

Large wildfires bring increases in annual river flow

April 13 2018, by Steve Lundeberg



Credit: Oregon State University

Large wildfires cause increases in stream flow that can last for years or even decades, according to a new analysis of 30 years of data from across the continental United States.

Enhanced river flows are a good news, bad news proposition. The good news is more water can be a boon, such as serving as a hedge during times of scarce water. The bad news is more water can also be a detriment, especially when it comes with an increase in contaminants,

such as sediment or nutrients, caused by the greater runoff that follows vegetation losses to [fire](#).

Prescribed burns on the other hand were not found to significantly alter river flows.

"That suggests smaller, prescribed burns can be a management tool for potentially decreasing the threat of bigger fires and creating more resilient forests without having a major effect on water yields," said co-corresponding author Kevin Bladon of Oregon State University.

The findings are important because they bring new insights into how water resource managers should look at fire, especially with the frequency of severe blazes on the rise in the face of global climate change.

Bladon, a hydrologist in OSU's College of Forestry, and collaborators looked at three decades of data regarding fires, climate and river flow from 168 river basins in the lower 48 states.

In watersheds where more than 19 percent of the forest burned, annual river flow increased significantly.

"The impacts of big fires on surface freshwater resources hadn't been previously studied at this scale, nor have they been factored into regional water management strategies," Bladon said. "But large fires are increasing and that heightens concern about their impacts on water in our forest streams and for downstream potable water."

More than two-thirds of U.S. municipalities get their drinking water from a source that originates in a forest, he said.

"Trace the water back from that tap in your kitchen and you begin to see

why it's important to care about what can happen when there's a large fire in the [forest](#) where your water comes from," he said. "And because of the sheer number of sites we looked at, we can say with a fair degree of confidence that as area burned and wildfire severity increases, so too do the impacts on annual water yields."

Bladon notes that for nearly a half-century through the late 1990s, wildfire trends were either holding steady or declining.

"All of a sudden there's an inflection point and it goes up in terms of area burned," he said. "We had been spending as a nation \$500 million a year fighting wildfires, and since 2000 that's grown to the order of \$2 billion a year. Suppressing and putting out wildfires now chews up more than half of the U.S. Forest Service budget. We need to find a way off that treadmill."

There are two factors behind the rise of wildfires, Bladon said: a generally warmer, drier climate, and the fuel left behind by earlier suppression efforts.

"Now when forests burn, they can burn with much greater severity," he said. "One percent of the fires, the high-severity ones, eat up 90 to 95 percent of the money being spent on suppression - money that's being taken away from management activities that could serve to reduce the likelihood of severe fires and produce healthier forests."

The effects of fires' relationship to water [flow](#) are most pronounced in the West, where climates tend toward warm temperate or humid continental. Despite regular droughts, the semi-arid lower Colorado region showed the greatest fire-induced [river flow](#) increases.

"People see and smell the smoke from fires and when it's gone, they think it's over," Bladon said. "But actually the impacts on other values,

such as [water](#), are just beginning at that point."

More information: Dennis W. Hallema et al, Burned forests impact water supplies, *Nature Communications* (2018). [DOI: 10.1038/s41467-018-03735-6](#)

Provided by Oregon State University

Citation: Large wildfires bring increases in annual river flow (2018, April 13) retrieved 26 April 2024 from <https://phys.org/news/2018-04-large-wildfires-annual-river.html>

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