



Wildfire risk reduction in the United States: Leadership staff perceptions of local fire department roles and responsibilities

Rachel S. Madsen^{a,*}, Hylton J.G. Haynes^b, Sarah M. McCaffrey^c

^a Brandeis University, Department of Sociology, MS 071, 415 South Street, Waltham, MA 02453, United States

^b National Fire Protection Association, United States

^c United States Forest Service, United States

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ABSTRACT

As wildland fires have had increasing negative impacts on a range of human values, in many parts of the United States (U.S.) and around the world, collaborative risk reduction efforts among agencies, homeowners, and fire departments are needed to improve wildfire safety and mitigate risk. Using interview data from 46 senior officers from local fire departments around the U.S., we examine how leadership staff view their departments' roles and responsibilities in wildfire risk reduction. Overall, our findings indicate that local fire personnel are often performing a variety of mitigation tasks and roles, acting as informants, educators, partners, and planners. The challenges these local departments have experienced also point to how funding, information sharing, and staff buy-in can better facilitate engagement in mitigation work and ultimately help improve community wildfire safety.

1. Introduction

In many places around the world, recent decades have seen growing wildfire impacts on human communities. Due in part to the effects of climate change, in many places it is also a result of increased fuels from decades of suppressing fire's natural ecological role as well as increased human habitation in fire prone areas. Although it is currently recognized that in many ecosystems fire is an important ecological function, in the United States suppression of fires on public lands has been the dominant response to wildland fires for over a hundred years. For much of this period, wildland fires had relatively minimal impact on human settlements, which tended to be in agricultural areas or less intertwined with public lands [18]. As such, in most of the United States the primary wildland firefighting response came from federal land management agencies, such as the Forest Service. However, since World War II, more residential development and human activity in wildland areas have added complexity to the system [1,5]. Along with increased fire ignitions, the mix of ownerships now affected by wildfires requires the active involvement of a greater array of emergency responders, particularly local fire departments, than just federal land management agencies both to respond to a wildfire and to foster mitigation before a fire as the most effective way to improve safety and long-term outcomes. The 2017 fires in Northern California, where wildfires burned through and destroyed whole neighbors in and

adjacent to the city of Santa Rosa, highlight the degree to which these issues are beginning to directly impact local structural fire departments.

The greater involvement of local emergency responders in wildland fire, however, has not been a straightforward matter. Historically, local fire departments have focused on structural fire protection while wildfire protection has been the domain of the state and federal government [18]. Each type of protection requires different firefighting techniques and equipment: urban protection is a focused effort to protect structures (requiring heavy duty personal protective equipment, including breathing apparatus, that allows for brief exposure to intense heat that can occur within a building), whereas wildland firefighting emphasizes a more extensive effort to prevent perimeter spread (requiring lighter weight protective equipment that allows for long periods of intense physical work) [17]. As a result, direct involvement in wildfire management, particularly fire mitigation efforts, has not always been seen by local fire departments as in their purview of responsibilities. Given their role as an important local institution and the need for more homeowners to undertake fire mitigation efforts, understanding how fire departments that have been affected by wildfires now perceive their role and the barriers to more proactive involvement is an area that merits more attention.

* Corresponding author.

E-mail address: rmadsen@brandeis.edu (R.S. Madsen).

1.1. Wildland fire suppression and mitigation in U.S. context

In the United States (U.S.) wildland fire response, preparedness, and mitigation activities are addressed by multiple governmental and non-governmental organizations. In terms of response, county, municipal, and volunteer fire departments play an important role in initial response to a wildfire. If the complexity of the wildfire incident increases beyond the capabilities of local resources, the U.S. national incident management system (NIMS) is implemented to coordinate appropriate local, state, and federal response resources based on incident complexity and resource availability. Once non-local resources are called in, local fire department responsibilities tend to focus on structure protection while state and federal resources focus on wildfire management. While some states, such as California, have extensive state level fire-fighting resources, others states have minimal fire response ability. At the federal level there are five primary land management agencies with firefighting responsibility, with the U.S. Forest Service the organization with the most firefighting resources.

From a wildfire preparedness and mitigation perspective there is no national coordinating group, however, most federal land management agencies provide administrative, research, and outreach services. The main examples of these national efforts include the Firewise USA™, Ready, Set, Go!, and the Fire Adapted Communities Learning Network. In addition, many local and regional community-based organizations have emerged, including firewise homeowner's associations, fire safe councils, and regional coalitions. In addition, public outreach about wildfire risk and mitigation has had a growing role on the agenda of many fire departments whose jurisdictions include the wildland-urban interface (WUI).¹

The Healthy Forests Restoration Act (HFRA) of 2003 encourages the creation of Community Wildfire Protection Plans (CWPP), which need to be developed collaboratively between local fire departments, local government and area residents. The typical role of local fire professionals in this process is to provide technical insights and tools to the planning process, as well as information about the surrounding area's vegetation and fuels.² Participation in CWPP development represents one avenue through which local fire departments act as partners with land management agencies and local residents in community risk reduction efforts.

1.2. Research on wildfire mitigation

A large body of work has developed since 2000 examining various aspects of public³ response and preparedness in relation to wildfire. Syntheses of this research show that, overall, the public tends to have high acceptance of fuels treatments (such as prescribed burning) on public lands, see it as their responsibility to mitigate fire risk on their property, and that overall wildfire risk mitigation is a shared responsibility [12,20]. Between 2000 and 2008, just 7% of the applicable studies were based outside of the U.S. [13]. However, since 2010, research based outside the U.S. has made up about half the published social science research articles related to wildfire, most coming from Australia. More work has also come from Canada in recent years, as well as from New Zealand and Europe. On the whole, findings from this body of research suggest that there are many similarities across countries in terms of the social dynamics of wildfire management, particularly as related to public trust and people's perceived benefits of

participating in mitigation programs [11].

Specific to homeowners and mitigation, early studies tended to focus on individual property owners and communities in regards to their direct participation in wildfire mitigation actions. In their review of these studies, Toman et al. [20] concluded that homeowners' risk reduction behaviors tend to be influenced most by psychological factors, particularly their perceived effectiveness of the activities and their perceived ability to complete them. Findings regarding the effect of property owners' awareness of fire risk on their mitigation activities have varied. Toman et al. [20] note that some studies found homeowners' awareness of risk to be an important but insufficient factor for adopting risk reduction behaviors. Where risk awareness relates to cooperation with others in mitigation work, Fischer and Charnley [4] found perceived risk to explain private forest owners' cooperation with public agencies, but it did not explain their cooperation with other private landowners.

More recent research has begun to examine the influence of outreach programs on homeowner awareness and preparedness. This work has shown public outreach programs, particularly those that directly connect fire agency personnel with community members, to be key in fostering wildfire preparedness and acceptance of mitigation efforts [11]. Studies have also highlighted how participatory planning processes, such as CWPP development, can provide a platform for interaction, collaboration, and information sharing among property owners, land management agencies, and fire agencies [8,16].

Public outreach, information sharing, and the collaborative process of wildfire protection planning with the community have also been found to help build trust among residents and local fire agencies [16]. In turn, public trust in fire personnel, as well as other local service agencies, has been found to be critical in successfully preparing a CWPP [9]. Evidence from Olsen and Sharp's [15] study of community-agency trust in fire-affected communities in the U.S. and Australia indicates that, in both countries, personnel from local fire agencies tend to engender greater public trust compared to interactions with regional and national actors. Research findings also indicate that local agencies, particularly fire departments, tend to be the public's preferred source of information on fire issues [12]. Given this general status as trustworthy sources, local fire departments have a particularly important role to play in facilitating community risk reduction efforts and engaging local residents.

While important to understand the perspective of individual property owners, it is equally important to understand the perspectives and actions of local fire personnel. Although a less researched area, findings from both Canton-Thompson et al. [2] interviews with Incident Management team members and Shiralipour et al. [19] interviews with local fire department and forestry agency personnel indicate that fire personnel see inter-organizational coordination and information sharing with community members as important in wildfire preparedness. However, the foci, respectively, of these studies relate to the impact on fire suppression costs and the role of neighborhood organizations in wildfire prevention efforts.

As wildfire threat intensifies for many communities located in wildland-urban interface areas across the world, local fire departments' roles in community protection and risk reduction will likely become only more critical in future years. Given this and the limited research specific to local fire professionals' perspectives on their preparedness role, this article aims to address the following questions: How do local fire departments perceive their role in addressing this need? What are the strategies and tactics they use to try to fulfill the role they envision and what are the challenges they face in doing so? Furthermore, we examine how role perceptions and engagement in non-response efforts may differ among departments by regional location, urban or rural community type, and career or volunteer status.

¹ "Wildland-urban interface" is used in this article to refer to what would be considered *interface*—"where housing is in the vicinity of a large area of dense wildland vegetation"—as well as *intermix* communities, "where housing and wildland vegetation intermingle" ([10]:8).

² Any combustible vegetative material that is typically found in wildland, open-spaces or within communities.

³ Following McCaffrey and Olsen [12], we use the "public" to refer to residents and recreation visitors of a given area.

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