



Ecosystem Workforce Program

BRIEFING PAPER
NUMBER 66
SPRING 2016



DRIVERS OF WILDFIRE SUPPRESSION COSTS: A REVIEW

AUTUMN ELLISON AND CASSANDRA MOSELEY

As federal spending on wildland fire suppression has increased dramatically in recent decades, significant policymaking has been designed, at least in part, to address and temper rising costs. Effective strategies for controlling public spending and leveraging limited wildfire management resources depend on a comprehensive understanding of the drivers of suppression costs. Problematically, frequently noted drivers often do not explain variability between similar wildfires or comparable wildfire seasons. As speculation and scrutiny around rising costs have increased, so too have scholarly investigations into a variety of influences on suppression costs. This review gathered and synthesized recent literature that examines how different variables affect wildfire suppression costs in order to present a more complete understanding of what is known and not known about what drives suppression costs.

Approach

We gathered, annotated, and synthesized recent peer-reviewed literature that investigated drivers of wildfire suppression spending. Included literature was published between 2001 and 2013.

Results

Research on the drivers of wildfire suppression costs became much more prevalent after the Forest Service's first billion-dollar suppression year in 2000 and the subsequent adoption of the National Forest Plan in 2001. Investigation for many drivers remains exploratory. This review grouped drivers into three main categories:

Biophysical drivers

Physical and environmental factors are the most measurable and empirically substantiated drivers of suppression costs. Broad climatic indices (e.g. drought, pressure systems, ocean temperatures) and more local fire and fire environment characteristics (e.g. flame length at head of fire, weather patterns,

type of terrain, fuel size, type, and moisture, geographic location) have all been consistently shown to have significant influences on both fire behavior and suppression costs. Despite the known influence of many physical and environmental variables on suppression costs, significant unexplained variability between wildfires persists after these influences are accounted for. In addition, many of these variables are uncontrollable by land managers and cannot be altered in order to evaluate different effects on suppression spending.

Socio-environmental drivers

Wildfires often affect landscapes with mixed land ownerships. Socio-environmental drivers arise from private development in the area known as the wildland-urban interface (WUI), where private property abuts public lands in wildfire-prone landscapes. Although there is broad agreement within the USDA that expanding development in the WUI has contributed to rising suppression costs, isolating the effects of private property on wildfire costs can be difficult.



Despite an early analysis that found no correlation between nearby private property and suppression costs, subsequent research with larger samples of fires has found significant correlations between private property near wildfires and wildfire costs. Analyses have found that private property variables are in fact one of the greatest drivers of costs, and that, along with fire size and fire intensity, these socio-environmental drivers are one of the most reliable influences on individual wildfire suppression expenditures.

Management and decision-making drivers

Analyses that include both biophysical and socio-environmental variables still leave half or more of the variability in suppression costs unexplained. Unexplained variability is often attributed to human decision-making, or managerial factors. Suppression decisions, resources, and approaches can greatly affect the cost of suppression efforts, and these decisions, resource allocations, and strategies can differ considerably between wildfire events. These drivers are less quantifiable, but theoretically more controllable by land managers.

Some studies have found that different fire management objectives and strategies had significant influences on suppression costs. While more aggressively suppressed fires typically costing less in the short-term, less aggressive strategies may cost less long-term and one study suggests considerable cost-saving benefits over time from letting wildfires burn in certain situations.

Ultimately, wildfire management strategies and resource allocation are based on decisions made by fire managers. Many studies examining decision-making drivers conclude that incentives to spend aggressively outweigh those to spend efficiently. In particular, investigations find that there are not compelling reasons for managers to conserve costs, particularly alongside policy directives and personal liability concerns that provide compelling pressure to avoid wildfire damages, and budget structures that do not prioritize efficient spending.

Implications

Controlling wildfire suppression costs has become a major public policy concern. As policymakers search for solutions to growing suppression expenditures and the budget challenges they create, it is important that the full suite of drivers is considered. Cost-containment measures of any type are likely to face significant pressure during large wildfire events, and progressive approaches will need to consider all of the influences on wildfire behavior and suppression decision-making in order to best align efficient spending with risk management.



More information

The full review with an annotated bibliography of reviewed literature is available at:
http://ewp.uoregon.edu/sites/ewp.uoregon.edu/files/WP_53.pdf

This research was supported by funding from the Joint Fire Science Program. The Northwest Fire Science Consortium is a regional fire science delivery system for disseminating knowledge and tools, and a venue for increasing researcher understanding of the needs of practitioners. Photo credit: US Forest Service, Apache-Sitgreaves National Forest (front header) and Coconino National Forest (back page).