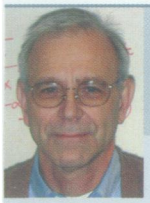
# Towards a sounder fire ecology



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Wildfires have been much in the news in the last few summers. Often, these fires are reported in adrenalin-charged terms like "firestorms" or "catastrophes", yet ecologists have known for almost half a century that fires and other natural disturbance processes are normal components of ecosystems. However, the probabilistic nature of these disturbances has left the public with the impression that they are unexpected. Perhaps more important, the public seems to understand little about how fires work and how they affect specific ecological processes.

A good example of this is the confusion over the issue of fuel accumulation. It arises from the clash between a simple, compelling idea – fires require fuel – and the more complicated reality of how wildfires actually operate. The argument goes something like this. Decades of fire prevention have led to the accumulation of fuel, which has made the forest abnormally flammable. This, in turn, has caused the increase in areas burned in recent years. Thus, the proposed solution is to reduce fuels through cutting and/or frequent low intensity management burns.

How could a better understanding of fire behavior illuminate this argument? First, years in which large areas are burned do not occur at regular intervals, because of the exceedingly important role played by large-scale weather patterns. Major fire years are usually associated with large-scale atmospheric patterns such as the El Niño Southern Oscillation, the Pacific North America Pattern, or the North Atlantic Oscillation, which cause persistent high pressure systems that lead to extreme fuel drying. The past decades may have seen an increase in the frequency and intensity of these events.

Second, whether an ecosystem has a regime of surface fire, crown fire, or a combination of both depends on the surface fire heat output, the height of the tree crowns, the amount of fuel in the crown space, and the rate of spread of the flaming front (Van Wagner 1977; Albini 1986). Ecosystems such as the North American ponderosa pine forests once had frequent surface fires that maintained their open canopy. Grazing, logging, and the prevention of surface fires over the past century allowed a closed canopied forest to develop, changing the fire regime from frequent surface fires to infrequent crown fires.

To explain this change as simply a fuel accumulation issue is confusing and misleading. For example, a similar change in the oak savannas of the US Midwest at the end of the 19th century did not result in a shift to a crown fire regime. Furthermore, because of the confusion over the role of weather and the poor understanding of fire behavior, the fuel accumulation argument has been extended to most ecosystems, and in particular has been used to explain years in which large areas burned in closed-canopied ecosystems such as subalpine and boreal forest, as well as chaparral shrublands.

In recent years, the fuel accumulation issue has become politicized, with environmentalists being blamed for preventing foresters from doing their job and thus allowing fuel to accumulate. A similar controversy erupted during and after the Yellowstone blazes of 1988. Here again, fuel accumulation supposedly played an important role in these subalpine forest fires. At the heart of this debate, often hidden by the smoke of politics, are several fundamentally important issues on which ecological science can offer some help. These issues are more universal than the current controversy in the western US.

This forum brings together fire ecologists from outside the current wildfire controversy in the US to give their views on three central topics related to ecosystems in which wildfires are an important process. First, how do fire behavior and ecological effects vary between ecosystems? Second, why does this variation require an understanding that goes beyond simple correlations between various fire and ecosystem variables to more careful causal models? Third, how can human values and goals be reconciled with fire disturbance processes in an ecologically sound manner?

We will need to answer these three questions if we are to make informed decisions, whether it is to live with fire as part of normal ecosystem processes while safeguarding human life and property, or to undertake large-scale ecosystem manipulations to try and produce specific fire regimes. By expanding the discussion to other ecological systems and to a more biophysical fire process/ecological response approach, we hope to dissipate much of the confusion surrounding the current wildfire controversy.

## References

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