



# More Area Burned in Non-Forest Than Forest in the West

## Let's rethink the focus on forest fires in fire management



**Summary** Over the past two decades, wildfires burned more area of non-forest than forest land in the western U.S. Non-forest fires were larger in size and had a higher number of burned patches compared to forest area burned. Current wildland fire management policies do not address the altered fire cycles in shrublands, grasslands, and deserts.

### BACKGROUND

For most of the 20th century and beyond, national wildland fire policies concerning fire suppression and fuels management have primarily focused on forested lands. Over the last two decades (2000-2020), however, wildfires burned more area of non-forest than forest land in the conterminous US (CONUS) and western US.

Wildfires fueled by nonnative grasses in shrubland and desert ecosystems have been increasing in frequency since the 1980s, and this nonnative invasive grass-fire cycle feedback loop is well documented. Yet, this phenomenon has not been broadly mapped or incorporated into wildland fire risk assessments for federal wildland fire management agencies.

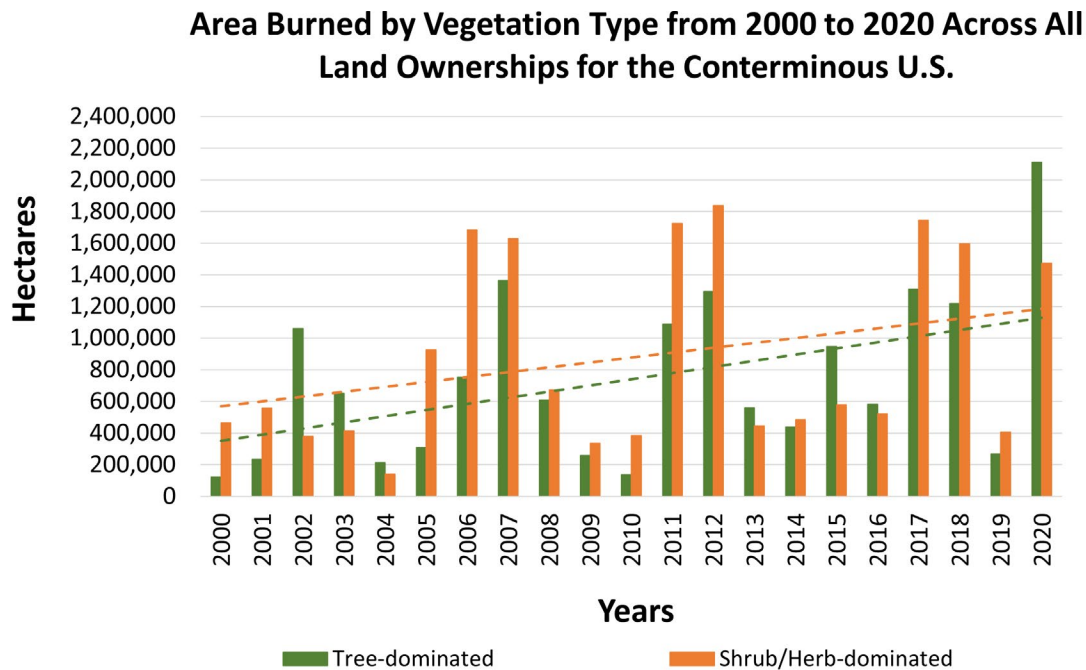
This study set out to quantify and compare wildfire patterns and trends (e.g., area burned, fire size, and changes in fire regimes) between non-forested and forested lands over the last two decades. Area burned and fire landscape patterns were analyzed for CONUS and the western US (CA, OR, WA, ID, NV, AZ, NM, UT, CO, WY, and MT).

### AREA BURNED

Wildfires burned more area on non-forested lands than forested lands over the past 20 years. This was true for all land ownerships in CONUS and the western US. Burned area increased over the 20-year time period for both non-forest and forest. Across CONUS, annual area burned was higher on non-forest than forests for 14 of the past 21 years (Fig. 1), and total area burned was almost 3,000,000 ha more in non-forest than in forest. For the western US, total burned area was almost 1,500,000 ha more in non-forest than in forest. From a federal agency perspective, approximately 74% of the burned area on Department of the Interior (DOI) lands occurred in non-forest and 78% of the burned area on US Forest Service (FS) lands occurred in the forest.

### WILDFIRE PATTERNS

Non-forest fires were larger in size and had a higher number of burned patches compared to forest fires. While both land types showed an increase in burned area over the twenty-year period, burned area increases were higher for forest than non-forest. Larger burned forest patches occurred closer together over time, indicating that forest



**Figure 1.** Forest (tree-dominated, green) and non-forest (shrub/herb dominated, orange) area burned from 2000 to 2020 across the conterminous U.S. (CONUS) (Crist 2023).

fires were becoming more regionalized annually over time. In comparison, larger burned non-forest patches were occurring farther apart over time indicating that non-forest fires, which historically were largely concentrated in the Great Basin, have expanded into other regions across the United States. For all federal agencies, the spatial distribution of wildfire (non-forest and forest) has increased over time at the scale of the western US.

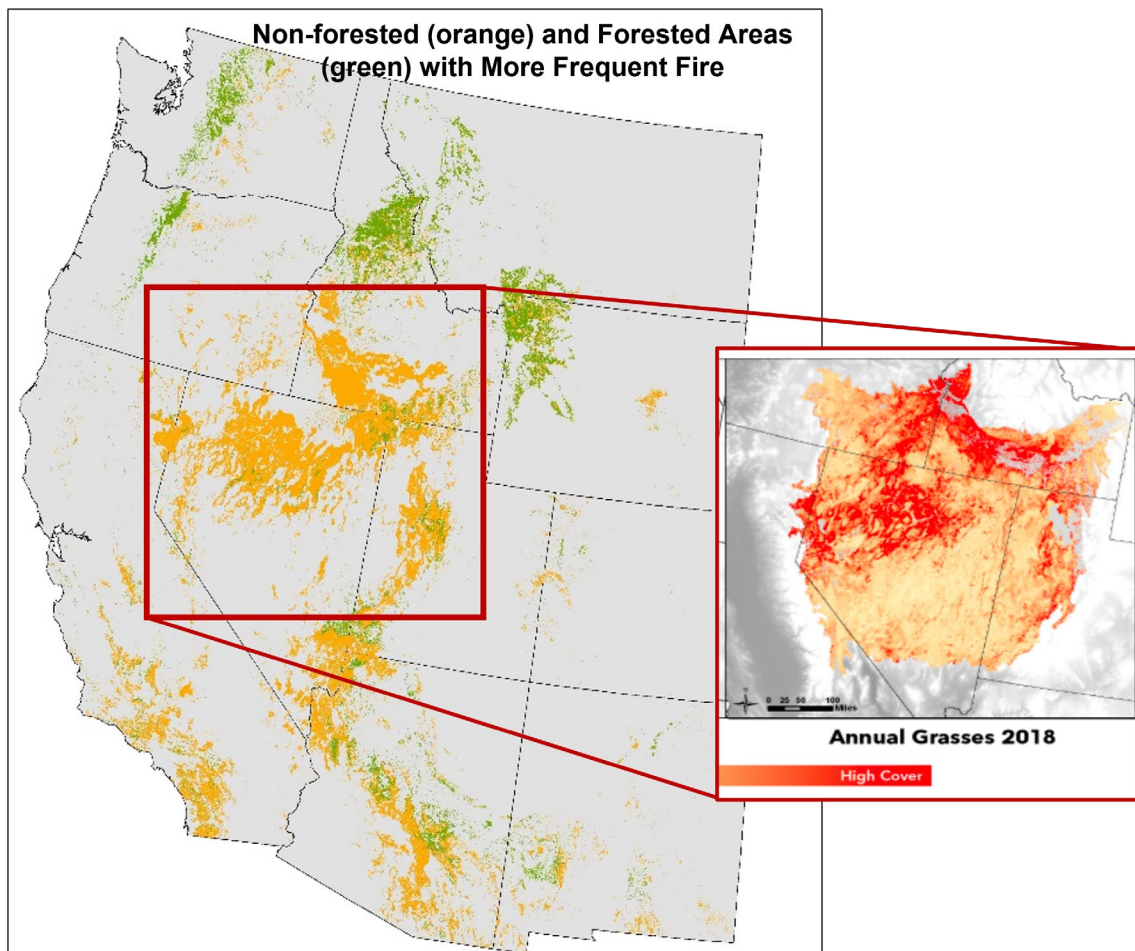
## FIRE REGIME CHANGES

Certain regions of western states are experiencing more fire than they did historically, this includes California, Nevada, Idaho, Utah, and Arizona (Fig. 2). Most of the area with a surplus of fire occurred in the Great Basin. Approximately 7,000,000 ha in the western US are burning at a frequency more than twice that of historical fire frequencies. Forty vegetation types experienced more wildfire than they did historically on 10,000 ha or more. Of the 40 vegetation types with a fire surplus, 23 are non-forest types. Put another way, 74% of the area experiencing too much fire is in non-forest vegetation types. The five vegetation types that had the most area experiencing a fire surplus were big basin sagebrush shrubland and steppe, desert scrub, introduced annual grasslands, pinyon-juniper woodlands, and spruce-fir forests.

## RECOMMENDATIONS

More than half of the area burned across CONUS over the past two decades occurred in non-forest ecosystems, and there are regions of non-forest and forest lands experiencing wildfire more often than they did historically. Current US wildland fire management policies are focused mainly on forests and restoring the natural role of fire due to past fire suppression (e.g., thinning and prescribed fire). These policies do not address the unique aspects of altered fire cycles (e.g., increased fire cycles), especially for shrubland and desert ecosystems (Fig. 3). Large-scale fuels management strategies have not yet been developed to address areas that are burning too frequently or are experiencing non-native grass induced wildfire regime changes (Fig. 4). Developing wildland fire policy and management strategies that address increased fire cycles, especially due to the non-native invasive grass/fire cycle is needed across federal and state agencies.

While there are several challenges in addressing uncharacteristic fire in non-forest ecosystems, one of the largest is that our culture is focused on forest fire. Much of the public's understanding of fire is that past fire suppression resulted in the fires they see today. The media drives public perception on wildfire, and the public is not



**Figure 2.** Non-forest (orange) and forest (green) areas experiencing fire more often than historically (Crist 2023). The surplus of fire in the Snake River Plain and Great Basin often occurs where there is high cover of nonnative annual grasses shown in the graphic inset where non-native annual grass cover ranges from very low (tan) to high (red) (Rangeland Analysis Platform).



aware of other causes of uncharacteristic fires, especially increased fire frequency and extent due to large-scale expansion of nonnative grasses. Approximately, 90% of wildfires in the US are human-caused from campfires, target shooting, power lines, fireworks, debris burning and arson, which are increasing on non-forested lands.

Results of this study highlight that to adequately reduce our wildfires “crisis”, the dominant focus cannot be largely on wildfire occurring in forests and woodlands. New policies and different management strategies aimed at reducing uncharacteristic wildfire patterns for both non-forest and forest ecosystems are needed.

## ADDITIONAL READING

Crist, M.R. 2023. [Rethinking the focus on forest fires in federal wildland fire management: Landscape patterns and trends of non-forest and forest burned area](#). Journal of Environmental Management. 327:116718

Nikonow, H. 2023. New study: Rethinking the focus on forest fires in federal wildland fire management, [Q & A with Michele Crist, Fuels Management and Fire Planning, Bureau of Land Management](#).



**Figure 3.** A large expanse of big sagebrush vegetation relatively free of invasive annual grasses in Jack’s Creek, Idaho. Photo: Society for Ecological Restoration Great Basin Chapter.



**Figure 4.** A burned area in northwestern Nevada now dominated by cheatgrass (*Bromus tectorum*) a common nonnative annual grass in the Snake River Plain and Great Basin. Photo: Cameron Aldridge, Colorado State University.