

Wildfire in a Warming World

PART I: TRENDS & THE ROLE OF CLIMATE

SYNOPSIS / SEPTEMBER 20, 2016 / BY JENNIFER HUSHAW

Wildfire has been a major news topic lately, with California ablaze due to dangerous fire weather, on-going drought, and scores of beetle-killed trees. While severe wildfires are nothing new, climate change is creating new cause for concern. In Part I, we examine recent trends in fire activity, untangle the role of climate change, and outline the most important aspects of climate that drive fire patterns.

Wildfire Trends

THE GLOBAL PICTURE: Recent trends vary by region—annual area burned increased in some areas and decreased in others. Globally, there has been a slight decrease in area burned over the last 16 years.

WILDFIRE IN THE U.S.: There is ample evidence that large portions of the western U.S. experienced more fire over the last 30 to 40 years, including more large fires, more area burned, and longer wildfire seasons. This squares with research indicating conditions have become more conducive to fire—since 1980, the length of the average fire weather season has increased by 19% globally and the land area affected by long fire weather seasons has doubled. Although, not all U.S. regions have experienced more fire, e.g. the Northeast has seen a decline in both area burned and the size of fires over the last 60 years.

A CLIMATE CHANGE CONNECTION?

Higher fuel loads due to fire suppression and mortality from bark beetles have contributed to the recent increase in U.S. fire, but **evidence from both modeling and observational studies suggests climate change has also played a big role.** Researchers have successfully replicated historic fire patterns using *only* climate variables and consistent wildfire trends appear across widely varying ecoregions, suggesting large-scale climate conditions are a dominant driver. Other research indicates climate accounted for ~64% of the variability in area burned since the late 1970's.

[Climate Smart Land Network Bulletin Synopsis](#)

Take-Homes for Forest Managers

CLIMATE DRIVES FIRE ACTIVITY

Climate is a primary control on fire activity— affecting availability and flammability of fuels. It controls ignition/propagation in the short-term and vegetation/productivity in the long-term.

TIME SCALE MATTERS

Weather drives individual fire events, while climate averages and variability shape fire regimes over decades and longer. For example, natural modes of climate variability, such as the El Niño Southern Oscillation (ENSO) or the Atlantic Multidecadal Oscillation (AMO), are closely related to fire regimes in parts of North America. Fire management and response systems typically operate on shorter time horizons (hourly-to-annual, seasonal-to-annual), but decadal climate fluctuations and a long-term warming trend are important to consider—with climate change projected to continue, it is reasonable for managers to expect deviations from historic fire regimes.

DROUGHT & FIRE RISK

Drought is projected to increase in both frequency and severity in many regions and it is known to directly affect fire severity, extent, and frequency. The uncertainty of future precipitation projections presents a challenge, but warmer temperatures alone can increase the intensity of individual drought events, and therefore fire risk—a factor implicated in the recent California drought.

WHAT'S LIMITING: FUEL OR MOISTURE?

The impact of climate change largely depends on whether an ecosystem is more fuel-limited or climate-limited. Fire activity in climate-limited systems, such as the boreal forest, is very sensitive to temperature, so warming will especially increase fire risk in those areas.

Click on the sub-headings above to go directly to the corresponding section of the full bulletin, or read the complete bulletin online:

<http://climatesmartnetwork.org/2016/09/wildfire-in-a-warming-world-part-1/>