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First Approximation of Prescribed Fire Risks . . .

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INTRODUCTION

Land managers and the public often have the perception that, although prescribed fire assists in management of fire-dependent landscapes, it presents greater risks than the use of other land management tools, such as mechanical removal. This perception can affect financial and public support for prescribed fire activities. Therefore, in a new paper published in PLOSOne, Twidwell and colleagues (1) approximated fatality rates for land management techniques from actual fatality rates of occupations using similar techniques to those in land management, (2) compared fatalities from wildfire and prescribed fire, and (3) explored the causes of wildfire fatalities. They examined these three datasets to test the perception that prescribed fire is riskier than other land management practices.

The authors used occupations with activities similar to those employed by landowners as proxies for actual land management fatality statistics. This was necessary to have an adequate dataset, developed from occupational fatality

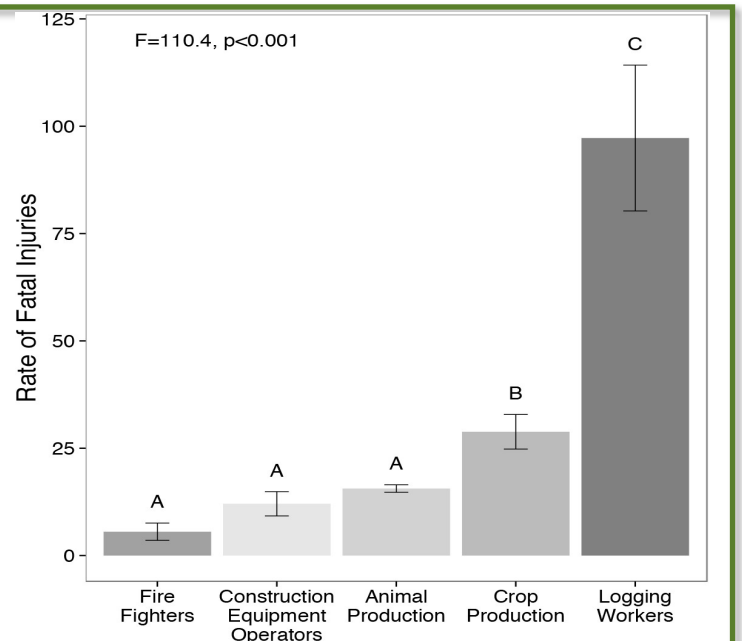
records, to complete the analysis. These data are available from the United States Department of Labor, Bureau of Labor Statistics Census of Fatal Occupational Injuries. Proxy occupations included specific activities, such as equipment operation, crop production, logging and others that require similar equipment as land management activities.

Data about fatalities associated with wildland fire came from the National Interagency Fire Center Wild Fire Accidents by Type of Accident. The authors compared the total number of fatalities from prescribed fires and wildfires from 1963-2014. These fatalities included 81 causal factors that fit into four principal categories: burn-over and entrapment, vehicles and transportation, medical (e.g., heart attack, stroke), and environmental (e.g., fallen tree, flying debris). The authors ascribed either machine-related or non-mechanical cause to each causal factor within the categories, such that wildfire burn-over fatality was non-mechanical and aircraft fatality was machine-related.

Proxy measures of fatality risk using occupational fatalities.

The explanation of proxies appears below. The chart of relative rate of fatalities for each occupation appears to the right.

Occupational Proxy	Comparison to Private Land Management Practices
Crop production	Heavy machinery, tractors, mowers
Animal production	Heavy machinery, animal transportation, ATVs
Firefighting	Heavy machinery & equipment, proximity to fire, medical emergencies
Logging	Heavy machinery and equipment. Commercial logging probably over-estimates the risk to private land managers.
Construction equipment operation	Heavy equipment



FINDINGS

The authors found that crop production and logging activities resulted in the highest fatality rate of all occupations considered, including firefighting. Many of these fatalities linked to transportation and contact with equipment, and so are machine-related causes. Firefighting had the fewest fatalities of the occupations examined. This included statistics for both wildfire and prescribed fire, combined.

Fatalities from firefighting mostly resulted from wildfire burn-over. The authors presented their Table 2, *Comparison of causal factors . . . in prescribed fires and wildfires from 1969-2014*, to show the differences in risk of fatality between prescribe fire and wildfire.

A summary of Table 2.

Causal factor	Wildfire	Prescribed fire
Burn-over	140	3
Burns	9	0
Entrapment	33	2
Snags	19	1
Total	201	6

The authors found that firefighting is the least risky occupation they reviewed. Wildfire accounted for 97% of the firefighting fatalities, making prescribed fire among the safest activities used in land management.

Within the other professions, machine-related fatalities occurred most frequently over the last 20 years. Even firefighting has seen an increase in machine-related fatalities (vehicle and transportation) and a decrease in fatalities directly associated with fire (burn-over and entrapment).

CONCLUSIONS

Urban residents doubt the ability of land managers to control prescribed fire, contributing to agencies' hesitancy to support use of prescribed fire in land management. In reality, burn cooperatives conduct 99% of prescribed fires without incident, using practices that avoid application of fire under conditions that may result in escape. Despite this, natural resource agencies often support management programs using vehicles and heavy equipment instead of prescribed fire in an attempt to avert perceived risks. Public agencies respond to the concerns of constituencies, as well as to the science of management practices.

The authors suggested that the driving force for land management by agencies differs from that of private landowners. While agencies focus on risk aversion in selecting management options, landowners emphasize profitability and personal values over risk aversion. Agencies must consider potential for property loss from prescribed-fire escape in their decision making. The authors looked at fatalities and did not assess the risk of property loss.

The authors conducted this study to improve understanding of risks from using prescribed fire in the private sector. The study did not include non-fatal incidents, because safety records with these data were not reported for prescribed fire in the private sector. Additionally, only sparse data exist on which to estimate property damage caused by prescribed fire. The authors call for comprehensive databases that characterize risks relevant to landowners using land management techniques.

For more information: The Great Plains Fire Science Exchange has resources on fire, fire effects, monitoring and more at <http://GPFireScience.org>. We can also locate experts to address your wildland fire questions.

REFERENCE

[Twidwell, Dirac, C.L. Wonkka, M.T. Sindelar, and J.R. Weir. 2015. First Approximations of Prescribed Fire Risks Relative to Other Management Techniques Used on Private Lands. PLoS One 10\(10\):e0140410. doi:10.1371/journal.pone.014410.](#)

For more information:

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