Are Oregon's 2020 Wildfires the Result of Climate Change?

Tom Baribault | September 17, 2020 | Mason, Bruce & Girard

In the aftermath of Oregon's September 2020 wildfires, national and local news media have published polarizing content, claiming either that the wildfires were driven by climate change or that poor forest management is the cause. In a Presidential election year, media outlets may have a political incentive to emphasize one perspective over the other[1], obscuring the facts about an already complicated subject. In this analysis, we review the primary scientific literature to identify—and quantify—the factors influencing wildfire activity in the Western United States.

The controversy over wildfire causes in the media is dominated by extreme positions. For example, a September ABC report[2] emphasized climate change: "[Washington Governor Jay] Inslee warned that the entire country should view the blazes as a warning of what could come if climate change is not addressed." In contrast, a report in Forbes[3] asserts without nuance that forest management is at fault: "This is California's big secret: it's not climate change that's burning up the forests, killing people, and destroying hundreds of homes; it's decades of environmental mismanagement that has created a tinderbox of unharvested timber, dead trees, and thick underbrush."

Contemporary scientific literature can assist with untangling the complex causes of wildfire. Fire ecologists classify constraints on wildfire activity as conditions-limited (weather conducive to fire), resource-limited (adequate fuels buildup)[4], and ignition-limited (occurrence of ignition sources)[5]. Each geographic region around the country has its own combination of these limitation regimes. The Desert Southwest, for example, is neither conditions-limited nor ignition-limited, but fires are relatively rare because the ecosystems there are resource-limited, and fuels do not build up. In contrast, fire in California forests is not limited on any axis: climate is seasonally dry, forests grow after the wet season and accumulate fuel, and ignition sources are widespread. Western Oregon is similar to Northern California, so wildfire is not unexpected in these regions.

Figure 1. Approaching Beachie Creek Fire, near Stayton, Oregon 11:02 AM September 8th 2020. Image courtesy Edie Dooley, MB&G.

[1] Balanced media reports that acknowledge multiple contributing factors do of course exist, but these accounts are often limited to local outlets or relegated to search returns below the sensationalist national headlines:
https://phys.org/news/2020-09-climate-forest-fueled-today-epic.html
https://www.kitsapsun.com/story/opinion/columnists/2020/09/16/climate-and-management-fueling-wests-wildfires/5818908002/

[2] https://abcnews.go.com/Politics/west-coast-facing-apocalyptic-conditions-amid-wildfires-worsened/story?id=72971021

[3] https://www.forbes.com/sites/chuckdevore/2019/02/25/wildfires-caused-by-bad-environmental-policy-are-causing-california-forests-to-be-net-co2-emitters/#241c7a7e5e30

[4] Krawchuk M, Moritz M (2012) Fire and climate change in California: Changes in the distribution and frequency of fire in climates of the future and recent past (1911–2099) (California Energy Commission, Sacramento, CA). Available at www.energy.ca.gov/ 2012 publications/CEC-500-2012-026/CEC-500-2012-026.pdf. Accessed September 16, 2020.

[5] Syphard, A.D. et al. 2017. Human presence diminishes the importance of climate in driving fire activity across the United States. PNAS. 114, 52: 13750–13755 www.pnas.org/cgi/doi/10.1073/pnas.1713885114

The mechanism connecting wildfire extent and severity to regional climate is well established[6,7], and intuitive. Strong seasonal climates like those that dominate the Western US accumulate fuel after the wet season, then a pronounced summer dry season increases the atmospheric vapor pressure deficit[6], drying out vegetation and increasing susceptibility to combustion. Evidence exists that the climate in this region is tending toward warmer and drier over time[8], attributed to some extent to anthropogenic causes. Year-on-year impact of changing climate is a relatively small fraction of the overall warming-drying trend. For example, between 8% and 27% of the extent of California's 2012-2015 drought can be attributed to changing climate rather than 'baseline' regional climate cycles.

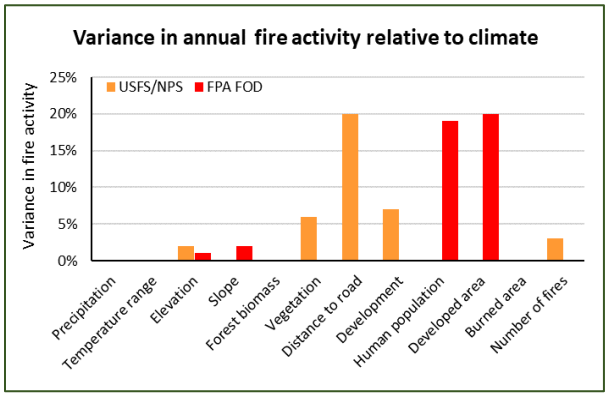

Figure 2. Relative impact of climate and human factors on annual fires activity (left) adapted from Syphard et al. 2018, Table 1.

While we readily grasp the connection between prevailing climate and fire regimes, the relative importance of ignition-limitation is more challenging to understand. Fortunately, fire researchers have investigated the relative contribution of all three limitations across the major national bio-climatic domains. In the Pacific Northwest (Oregon and Washington), the combination of all potential climate factors influencing conditions-limitation and resource-limitation account for 28% to 38% of annual fire activity[5]. In the Pacific Southwest (California), climatic factors account for between 18% and 51% of annual fire activity. For both regions, although climate explained some variance in annual fire activity, no climate variable was a statistically significant (P-value ≤ 0.05) predictor of fire activity[5].

When measures of human presence are included with climate variables to predict fire activity, however, the importance of climate is greatly diminished (Figure 2). Out of ten total variables, nine climate factors and human presence, it was only human presence[5] that reached the statistically significant level of P <= 0.05. Regions closer to roads or developed areas, or with larger human population, showed weaker relationships between fire activity and climate variables. In other words, presence of humans is a more important predictor of fire activity than climate. In this particular study, the authors conclude that "[c]limate was significantly less important where humans were more prevalent, suggesting that human influence could override or even exceed the effect of climate change on fire activity"[5].

The scientific literature has clearly demonstrated that the most direct, important factor determining annual wildfire activity is the presence of humans, which serves as a proxy for the frequency and number of ignition events. While fire activity in western forests is not resource-limited or climate-limited, areas with lower human influence are more ignition-limited. Ignition probability is more influential than climate factors on fire activity, but the reality is human presence is widespread through most of our region, and anthropogenic ignition events are common. For example, among the most recent Oregon wildfires (Table 1), only the Lionshead fire (138,718 acres as of 9/14/2020) was unequivocally a non-human ignition event (lightning). Three fires totaling 143,726 acres are known to have been human-caused, while nearly 650,000 acres are under investigation or unknown, leaving open the possibility of a human-caused ignition.

[6] Diffenbaugh, N.S. et al. 2015. Anthropogenic warming has increased drought risk in California. PNAS. 112, 13: 3931-3936 https://doi.org/10.1073/pnas.1422385112

[7] Williams, A.P. et al. 2019. Observed impacts of anthropogenic climate change on wildfire in California. Earth's Future, 7, 892–910. https://doi.org/10.1029/2019EF001210

[8] Barbero, R. et al. 2015. Seasonal reversal of the influence of El Niño–Southern Oscillation on very large wildfire occurrence in the interior northwestern United States, Geophys. Res. Lett., 42, 3538–3545, doi:10.1002/2015GL063428

Table 1. Areal extent and ignition source of major 2020 wildfires in Oregon. For updated acreage, refer to MB&G press release https://lnkd.in/gdEvY2v

2020 Fire Name	Acres (9/15/2020)	Cause
Beachie Creek	188,374	Unknown
Holiday Farm	161,872	Unknown
Lionshead	138,718	Lightning
Riverside	132,526	Human
Slater/Devil Fire	130,482	Unknown
Archie Creek	115,857	Under investigation
Brattain	40,316	Human
S. Obenchain	30,503	Under investigation
Two Four Two	14,450	Unknown
Thielsen	5,110	Unknown
Almeda	3,200	Arson investigation
Echo Mountain Complex	2,435	Under investigation

https://www.oregonlive.com/pacific-northwest-news/2020/09/oregon-wildfires-sunday-new-maps-details-evacuation-information-for-most-dangerous-blazes.html

The number of concurrent, large wildfires in Oregon and across the western states this year is certainly unusual, but not unprecedented. The first fire of the Tillamook Burn in 1933 destroyed 350,000 acres of forest in the Coast Range, while the 1910 'Big Blowup' incinerated three million acres in two days spanning Idaho, Montana, eastern Washington, and into southern British Columbia[9].

One consequence of the 1910 Big Blowup was that the US Forest Service began its century-long campaign of aggressive fire suppression. Public policy prioritized reducing loss of human life from wildfire, and USFS soon settled on a policy of total suppression. Although inconvenient for some human objectives, fire is an integral part of western forest ecology. Citing S. Pyne's 1996 perspective on national fire policy[10]: "The environmental tragedy was not that wildfires were suppressed but that controlled ones were no longer kindled, because withholding fire is as powerful an ecological act as applying it." A century of fire suppression has left federal lands, and to an increasing extent state and private land, vulnerable to conflagration.

Unfortunately, media reports in recent weeks have mischaracterized the relationship between human activity and wildfire. For example, Robinson Meyer writing for The Atlantic, states[11]: "The primary driver of the fires this year ... is California's rising air temperature. Over the past century, climate change has warmed California by about 3 degrees Fahrenheit."

Statements like these, when presented in popularized news articles without complete context, imply to the public that solutions to wildfires should focus on reversing observed climate trends. It is undisputed that climate strongly impacts fire activity, varying by geographic area and over time. A hotter, drier climate—widely expected to occur over the next century—will increase the frequency, extent, and duration of wildfire. But the contribution of changing climate to fire activity, particularly to the annual variance, is significantly weaker than human activity both as it influences resource-limitation via suppression and ignition-limitation through settlement and land use patterns.

Public policy that focuses on climate change as the singular driver of wildfire risk ignores more direct causes: expanding human presence within fire-prone climate regimes, human-caused fire ignition, and long-term fuel accumulation from 100 years of strict fire suppression. We must address climate change and forest management missteps with solutions calibrated to the different time scales involved. In the short term, management actions like thinning and prescribed fire will reduce the imminent threat to life and infrastructure. Over the long term, thoughtful placement of new communities, careful use of public lands, and informed carbon emissions policy can mitigate climate change and reduce its contribution to the prevalence of catastrophic wildfire.

[9] Silcox, F.A. 1910. Fire Prevention and Control on the National Forests. Yearbook of the Department of Agriculture 1910. https://foresthistory.org/wp-content/uploads/2017/01/Silcox_Fire_1910.pdf Accessed September 16, 2020.

[10] Pyne, S.J. 1996. Flame & Fortune, Forest History Today. 8-10.https://foresthistory.org/wp-content/uploads/2017/01/Pyne.pdf Accessed September 16, 2020.

[11]https://www.theatlantic.com/science/archive/2020/09/most-important-number-for-the-wests-wildfires-california/616359/