Study suggests less rainfall in western U.S. likely major contributor to increase in wildfires

August 21 2018, by Bob Yirka

Credit: CC0 Public Domain

A team of researchers affiliated with several institutions in the U.S. has found that reduced rainfall in western parts of the U.S. may be playing a more important role than increased temperatures in spreading more and

bigger wildfires. In their paper published in *Proceedings of that National Academy of Sciences*, the group describes their study of rainfall and fires in the area, and what they found.

Wildfires in the western U.S. have been increasing in number and have been getting bigger over the past several years. Prior research has suggested that the primary reason for the change is an increase in temperatures in the region. In this new effort, the researchers wanted to know if changes in precipitation were also playing a role. To find out, they studied data collected from weather stations across the region for the years 1984 to 2015. They compared the data to satellite maps showing where wildfires had occurred and how big they had grown over the same time period.

Before conducting their analysis, the group proposed three main possible factors contributing to the increase and size of fires—that they were due to reduced snowpack, that they were due to higher temperature, or that they were due to lower rainfall.

Their first finding was that a reduction in snowpack was not a factor, either in the increase in fires or how big they grew. Their second finding was that there did seem to be a correlation between higher average temperatures in the area and the changes in wildfire patterns. Their third finding was that there appeared to be an even more pronounced correlation between declining amounts of summer precipitation and the number and size of wildfires. More specifically, they found that between 82 and 94 percent of the land area they surveyed experienced less summer rainfall over the time period they studied. They also found that the average forest in the area under study had 4 percent less rainfall per decade, and the worst of them had a 47 percent decline. They also found that the average number of days that rainfall exceeded 2.5 mm in the impacted areas fell, as well—and that the average length of dry spells increased.

The researchers suggest their data shows declines in rainfall in the western United States are a major factor causing an increase in the number of wildfires and how big they grow.

More information: Zachary A. Holden et al. Decreasing fire season precipitation increased recent western US forest wildfire activity, *Proceedings of the National Academy of Sciences* (2018). DOI: 10.1073/pnas.1802316115

Abstract

Western United States wildfire increases have been generally attributed to warming temperatures, either through effects on winter snowpack or summer evaporation. However, near-surface air temperature and evaporative demand are strongly influenced by moisture availability and these interactions and their role in regulating fire activity have never been fully explored. Here we show that previously unnoted declines in summer precipitation from 1979 to 2016 across 31–45% of the forested areas in the western United States are strongly associated with burned area variations. The number of wetting rain days (WRD; days with precipitation ≥2.54 mm) during the fire season partially regulated the temperature and subsequent vapor pressure deficit (VPD) previously implicated as a primary driver of annual wildfire area burned. We use path analysis to decompose the relative influence of declining snowpack, rising temperatures, and declining precipitation on observed fire activity increases. After accounting for interactions, the net effect of WRD anomalies on wildfire area burned was more than 2.5 times greater than the net effect of VPD, and both the WRD and VPD effects were substantially greater than the influence of winter snowpack. These results suggest that precipitation during the fire season exerts the strongest control on burned area either directly through its wetting effects or indirectly through feedbacks to VPD. If these trends persist, decreases in summer precipitation and the associated summertime aridity increases would lead to more burned area across the western United States with far-

reaching ecological and socioeconomic impacts.