: 50% on lands managed by the U.S. Forest Service, 15% on other federal lands, and 11% on state, county, or local lands.

With the aim of informing strategies to limit the risk of recreation-caused ignitions, we evaluated whether the density of wildfires ignited by recreation or ceremony on U.S. Forest Service lands, and the size of such wildfires, was influenced by proximity to designated campgrounds, visitor density, previous and current drought conditions, and the type of vegetation surrounding the ignition point. With respect to recreation-caused ignitions, we tested the common assumption that large wildfires tend to be enabled by wet conditions in the prior growing season in areas where vegetation is not

Management Implications

- Increasing outreach and enforcement during weekends and holidays, when the number of human-caused ignitions is highest, may reduce the incidence of such ignitions.
- Incorporating drought conditions into decisions about when and where to restrict fire use and targeting wildfire-prevention efforts at recreational users outside designated campgrounds may reduce the number of recreation-caused ignitions.

continuous, and by dry conditions in the current growing season in areas where vegetation is abundant and the climate generally limits flammability. We accounted for the potential effects of ecoregion on these associations given that vegetation composition, climate, and historical fire-return intervals and sizes vary among ecoregions.

Results

Mean annual densities of recreation-caused ignitions on national forests were 7 times greater within than beyond 1 km of designated campgrounds. Densities of ignitions that became wildfires <4 ha (small wildfires) were 620% higher within than beyond 1 km of campgrounds, and densities of ignitions that became wildfires ≥4 ha (large wildfires) were 130% higher within

1 km of campgrounds. The mean annual density of all ignitions, and of those within 1 km of campgrounds that resulted in small wildfires, increased by an average of 43% among ecoregions given a doubling of visitor density.

Among ignitions that became large wildfires, the percentages of those that were within and beyond 1 km from designated campgrounds were similar regardless of the vegetation surrounding the ignition site. Ignitions further from campgrounds were more than twice as likely as those near campgrounds to result in large wildfires. Further from campgrounds, ignitions surrounded by shrubs and grasses resulted in three times as many large wildfires than those surrounded by trees. Shrubs and grasses surrounded nearly six times more ignitions near campgrounds that became large wildfires than did trees.

Recreation-caused large wildfires tended to ignite during dry conditions, especially in areas dominated by trees. Ignitions in grass-dominated areas that became large wildfires were significantly associated with wet conditions 12–24 months prior to the wildfire, whereas large wildfires that ignited in areas dominated by trees or shrubs were significantly associated with wet conditions 24 months before the wildfire.

Management implications

Wildfires ignited by recreational activities not only increase wildfire suppression expenditures but have the potential to limit recreational activities traditionally associated with use of fire, such as camping. Improved understanding of the impacts of human and climatic factors on recreation-caused ignitions can inform policy and management decisions. Strategies used by the U.S. Forest Service to limit the risk of recreation-caused ignitions include fire-permit requirements, forest closures, burn bans, and educational programs. The mean annual number of recreation-caused wildfires within non-U.S. Forest Service lands in California, Oregon, and Washington decreased by 40% from 1992–2020. Nevertheless, the mean annual number of recreation-caused ignitions on national forests remained around 500 over the same time period. Much recreational use of public lands occurs during summer, with peaks in ignitions around Memorial Day, Independence Day, and Labor Day

and after the end of the federal fiscal year (September 30), when most campgrounds close. From 1992–2020, nearly twice as many wildfires (all causes) occurred on weekend days as on weekdays. This reinforces the potential benefits of increasing outreach and enforcement during weekends and on holidays. Accounting for drought in implementation of fire-use restrictions, and targeting wildfire-prevention awareness to recreational users outside designated campgrounds, might reduce the likelihood of recreation-caused ignitions.

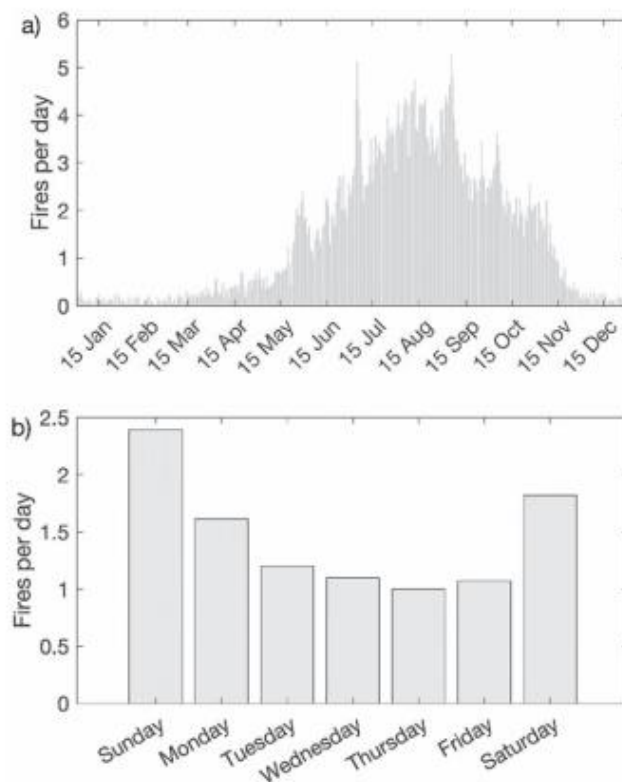


Figure 1. Mean annual number of wildfires ignited by recreation and ceremony on national forests in California, Oregon, and Washington by date and day of the week from 1992 through 2020.