Risk Perceptions, Management Regimes, and Wildfire Mitigation Behavior in Wildland-Urban Interface Zones: A Cross-Case Analysis

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Abstract

In recent years, wildfires affecting communities located in the wildland-urban interface (WUI) have grown in size and become more destructive, substantially impacting life and property across the West. Regional demographic and climate trends are working to exacerbate wildfire conditions, as the West's human population continues to grow rapidly and drought conditions persist. Understanding residents' perceptions of wildfire risk and responsibility for fire mitigation on private lands, as well as wildfire management options in the WUI, is important for shaping policy and land management decisions that reduce risk to life and property. Although this is an increasingly urgent topic, little research has been conducted to investigate the nexus between residents' wildfire mitigation behavior and the role of information in promoting knowledge about and responsibility for mitigation. This study uses two in-depth cases of recent catastrophic wildfires in Colorado to analyze such connections. Using data from interviews with fire managers, focus groups with residents, as well as fire mitigation planning documents, this research investigates the connections between information, local management regimes, and homeowner decisions regarding property mitigation in the face of wildfire risk. These findings indicate that fire management agencies can best encourage mitigation by local residents by supporting and incentivizing mitigation activities, disseminating risk and mitigation information through personal channels, and seizing post-fire windows of heightened community interest.

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In the western United States, wildfire is a natural component of many ecosystems. While fire can provide ecosystem benefits, its potential for destruction of life and property in wildland-urban interface (WUI) zones is severe. Due to a century of fire suppression policy, along with increasingly dry conditions, the western United States is currently experiencing some of the biggest and most severe wildfires in history (National Interagency Fire Center, 2012; Litschert et al., 2012). Furthermore, western states are experiencing significant population growth and exurban development. These factors may contribute to increasing problems with managing fire in the WUI. Understanding the role that residents and policymakers play in mitigating this risk is critical to reducing future risk of destruction of life and property.

This study investigates how information about wildfire risk and mitigation[1] is disseminated to residents, and whether that information leads to on-the-ground wildfire mitigation activity. Using data gathered through two in-depth case studies of communities that have experienced catastrophic wildfire in Colorado, we analyze what information types and dissemination strategies are in use, what effects they have on residents' mitigation behavior, and what incentives and limitations exist for information use. Gaining a better understanding of these variables can directly inform the creation of effective policy aimed at reducing wildfire risk. The following sections identify the theoretical underpinnings of the investigation, the research design and methods employed, the results of the investigation, and a discussion of the significance of the findings.

Literature Review & Research Questions

The Wildland-Urban Interface and Colorado

The most commonly used definition of the "wildland-urban interface" (WUI) was published in the Federal Register in 2001. It defines the WUI as an area "where humans and their development meet or intermix with wildland fuel" (U.S. Department of Interior [USDI] & U.S. Department of Agriculture [USDA], 2001, p. 752-753). The WUI can be further categorized into "interface," "intermix," and "occluded" areas. The WUI categories most commonly discussed in fire mitigation policy are "interface," where the boundaries of human development are easily defined (such as the border between a town and forested land), and "intermix," where human development is interspersed among fuels.[2]

The WUI is an increasingly important topic of research in the West. Radeloff et al. (2005) conducted a spatial analysis of lands in the United States and found that 9.4% could be characterized as WUI, while 38.5% of all housing units are located within the WUI. In particular,

[1] We define wildfire mitigation broadly here as actions taken to minimize the destructiveness of a wildfire to one's home and/or property. Examples of mitigation include thinning woods, clearing overgrown and/or flammable brush, removing mulch from landscaping, and cutting down hazard trees in close proximity to structures.

[2] The third WUI category, "occluded," describes areas that are surrounded by development, such as a park or natural area within the boundaries of a town (USDI & USDA, 2001, p. 753). The latter type of WUI is not examined here because it is not as common as "interface" and "intermix" zones, and the contained nature of the "wildland" in question makes its management significantly easier.

the Colorado Front Range[3] was identified as a "major WUI area" (Radeloff et al., 2005, p. 801), with 50% of Colorado's WUI assigned to the highest risk severity class (Theobald & Romme, 2007, p. 349). Furthermore, between April 2010 and July 2013, the U.S. Census Bureau (2013) estimated that Colorado's population grew by 4.76%, the fourth highest growth rate in the country. Colorado also has the dubious distinction of being one of six states predicted to have the greatest growth in WUI acreage between 2000 and 2030 (Theobald & Romme, 2007, p. 349). These factors all contribute to the need to understand social, cultural, and political aspects of WUI areas in addition to their fire ecology. The Colorado State Forest Service has identified significant tracts of Front Range counties, including Larimer, Boulder, Gilpin, Clear Creek, Summit, Jefferson, Douglas, Teller, and El Paso, as WUI areas where wildfire poses significant threats to human life and property (Colorado State Forest Service, 2004). Consequently, Colorado's Front Range provides ample opportunities to explore questions related to reducing wildfire risk in the WUI. The lessons learned here may be useful in other contexts where communities are endeavoring to address their wildfire vulnerability.

Natural Hazards Scholarship

Natural hazards scholarship provides useful knowledge for wildfire-oriented investigations such as this one. Natural hazards scholarship attempts to understand how people mitigate risks posed by naturally occurring events, such as hurricanes and tsunamis (White et al., 2001). While wildfire seems like an obvious candidate for inclusion in the hazards canon, it was not incorporated into hazards research until recently, when scholars began to acknowledge the fact that wildfires often confound human control (McCaffrey, 2004). Natural hazards scholars divide hazard-related human losses into three categories: physical, social, and constructed (Mileti, 1999). The latter designation – "constructed" – refers to the built environment (e.g., roads, buildings, or other infrastructure). Damage to the "constructed" environment is increasing across natural hazard types, as the built environment expands globally and human systems become increasingly intertwined with, and dependent upon, natural systems (Mileti, 1999). Wildfire poses acute threats to the built environment and is therefore a source of heavy "constructed" losses.

Research on the social aspects of hazards have focused on understanding demographic factors that describe who is most vulnerable to natural hazard-related risk and who is more or less likely to proactively mitigate against those risks (Cutter et al., 2003). Common demographic factors, such as income and age, do not appear to reliably predict homeowners' fire mitigation behavior in the WUI, however, suggesting that there must be more to the story (Brenkert-Smith et al., 2012). Researchers who have looked beyond demographic variables in Colorado have found that homeowners typically follow a "parcel" approach to wildfire mitigation, for example, treating a single parcel of land (their own) based on a personal assessment of whether mitigation is necessary and possible (Brenkert-Smith, 2011). Unfortunately, the parcel approach is limited in its ability to broadly reduce risk because neighbors must mitigate their own parcels to similar standards in order for parcel mitigation to be effective, and also because individuals and communities vary in their perceptions of wildfire risk and motivation to actively mitigate that risk (Brenkert-Smith, 2011).

[3] The Front Range is the Denver metro area that sits along the foothills of the Rocky Mountains as they descend into the prairies of Colorado and Kansas. It is also where the majority of the urban and suburban populations live.

It is increasingly clear that the demographics of hazard vulnerability are only a starting point for research that aims to understand wildfire risk perception and policies that aim to reduce wildfire risk. Effective, context-sensitive, and locally sustainable policies demand a deeper understanding of individual perceptions of risk and decision-making processes regarding mitigation activities (Mileti, 1999, p. 4). In other words, policymakers can better plan for the worst if they understand both individuals' vulnerabilities and the factors that drive individual actions to reduce those vulnerabilities. Policymakers need also to understand fire-related behavior at the neighborhood and community levels, two scales that hazards research often leaves unaddressed, as well as the effectiveness of different governmental outreach and information strategies.

A recent survey of WUI residents on Colorado's Front Range (Brenkert-Smith et al., 2012) addressed some of these factors, asking why homeowners undertook specific mitigation measures recommended by county wildfire experts. Information proved important to mitigation activity. According to the authors, "receiving wildfire information from the county wildfire specialists in both Larimer and Boulder Counties had a strong positive relationship with mitigation level" (Brenkert-Smith et al., 2012, p. 1149). However, this information can be provided in many ways, such as through direct mailings, conversations with professionals and neighbors, media, social networking outlets, and websites. Left uninvestigated by existing research is how, exactly, residents obtain and use wildfire-related information. Furthermore, because natural hazards scholarship is predominantly focused on individual behavior and vulnerability, the role that policymakers and resource managers play in facilitating risk mitigation is also underdeveloped.

Policy Diffusion

The conveyance of mitigation information to residents from policymakers is a critical step in the process of reducing community vulnerability. Understanding policy diffusion can help to understand the strengths and limitations of information transfer, focusing on how policy innovations move across and between jurisdictions and levels of governance. Diffusion primarily occurs as a result of social learning or economic competition. Social learning occurs when one jurisdiction (e.g., a state) is faced with a similar problem as a second jurisdiction (e.g., another state), and implements a similar policy after observing its success elsewhere. Economic pressure can also lead to policy innovation, as states seek to outcompete their neighbors in particular markets (Boehmke & Witmer, 2004). A third method by which innovation spreads is proposed by Boushey (2010), who uses an epidemiological metaphor to describe the sudden "outbreaks" of policy change that defy more incremental explanations of policy innovation. Under Boushey's model, states are akin to hosts, policy innovations are like pathogens, and interest groups mimic vectors, spreading policy innovation like a contagion in a "positive feedback cycle" that generates "extremely rapid adoption of policy innovation across states" (2010, p. 5).

The nature of policy diffusion has been increasingly examined in the context of environmental problems, particularly at the international (i.e., country-to-country) or state level. Much of this research has examined the diffusion of technical or scientific knowledge for specific, bounded problems, such as hazardous waste (e.g., Daley & Garand, 2005) or emissions trading (e.g., Shin, 2013). These analyses often fail to acknowledge that the mere provision of scientific information does not guarantee decision makers' ability to use that information effectively (McNie, 2007). Furthermore, Crow (2012) argues that, when assessing how information spreads, "it is important

to consider a wider variety of information and types of knowledge" than only scientific information (p. 29). Wildfire presents a unique environmental hazard through which to examine how technical knowledge and other sources of information spread to residents, as well as if and how residents use that information on the ground.

Much policy diffusion literature is focused on analyzing the transfer of innovation among states, leaving the applicability of policy diffusion theory relatively unexplored at the local, community, or neighborhood levels. However, Crow (2012) examined how an innovation in the arena of Colorado water rights policy was transferred to other communities within the state and found that "accurate knowledge about policy options, resources, and expertise was important for policy diffusion" (p. 38). In the water rights case, experts (typically water attorneys) acted as the primary sources of expertise among communities within Colorado and the primary diffusers of inter-community policy innovation. In the case of wildfire mitigation, local experts may operate on more of an intra-community basis, communicating mitigation information or mitigation-related policy innovations to residents within their neighborhoods or jurisdictions. Understanding how information is shared within a community – and the consequent effect of this diffusion – can in turn help policymakers and resource managers bolster existing outreach efforts or expand those efforts into other communities.

Events may also play a "vector"-like role in policy innovation diffusion, as per Boushey (2010). Sabatier and Weible (2007) assert that external perturbations or "shocks" can provide the impetus for policy change. It may follow, then, that a major event such as a wildfire could also serve as an impetus for change at the community or local level. In the months following recovery from a major wildfire, policy entrepreneurs, or those individuals who are adept at shepherding policy change through to adoption (Zahariadis, 2007), may have a window of time during which to engage individuals or communities in stepping up mitigation activities in advance of the next potential wildfire (Kingdon, 1995). In this way, the policy process surrounding wildfire mitigation may be dialectical, where experts and policymakers provide information on best practices that residents may choose to implement after a nearby wildfire compels them to act, or for other reasons. Providing feedback to policymakers or managers on how, why, and under what circumstances individuals or communities use mitigation information can help to improve the processes by which policy is made and subsequently transferred.

Community Wildfire Protection Plans (CWPPs) are one example of policy innovation that may illustrate how policy diffusion and information adoption occurs at the local level. In 2003, the Healthy Forests Restoration Act in 2003 authorized CWPPs as a means to "help a community clarify and refine its priorities for the protection of life, property, and critical infrastructure in the wildland–urban interface" (Society of American Foresters, 2004, p. 1). The federal emphasis on collaborative CWPPs gave more authority to states and communities and indicated a major policy change (Davis, 2001). In the decade since, however, little research has investigated the efficacy of these plans and the processes by which they are created. In particular, little is known about how communities and residents use CWPPs to reduce their vulnerability. A case study review of the process by which CWPPs were developed in two communities in Oregon found that "CWPPs are unlikely to be effective tools in mitigating the risk of wildfire unless they can successfully coordinate the activities of multiple levels of government and integrate the interests of relevant stakeholders" (Fleeger & Becker, 2010, p. 364). Specifically, the authors cite

information gathering as an important component of the CWPP process and add that stakeholders must agree on types and sources of relevant information in order for plans to be useful (Fleeger & Becker, 2010, p. 364). The prevalence of CWPPs, and their role in neighborhood and community mitigation activities, is explored in more depth in this study.

Research Questions

Managing wildfire in the wildland-urban interface is complex. In order to understand the relationships between management regimes, information, and homeowner mitigation behavior, this study explores the following over-arching research question:

> *RQ1: How does information dissemination and use influence perceived wildfire risk and mitigation behavior among WUI residents?*

In order to answer this question, five sub-research questions are proposed:

> *RQ1a: What information is important to disseminate in order to promote wildfire mitigation?*

Much information exists on wildfire mitigation through websites, direct mailings, the media, social networking sites, scientific research, and other outlets. This study attempts to understand what information policymakers used in their mitigation efforts as well as what types of information was sought by private landowners. Given the prevalence of CWPPs as a tool for providing information and planning within communities in the study area, these policy documents were given specific attention.

> *RQ1b: How are communities distributing information related to wildfire risk and mitigation?*

In other words, how do residents obtain information on how to prepare for a wildfire? This question has been explored in depth by Brenkert-Smith et al. (2012); however, here, the question is approached from the perspectives of natural resource managers that deal with wildfire (primarily fire department officials) and neighborhood leaders in addition to individual residents.

> *RQ1c: What are the most successful approaches to wildfire risk and mitigation information dissemination?*

Policymakers and resource managers may not always disseminate information in ways that directly match residents' needs or information-gathering habits. Understanding what tools are effective for sharing fire mitigation goals and objectives, as well as which efforts have been the most useful, can help improve future efforts by policymakers and resource managers.

> *RQ1d: What are the effects of received wildfire risk and mitigation information on homeowner mitigation behavior?*

A great deal of policymakers' and resource managers' wildfire mitigation efforts have thus far been focused on education and outreach to communities and residents. Determining what effect a

particular information source has on encouraging mitigation can help to ensure that agencies target their limited resources in the most effective manner possible.

> *RQ1e: What limits or incentives exist that might make WUI residents more or less receptive to the information they receive?*

Despite the best efforts of well-intentioned individuals and communities, some residents may simply perceive wildfire risk differently than others, or may have competing priorities that influence their ability to deal with that risk. Identifying these barriers and assessing them can help policymakers and resource managers find new ways to convey information for the greater good.

Given the growing incidence of destructive wildfire in Colorado and the West, as well as a rapidly growing population in the WUI, understanding what information types and dissemination techniques influence individuals' decision to mitigate and how policymakers can better reach residents with high wildfire risk profiles is critical. Progress on both fronts could significantly reduce risk to life and property and simultaneously reduce the public cost of managing wildfires. This research targets important gaps in our understanding of how individuals use mitigation information to reduce their vulnerability to wildfire, and how information and policy diffusion succeeds at the community scale.

Research Methods

Research Design

This research employed an in-depth, comparative case study approach to understand the role of information in homeowner risk perception and mitigation in two communities on the Front Range of Colorado affected by significant, destructive wildfires in 2012: Fort Collins, which experienced the High Park Fire, and Colorado Springs, which experienced the Waldo Canyon Fire. Case studies aid in understanding complex social phenomena in their real-world context (Yin, 2014). They are bounded by time, activity, or geography (Stake, 1995) and are most insightful when the goal of the research is to understand "why" and "how" something happens in a contemporary setting, especially when it is impossible to control variables (Yin, 2014). Case study designs enable researchers to examine multiple factors that influence, or are influenced by, the phenomenon being investigated. In this way, case studies can produce a broad understanding of the phenomenon under study and the dynamics that surround it. For the purposes of this investigation, case studies were used to better understand the role that wildfire risk and mitigation information played in the context of different wildfire-prone communities and management regimes, constantly shifting wildfire ecology, and a spectrum of individual perceptions of risk.

The two case studies analyzed here were selected based on the following criteria: 1) an occurrence of a fire event in 2012 or later that 2) destroyed or threatened human lives and property. Fire events that occurred after the beginning of 2012 were selected because of a fundamental change in federal fire management policy that year, which affected how the management of wildfires. In 2012, federal fire managers shifted their focus to the "prevention and suppression of fires," with "reduced emphasis placed on maintaining or restoring fire-

adapted ecosystems and managing hazardous fuels for resource benefits in favor of treating lands in the Wildland-Urban Interface" (U.S. Department of the Interior, 2012). In other words, resource managers expressly abandoned the use of fire as a tool to manage fire-dependent ecosystems and moved to a suppression-centric policy.

Because both cases were based in Colorado, they could be bounded by the same state policies governing mitigation and emergency responses. In addition, the 2012 wildfires under investigation were the most destructive in each community's history (in terms of size and cost) at the time. Beyond their common geographic and economic foundation, however, each case demonstrates unique characteristics of the different communities, geographies, CWPPs, fire departments, and wildfire mitigation habits and strategies involved.

Data Collection

Three sources of data were gathered to build in-depth studies of each case. Semi-structured interviews, focus groups, and documents inform the analysis presented below. Wildfire planning documents such as management plans, CWPPs, and risk assessment plans were analyzed to understand the cases, timelines, and agencies involved in wildfire management and response, along with the policies and plans that they had in place at the time of the fires.

Interviews

Semi-structured interviews were conducted with fire management professionals about both mitigation and broader questions of fire management and response (Rubin & Rubin, 2012). Key informants were selected for interviews based on their wildfire management expertise, their roles as decision makers or managers related to wildfire in their communities, and their knowledge of fire management. After identifying initial interview subjects, snowball sampling was employed to find other key informants to interview (Auerbach & Silverstein, 2003; Goodman, 1961).

Focus Groups

Focus groups were conducted with local residents within the fire burn zones to help understand wildfire risk and mitigation directly from the perspective of those who are most at risk and who have the agency to make mitigation decisions on their own property. Focus groups allow the researcher to interact with participants and allow participants to interact with each other in ways that highlight community consensus and/or tension on specific issues (Goss & Leinbach, 1996). Focus groups provide for a more dynamic understanding of perceptions and opinions than a singular interview, and are therefore particularly useful for exploring personal issues such as mitigation and risk perception. Participants were initially recruited either through their connection to impacted HOAs or through recommendations from the policy and management officials interviewed. From there, willing participants assisted in snowball recruitment of additional residents.

One focus group was conducted in each of the case study communities. Each focus group ranged from 90 to 120 minutes, was held in a community library, and involved six participants who were all residents who, in some way, were impacted by the case study fires. In both groups, a majority of participants were retired, and some had lost their homes in the wildfire, while others had been evacuated, or had survived without significant damage. Some of the participants already knew each other through community engagement in wildfire issues, and all were more engaged in wildfire mitigation than the average community member.

Data Analysis

Interviews and focus groups were recorded and transcribed verbatim. Two researchers used NVivo qualitative analysis software to code the transcripts in order to investigate thematic patterns within and across cases. A priori codes were established according to the research questions and theoretical frameworks employed in the study (Miles & Huberman, 1994; Weston et al., 2001) and assembled into a detailed codebook. This a priori coding structure focused the analysis toward answering the research questions and limited the number of infinitely possible codes to a manageable number. In addition, multiple coders performed coding, working off the same a priori-defined codebook and set of instructions to foster greater intra- and inter-coder consistency and reliability (Krippendorff, 2004). It was also important to remain open to emergent themes in the data and incorporate those themes into the codes and eventual findings (Miles & Huberman, 1994; Saldaña, 2012). From the coded data, researchers created within-case summaries that described in narrative form the findings from each case for each research question. From these summaries, researchers worked to identify the cross-case patterns presented here (Miles & Huberman, 1994).

Case Studies

<u>High Park Fire</u>

On June 9, 2012, a lightning strike ignited forests outside of Fort Collins, Colorado, producing a fire that raged for twenty-two days. Despite cross-agency efforts, the High Park Fire scorched 87,284 acres in central Larimer Country and was not completely contained until July 1. The fire burned 259 homes and resulted in one death (Colorado State Forest Service, 2012). Drought conditions and rough terrain made the fire particularly difficult to contain (Colorado Department of Transportation, et al., 2012). At the time, the High Park Fire was the largest and most destructive wildfire in Colorado history in terms of houses burned, and the second largest fire in total acres burned (Mitchell & Udell, 2012). In the aftermath of the fire, 1,293 insurance claims were filed for an estimated $113.7 million in losses (Svaldi, 2013). Just weeks later, however, the Waldo Canyon Fire in central Colorado surpassed the High Park Fire as Colorado's most destructive wildfire on record.

Fort Collins is the fourth largest city in the state with more than 150,000 residents (City of Fort Collins, 2014). Beyond Fort Collins city limits in the Bellvue area, small rural communities dot canyons that neighbor the city. Indeed, many of the communities at greatest wildfire risk in the Larimer County WUI are not expanding subdivisions at the interface of Fort Collins and surrounding wildlands, but rather are well outside of the city's reach and are fully intermixed with wildlands. Larimer County Emergency Management and the Poudre Fire Authority (PFA) wrote over-arching CWPPs for this area in the past decade. Larimer County's plan was written in 2003 and was most recently updated in 2009, while PFA's plan was written in 2006 and updated in 2011. Both the Larimer County and PFA plans identify areas of wildfire risk, detail important necessary mitigation activities, and explain construction requirements for new buildings. PFA, specifically, has worked to identify individual parcel-level risk through their WUI Outreach and Planning Initiative (WOPI) Program. However, individual property risk levels are not public information, and can only be accessed online through a password-protected site, which prohibits the broad dissemination of this specific type of risk information.

The Larimer County CWPP acts as a general framework for the county, but smaller communities based in the WUI, such as Rist Canyon and Bellvue, have written their own localized CWPPs. They encourage mitigation of all WUI lands, but focus primarily on those with highest wildfire risk because of small communities' and volunteer fire departments' limited resources.

Waldo Canyon Fire

The Waldo Canyon Fire burned on the western edge of Colorado Springs for eighteen days, from June 23 through July 10, 2012, consuming 18,247 acres, destroying 347 homes, and damaging many others. It was ranked as the most destructive forest fire in Colorado history for about a year, until the Black Forest Fire surpassed it during the summer of 2013, burning 511 homes to the northeast of Colorado Springs. Over the course of the Waldo Canyon fire, more than 32,000 residents of Colorado Springs and neighboring communities were forced to evacuate. Two individuals lost their lives as a result of the fire. Insurance claims have topped $450 million. The source of the fire is still being investigated, but experts believe it was human-caused (City of Colorado Springs, 2013).

Colorado Springs is the second largest city in the state with a population of 414,358 residents. Approximately 24% of the Colorado Springs population lives in the WUI at the base of Pike's Peak, in the foothills along the city's western edge. Colorado Springs' emergency managers and first responders have been making significant progress on wildfire mitigation in the WUI for over a decade. The city published its first wildfire mitigation plan in 2001 and updated it in 2011. The 2011 version included fire-modeling efforts that identified 35,360 individual parcels as "at risk" to wildfire in the Colorado Springs WUI. Residents can access their individual wildfire ratings, as well as those of their neighbors, on the Colorado Springs Fire Department (CSFD) website. The CSFD conducts extensive wildfire outreach and mitigation activities with Colorado Springs' WUI-based neighborhoods, from neighborhood meetings and onsite consultations, to mitigation literature (online and in print) and visits from free chipping crews in neighborhoods that agree to pursue mitigation projects. The CSFD also conducted wildfire evacuation drills in select neighborhoods in 2009 and 2011 (City of Colorado Springs, 2011). Smaller communities affected by the Waldo Canyon Fire, such as Manitou Springs, Woodland Park, and developments along Highway 24 west of the city, have fewer resources in terms of fire planning and mitigation. The Coalition for the Upper South Platte, a non-profit organization, provides assistance to these small communities and homeowners' associations (HOAs) in developing Community Wildfire Protection Plans and securing resources for fire mitigation.

Research Findings: Information Dissemination and Influence on Wildfire Mitigation Behavior

This study used the research methods and case studies detailed above to explore the following overarching research question: *RQ1: How does information dissemination and use influence perceived wildfire risk and mitigation behavior among WUI residents?* This question will be answered by addressing the five sub-questions below. Understanding the sources and types of information being distributed in communities is an important first step in determining how residents respond to information on risk and mitigation.

RQ1a: What information is important to disseminate in order to promote wildfire mitigation?

Table 1 illustrates the data from interviews and focus groups as they pertain to this research question[4]. As the table shows, the most important type of information that an individual receives is experiential or social information pertaining to personal experiences with fire risk, loss, or damage. This information is obviously not being actively disseminated by policymakers or resource managers and is instead experienced by individuals through proximity to wildfire. However, beyond these key personal experiences, there are sources and types of information that are potentially useful in promoting mitigation behavior that are and can be actively disseminated to the community by policymakers or resource managers. Wildfire risk data are available at the household/property level in both the Waldo Canyon Fire area and the High Park Fire area, but these risk data are communicated differently in each community and residents ascribe the data differing levels of importance. The most valuable source of information described by interview and focus group subjects was personal contact from "citizen entrepreneurs," or individuals who personally work within their communities to promote mitigation efforts.

[INSERT TABLE 1 ABOUT HERE]

Beyond the type and source of information related to fire risk and mitigation, it is next necessary to understand the dissemination approaches used by various actors in the case study communities and the relative success of these approaches for distributing information to residents.

RQ1b: How are communities distributing information related to wildfire risk and mitigation?
RQ1c: What are the most successful approaches to wildfire risk and mitigation information dissemination?

As shown in Table 2, meetings are a highly used form of communication, but they are ineffective in most instances due to low public turnout. Face-to-face contact by citizen entrepreneurs or neighborhood leaders is an effective and often-used approach to providing information to residents who often do not attend meetings or seek out information. Finally, the table shows that the role of agencies can be vital in both direct outreach to residents as well as in supporting residents with information and assistance when they seek it out, but that agencies may have limited resources.

[INSERT TABLE 2 ABOUT HERE]

It is clear that most communities need individual entrepreneurs to successfully disseminate information to residents. Whether these entrepreneurs are simply individual residents who began mitigating their own property or those that have learned how write Community Wildfire Protection Plans and obtain grants, their leading role in outreach, coordination, and planning in their neighborhoods is essential to promoting mitigation.

[4] Throughout this paper the code WC is used for quotations from Waldo Canyon Fire interview and focus group subjects, while HP is used to reference High Park Fire interview and focus group subjects.

"Your communities are so lucky to have you and unfortunately there aren't people like you in every community. If there were more people like you in Colorado, it would be much healthier." (WC)

"What's interesting in our community is that we have a lot of retired military. And so these colonels who used to run shooting ranges now are retired and they play golf, and this is their new mission in life, and they get out there." (WC)

"Grants play a huge role in the CWPP. And, honestly, very little has been done in my canyon. I've been a driving force in getting this done…" (HP)

"The same group of folks who didn't want us going up to do assessments decided that they were going to take it upon themselves to put in some fuel breaks. They used the CWPP maps to define where their highest hazard areas [were]… [and] were able to get grant funds to take care of it on their own. Excellent, but highly exceptional." (HP)

Not only do individual entrepreneurs rely on agencies for resources and guidance, but these agencies also are coping with limited capacity (resources, personnel, and sometimes political support). The success of agencies in accomplishing mitigation outreach and education also appears to be highly reliant on the presence of individual entrepreneurs within the agencies.

"Through this whole thing CUSP [Coalition for the Upper South Platte] is such a player. They have done almost all our mitigation." (WC)

"What [name of contact at fire department] does so remarkably well here is solicits grants, gets money, manages crews, knows what the prescriptions have to be, does the detailed planning, the reports, interfaces with the community." (WC)

"So educating the public is really important… I do that in my district and go out and have conversations with people." (HP)

"I go around to different networking groups and I talk about this so that, hopefully, they'll be educated about the preparation." (HP)

Beyond simply disseminating information and understanding its relative importance, understanding whether that information increases the likelihood that residents will choose to actively mitigate their property is central. Moreover, investigating the limits of information or incentives – the conditions under which risk information fails to move people to action – is another important part of the information dissemination picture.

RQ1d: What are the effects of received wildfire risk and mitigation information on mitigation behavior?

RQ1e: What limits or incentives exist that might make individuals more or less receptive to the mitigation information they receive?

Table 3 describes the most frequent mitigation responses observed by interview and focus group subjects and the common reasons for such responses, based on the availability of information about wildfire risk and mitigation (and the limits of that information, which will be discussed below). Many residents are described as not changing their mitigation behavior due to their individual perceptions, risk tolerance, or landscape values. Others, however, seem to be much more likely to choose to mitigate their property once they are aware of the wildfire risk that they face and the actions they can take to protect themselves and their property.

[INSERT TABLE 3 ABOUT HERE]

Insurance requirements or pressure, along with the availability of grants to help pay for mitigation costs, are frequently cited as important incentives or pressures that residents face with regard to mitigation on their property, as shown in Table 4.

[INSERT TABLE 4 ABOUT HERE]

Residents do, however, face various limits to the effectiveness of information on mitigation choices. In other words, even if residents receive and understand mitigation information, they may be prevented from taking action for a variety of reasons[5]. As Table 5 illustrates, individual perceptions about risk, wildland aesthetics, and the role of government can all intervene to limit the effectiveness of wildfire risk information. Additionally, risk information faces temporal barriers to effectiveness: residents are most receptive to mitigation information, and most likely to act on that information, within a year of a nearby fire. Both individual and group capacity can limit an individual's mitigation activity, regardless of the degree of wildfire risk that the individual faces on their property.

[INSERT TABLE 5 ABOUT HERE]

Finally, there are two variables that can act either to enhance or limit the effectiveness of information about wildfire risk and mitigation, as outlined in Table 6. For example, while local building ordinances such as fireproof roofing requirements can effectively encourage mitigation, they are incomplete incentives, since they typically apply only to new homes or to existing homes undergoing significant renovations. The role of government in facilitating, requiring, or encouraging mitigation behavior can also act either to enhance or limit the effectiveness of information.

[INSERT TABLE 6 ABOUT HERE]

Discussion

It may come as no surprise that residents' perceptions of wildfire risk are complex, and that the translation of their risk perceptions into on-the-ground wildfire mitigation action is more intricate still. Our interview and focus group subjects in the greater Colorado Springs and Fort Collins areas described wide variation in WUI residents' risk perceptions, risk tolerance, landscape

[5] Not addressed in this study is the role of landlord/renter relationships. These rental arrangements may have important influences with regard to limits and incentives to mitigation, but were not the focus of this study.

values, and personal motivation and capacity to mitigate. The results of this study also demonstrate heterogeneity in the types of wildfire information available in WUI communities, diversity in the channels used to disseminate that information, and variance in information's impact and effectiveness. Several common themes about successes and failures in information dissemination and use emerge from WUI residents' responses, however.

Constraints on Individual and Collective Capacity

When it comes to reducing wildfire risk in the WUI, individuals and policymakers face important barriers that are not easily surmounted by information alone. Our results demonstrate that information on wildfire risk does not always lead to mitigation action by individuals. Some WUI residents fail to thin the brush and trees on their property because they want to keep its "natural" wooded look. Others are fatalistic in their estimation of wildfire mitigation, convinced that it will not save their home from an oncoming blaze. Yet others are overwhelmed by the enormity of the task, are in denial about their risk profile, are well-intentioned procrastinators, believe that a past fire has made them safe, or do not want to be told (by the fire department, local government, or anyone else) what they should do with their property. Individuals, communities, and governmental bodies also face legitimate capacity constraints – financial and labor-oriented – that inhibit progress on wildfire mitigation. All of these realities, reported by WUI residents and resource managers, beg our overarching research question: *how does information dissemination and use influence perceived wildfire risk and mitigation behavior among WUI residents?*

WUI residents from both the Colorado Springs and Fort Collins regions answered our central research question by consistently emphasizing the importance of "the personal" in wildfire risk perception and mitigation action. According to our WUI resident focus group subjects, there is no better motivator for wildfire mitigation activity than the personal experience of smelling smoke from a nearby wildfire, being evacuated from one's home, seeing a burn area in person, or knowing somebody who has lost their home in a wildfire. This finding may be of little comfort to policymakers who hope to inspire wildfire mitigation through less extreme forms of risk communication, but there is good news to be found in the fact that the weight of "the personal" extends to personal communication as well. Where personal experience ends, personal contact appears to take on significant importance. Our focus group subjects cited face-to-face interactions with, and information from, neighborhood leaders – or, in policy diffusion terms, "citizen policy entrepreneurs" – as being the second most effective source of wildfire risk information to the lived experience of a close call.

Personal experience and personal contact are not failsafe methods for motivating residents to mitigate, however, since people react differently to close calls and various forms of personal contact. WUI focus group subjects reported that they personally were motivated to mitigate by the Waldo Canyon and High Park fires (or by earlier fires in their areas), but that some of their neighbors found false comfort in the freshly-burned buffers near their homes or grew fatalistic after seeing houses burn despite extensive mitigation efforts. Furthermore, when it comes to making personal, face-to-face contact on wildfire risk and mitigation issues, neighborhood or community meetings were reported to be much less effective than knocking on doors and emailing or calling neighbors. Attendance at fire district, community, and even HOA meetings was described as typically sparse unless there had been a recent wildfire in the area.

The Effectiveness of Formal versus Informal Roles for Government

Subjects reported maximum wildfire mitigation progress when local, state, and/or federal agencies worked to incentivize and even multiply personal contact between "citizen entrepreneurs" and members of their neighborhood or community. Wildfire risk information was most effectively translated into mitigation action when the fire department, state forest service, or U.S. Forest Service office encouraged the writing of CWPPs – either by providing expertise for small WUI communities and neighborhood associations, or by expressly writing a CWPP for WUI residents in city limits. Progress on mitigation went the furthest when a governmental body also contributed funding, labor, contractor coordination, and/or equipment to communities and neighborhoods working to reduce their wildfire risk. The amount of assistance received by each community or neighborhood varied based on local governmental capacity, specifically, by the fire department's ability to encourage and fund mitigation activities. Non-governmental organizations such as the Coalition for the Upper South Platte in Teller County played an important role in filling gaps in resources and capacity for rural communities.

To our surprise, the more formal governmental role of fire department as "wildfire risk assessor" generated mixed mitigation attitudes and results between our two case studies. In Colorado Springs, the city fire department assesses wildfire risk at the level of the household, assigning either a green, yellow, or red rating to every property inside city limits. The CSFD also makes these risk data publicly available so that residents can check their own risk profile as well as the risk profiles of their neighbors and neighborhood. Colorado Springs-area WUI residents reported being deeply affected by their property's risk rating and motivated to reduce their personal risk. In the Fort Collins region, the Poudre Fire Authority also conducts property-level wildfire risk assessments but communicates the risk data only to the individual resident. According to interviewees, the PFA risk data are not made publicly available because residents might not allow the assessments to be performed if they were, and because residents are concerned that the data might be shared with insurance agencies. Fort Collins-area WUI residents did not cite their risk rankings as being important sources of wildfire risk information.

The more formal governmental role of city or county as author and enforcer of building codes also produced mixed success, according to WUI residents. Because new ordinances generally apply only to new construction or to extensive home renovations, and because WUI lands are already heavily developed, this official route for mitigation is only partially successful. Where new building ordinances and individualized risk data fail to motivate mitigation action, insurance companies may ultimately play a backstop role. Rumors of future homeowner policy cancellations by insurers who deem certain neighborhoods too risky to cover without significant wildfire mitigation activity are spurring some WUI residents to action, according to our interviewees, who added that insurance cancellations may be the only event capable of compelling mitigation activity among the least motivated residents of the WUI.

Conclusions and Policy Recommendations

Several conclusions can be drawn from our results that may benefit policymakers and natural resource managers who seek to encourage residents living in the WUI to mitigate wildfire risk. Because local, state, and federal agencies operate with limited resources and capacity, it is crucial that policymakers and resource managers use the most effective wildfire mitigation strategies available to them. Our results suggest that formal governmental actions in the manner

of official risk assessment and the establishment of building ordinances are not, by themselves, enough to motivate widespread mitigation efforts within wildfire-prone communities and neighborhoods. More informal, information-based, governmental actions appear to generate greater on-the-ground wildfire mitigation success.

Indeed, the dissemination of wildfire risk and mitigation information is integral to mitigation success, but our results also suggest not all information or information dissemination strategies are received equally. Based on our subjects' experiences in Colorado Springs and Fort Collins, we conclude with the following preliminary recommendations for policymakers and natural resource managers working on wildfire mitigation in the WUI:

1. Because personal experience is a powerful motivator of wildfire mitigation activity, local WUI residents' personal stories of close calls or property damage may carry greater weight in wildfire information campaigns than risk rankings or other forms of risk communication.
2. WUI residents appear to be most open to wildfire risk and mitigation information in the roughly 12 months following a nearby wildfire, which suggests that information campaigns will be most successful if timed to coincide with these windows of receptivity.
3. Personal, face-to-face communication about wildfire mitigation between motivated "citizen entrepreneurs" and their neighbors may generate more mitigation activity than district, community, or neighborhood meetings, which may be sparsely attended.
4. Motivated "citizen entrepreneurs" can act as force-multipliers for agencies and fire departments and can spread mitigation information further than it would travel if disseminated only through official channels.
5. Incentives appear to generate more mitigation activity than governmental mandates. In particular, communities and neighborhoods with CWPP assistance and grant funding from a governmental body achieve the most on-the-ground mitigation success.

There are several limitations to the findings presented above that are important to acknowledge. First, while our choice to bound this cross-case investigation by state provided analytical strength by holding state regulations constant, our Colorado focus may also have obscured differences in information dissemination and use that would have emerged through comparisons between or among different states. Second, more interviews with community members would improve our ability to generalize our case study results. Third, surveys of wildfire professionals and WUI residents would generate quantitative results that could be analyzed statistically and generalized further. Future research will incorporate additional cases in other Western states, larger sample sizes, and surveys. We expect that expanding our cases and methods will allow us to capture the full breadth of variation in wildfire information dissemination in the West.

We hope that our findings and policy recommendations provide a basis for further empirical testing and theoretical elaboration on WUI governance and policy diffusion. On the individual homeowner level, future research should further elaborate upon individuals' differing responses to close calls from nearby wildfires, residents' differing perceptions of nature and what constitutes a "natural" WUI aesthetic, as well as the influence of political ideology and attitudes toward government on willingness to mitigate or receptiveness to formal governmental actions on wildfire mitigation. At the level of the community, it may prove valuable to further

investigate differences in the communication of property-level risk data and the effects of those differences on mitigation activity. From a policy diffusion perspective, our results suggest that individual neighborhood effects are as important to wildfire mitigation activity as bigger-picture municipal, county, state, or federal wildfire activities. Those neighborhood effects may be better constrained through survey research and geographic analysis of WUI proximity to a major municipality.

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Table 1. Important Types and Sources of Mitigation Information

Type	Waldo Canyon Characteristics	High Park Characteristics	Relevant Quotations
Personal experience	• The 2002 Hayman Fire was a turning point in local understanding of wildfire risk. • Residents smelled smoke around Colorado Springs and began to mitigate after this fire, although in an uneven and unorganized manner. • Being evacuated or knowing someone who has been evacuated due to a wildfire is an important experience that can lead to mitigation.	• People seem to be more "dialed in" to wildfire risk since a series of fires in the area beginning in 2000. • People often repeat friends' stories about houses burning, evacuations, and seeing signs of fire. • After a major fire occurs, some people become more motivated; however, others may think that the danger has passed.	"Hayman burn occurred and the interest spiked, even though all we were doing was smelling the burn." (WC) "It only took one fire and then we started… cutting the trees down around the deck… we started raking up the pine needles... this house we're building is probably as fire-proof as it possibly can get. "(HP)
Data about individual risk	• Colorado Springs Fire Department's individual property-level risk maps are important sources of information for residents. • These maps make people's vulnerability obvious to them, and sometimes reinforce the fact that, mitigation aside, some properties will always have a high fire risk because of their location and/or topography.	• Poudre Fire Authority assesses risk levels for homes. However, residents did not discuss property-level risk maps as being an important source of information. • Residents were most willing to have their risk assessed when personally approached by PFA. • Some volunteer fire districts see "grading homes" as a liability and a low risk rating may provide false comfort to residents.	"Each property … was color coded in terms of what the risk profile was. If you … saw that you were red and you thought that you should be green, that really shocked a lot of people." (WC) "We basically go out and assess homes… to determine their hazards and risks… it's password protected. So you can … get your own rating… but we're not going to make this public. " (HP)
Citizen "champions" or entrepreneurs	• Individual contacts made by "neighborhood champions" are important. • These champions send mailers, knock on doors, hold neighborhood meetings, write CWPPs, seek grant funding, and organize volunteers and contractors. • In Colorado Springs this is a formal program through the CSFD.	• Fire districts seek out HOAs and other community leaders to spread mitigation information. • Some communities become leaders in mitigation because they hold anti-government values and want to do mitigation themselves rather than being told what to do.	"Every new resident that moves into our neighborhood gets a welcome bag…Then our welcome committee visits them." (WC) "You really need a strong community up there with some real sparkplugs, and sometimes it really is just 1 or 2 people who …carry it forward for a community." (HP)

Table 2. Mitigation Information Distribution Methods

Method	Waldo Canyon Characteristics	High Park Characteristics	Relevant Quotations
Meetings	• Most neighborhoods hold meetings to distribute fire information, but very few people attend. • Immediately after a fire there is a spike in attendance and interest.	• Districts hold many events and meetings with a wide variety of content (from formal presentations to neighborhood tours and BBQs), but they are poorly attended.	"It's kind of ridiculous how little we get… we talk to other neighborhood champions who say the only contact they have is when they go door-to-door." (WC) "We held this event …but we had only 100 people out of what - probably 1,000 people or more … so a lot more of them could've shown up and should've shown up, but they didn't." (HP)
Face-to-face Outreach	• Neighborhood leaders are often the ones who take charge and meet with their neighbors, organize wood chipping events, and other outreach. • These leaders often organize grant writing and mitigation plans for their neighborhoods.	• Fire districts go out to schools with information, have conversations with residents, and bring wood chippers up to neighborhoods. • PFA brings equipment up when assessing properties to encourage citizens to participate in assessments.	"The other key part of it is the fire department would come out and assess your property." (WC) "We have people saying, '…now speaking to you … I want you to come up in here and do this for me, but I'm gonna call Fred. I think that he would like this too.' And pretty soon Fred calls Denise and the next thing you know we've got six people coming out to meet us saying, 'yeah come on in."(HP)
Agency Outreach and Responsiveness	• Colorado Springs Fire has limited staff and works through their "neighborhood champion" program as a force-multiplier. • U.S. Forest Service is helpful in providing expertise, but is limited by resources and their own sizeable mitigation tasks. • The Coalition for the Upper South Platte is an NGO working in the rural areas in Teller County to help obtain and manage grants and provide expertise.	• PFA has limited capacity for outreach; volunteer districts help with this in their own communities. • Resources from the Colorado State Forest Service level are increasingly limited; they do provide information and help with CWPPs. • Most funding from state and federal agencies comes through the grant process.	"The Colorado Springs Fire Department, they have a very small staff in their wildfire organization, so their target is the HOAs. Then, of course, their champions. I think by now there are well over 100… 120." (WC) "We just don't have the resources to do that, because [Colorado Spring's] urban-interface problem is really in the core, it's right there in the city. Ours is out in the sticks where we have volunteer stations. We can't send paid [firefighter] companies away from their response areas [for mitigation]." (HP)

Table 3. Effects of Mitigation Information on Mitigation Behavior

Effect	Waldo Canyon Characteristics	High Park Characteristics	Relevant Quotations
No Change	• Residents believe the danger has passed once a fire happens nearby. • Some residents begin to see tree cutting and back out of plans to mitigate for fear of losing the 'natural' look of their property. • Some residents believe that, because they've seen highly mitigated homes burn, mitigation does not matter.	• As in Waldo Canyon, some residents believe the danger has passed once a fire happens nearby, some balk at tree cutting on the property, and some believe that mitigation does not make a difference. • Some people seem to be in denial and fail to deal with the risk because it is too mentally taxing or overwhelming to cope with.	"After the burns happen, the people that were mitigating want to mitigate more. The people that didn't mitigate say, 'holy cow, it's happened. We're safe now, we've got this great buffer around us now, so… no big problem.' That's an issue." (WC) "You know, I've heard that…comment from people who just went through the fire and they were so thankful that their homes didn't burn that they want to believe that the fire danger is gone, at least for a few years. " (HP)
Increased Mitigation	• After a fire in the local area, especially where homes were lost, people begin mitigation at much higher levels. • Direct communication helps, but personal experience or social understanding through personal connections is the primary driver to increase mitigation.	• Direct communication with fire professionals helps with getting assessments done, but personal experience or social connections with individuals who have personal experience seems to be the primary motive for mitigation.	"Having that experience of being evacuated and moved out of your house is pretty unsettling… so from that, neighbors started getting together." (WC) "My wife wasn't too happy when I said it's time for us to go out and mitigate this brush and cut all the brush down… she feels differently today. She says, 'Oh, is it time to cut the brush?' Because that, essentially saved our home. And so, mitigation is important." (HP)

Table 4. Incentives to Information Affecting Mitigation Efforts of Residents

Incentive	Waldo Canyon Characteristics	High Park Characteristics	Relevant Quotations
Insurance	• Insurance companies are starting to pressure homeowners to mitigate, particularly when replacing roofs and renovating. • Isolated instances of homeowners being turned down for insurance due to wildfire risk have generated rumors that insurers will cut entire neighborhoods from insurance coverage areas. • Residents agree that if this happens homeowners will mitigate much more.	• Some homeowners have received insurance cancellation notices because they had piles of slash on their properties. • Residents expect to see more policies being cancelled for homes in high risk areas. • Insurance companies have not been interested in accessing risk map data from PFA. They have their own risk rating systems.	"The insurance companies have come down hard lately. You had a big article in the Gazette… about State Farm setting a precedent on defensible space and that others are going to follow suit. So that got some people's attention." (WC) "In December 2011, I received a cancellation notice because some 'yahoo' from our insurance finally decided to come up and look at our property, and because we have piles of slash all over property – because we're cutting down trees to mitigate fire!" (HP)
Grants /CWPP	• The availability of grants to help pay for mitigation on private property and neighborhood common spaces is a significant incentive to begin mitigation. • These grants are also the primary or sole reason that communities write Community Wildfire Protection Plans (CWPPs).	• The CWPPs primary purpose is to help districts and communities get grant money for mitigation work. • CWPPs are perceived to be useful sources of information, but residents rarely read them.	"So that's the incentive, 'how do we become a Fire Wise Community?' … and 'How do we get grant money'… so by bringing them resources and enticing them." (WC) "There are certain grants that if you want to get funding, they require you to have to CWPP in place. That's essentially the federal government saying, 'If we're going to give you money to do fuels management work, we want to know at least that you've given some thought as to prioritizing this… that you've had some basis to examine the overall issue and prioritize that.'" (HP)

Table 5. Limits to Information Affecting Mitigation Efforts of Residents

Limit	Waldo Canyon Characteristics	High Park Characteristics	Relevant Quotations
Perceptions & Ideology	• Some residents want to maintain their "natural" wooded lots, although there is acknowledgement that this is actually not the natural state of Colorado forests. • Some residents think they are safe once a fire happens. • Political ideology comes into play where Colorado Springs and surrounding areas have a general anti-government ideology and do not support stronger mitigation requirements.	• Some residents feel that they are safe after a fire burns the area because they think there isn't anything left to burn. • Some people move to the area for the "wilderness aesthetic" and want to keep it that way. • Some residents don't want government control or restrictions dictating how they mitigate. • It is hard for districts to communicate that mitigating improves wildfire risk, but doesn't guarantee protection.	"The City thinned a place in the Broadmoor… and the neighbors were totally upset because the trees had been thinned." (WC) "We try to mention to people, you know, 'We're trying to improve your odds here. You're more likely that your house will be saved if you do these things, but there are absolutely no guarantees because it depends on the nature of the fire when it reaches your house.'" (HP)
Window of Opportunity	• There is roughly a one-year time period after a major fire where information and outreach can reach residents when they are receptive to increased mitigation.	• Time after a fire is important for providing information, but this can be taxing on small districts where firefighters are both fighting fires and doing outreach. • Once the media shifts to a different event, interest is lost.	"The fire right by you is a great teachable moment kind of thing, but boy it dies." (WC) "You usually have a window after a catastrophe where people are more willing to listen to you… Less than a year." (HP)
Capacity	• Individual mitigation is limited by financial resources, age, or physical ability. • Agencies and groups are often limited by financial resources and personnel.	• As in Waldo Canyon, individual and group mitigation can be limited by manpower and cost. • Financial limits are particularly important for both individuals and organizations. • Individuals can have the best intentions, but put off mitigation activities anyway.	"There are a lot of folks who can't do mitigation because they just don't have the money or their priority on spending is somewhere else." (WC) "I'm not sure how much more we can do, you know the fire department – you're limited in the amount of funds you have to put out that information and then, like you said, there's a lot of people that don't want to hear it anyways." (HP)

Table 6. Issues that Limit and Encourage Information Affecting Mitigation Efforts of Residents

Limit	Waldo Canyon Characteristics	High Park Characteristics	Relevant Quotations
Ordinances	• Ordinances force people to begin mitigation or build more fire-resistant structures. • Ordinances typically get created after a fire, and are only in force for future development and major remodeling.	• Colorado's ordinances vary greatly by locale and may not be as strict as other states. • There is often debate about what is considered a re-build and how to handle that under building codes that require mitigation or fire-prevention in a politically feasible way.	"What we have is an existing problem. The ordinance only applies to reconstruction and new construction. There's only about 8% of the hillside left that's able to be built on." (WC) "Colorado has not adopted the fire codes and building codes [prescribed by the International Conference of Building Officials] in its entirety… I would venture to say that, in the next five years you're going to see a huge change in building code requirements and building materials – non-combustible roofs, you can still put up a combustible roof here in Colorado." (HP)
Presence and Role of Government	• There is a general attitude that government should have little, if any, role in regulating property and mitigation behavior. • Despite this, there is a high level of support for the efforts and presence of various local, county, and federal fire agencies that work with residents to promote mitigation.	• Residents have a general attitude of independence and desire for limited government intervention and regulation. • Residents have seen failures in government action such as FEMA and Forest Service resources being removed due to lack of funding. • However, the governments might be helpful for reforming building codes and providing money for mitigation through grants.	"I feel very lucky we live in the city… we have our neighborhood, we have the City, then we have the County, then we have the State. We have a lot of different layers." (WC) "You know, one of the things that people are working on now is improving the building codes and that sort of thing. A lot of us up in the mountains would just assume the governments stay away, but occasionally, they might do something good." (HP)