



Mitigation of Wildfire Risk by Homeowners

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Abstract—In-depth interviews conducted with homeowners in Larimer County's Wildland-Urban Interface revealed that homeowners face difficult decisions regarding the implementation of wildfire mitigation measures. Perceptions of wildfire mitigation options may be as important as perceptions of wildfire risk in determining likelihood of implementation. These mitigation options are often viewed as trade-offs between wildfire risk and preferred landscapes. Study participants reported, however, that one-on-one information sharing with fire experts as well as an increased understanding of the flexibility of mitigation options encourage implementation of wildfire mitigation measures.



Background

In the summer of 2003, we began studying how institutional incentives impact the decisions homeowners make to mitigate wildfire risk on their property. Hodgson (1996) has predicted that homeowners take action to reduce their risk of loss due to wildfire based on motive, means, and opportunity. Our research was originally designed to ascertain whether formal institutional arrangements, in particular homeowner insurance and government programs, provide incentives for homeowners to mitigate wildfire risk. While the original intent of the study was to focus on the role of institutional arrangements and incentives, our open approach led to a somewhat different study focus. When asking homeowners about the kinds of mitigation actions they were undertaking and their motivations for these taking these actions, we realized that formal institutional arrangements were not a major motivator for homeowners. Therefore, the interviews focused on informal social arrangements and other factors that homeowners told us were motivators for them to undertake mitigation efforts. Ultimately, the results of the study could be used to inform program implementers charged with encouraging homeowners to mitigate wildfire risk.

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To pursue the larger goal, we conducted semi-structured, in-depth interviews. This approach allowed us to explore and pursue the interests of individual homeowners as each explained what he or she knew about fire, fire risk, and fire mitigation. Rather than composing a pre-fabricated set of questions which binds the subject to confined answers, this approach allowed study participants to explain the justification and importance of these issues to them and their lives. It also facilitated the study participants guiding the research and the researchers.

Five communities in Larimer County were selected through the assistance of the Larimer County Wildfire Safety Specialist (CWSS), who has extensive experience working in wildland interface communities who face the threat of wildfire. With his expertise, the communities where study participants were recruited were chosen based on fire history and general level of mitigation activity.

Obtaining the Sample

Funding for this research was provided by the Front Range Fuels Treatment Partnership and the Rocky Mountain Research Station under Cost Share Agreement 03-CS-11221617.

Purposive or judgmental sampling was used to choose key informants. This non-probability type of sampling allows the researcher to "select a sample on the basis of knowledge of a population and the purpose of the study" (Babbie 2001). This approach in exploratory research ensures that a wide variety of perspectives are captured.

Characteristics of the communities and community leaders were used to determine which communities might represent a wide range of activity levels in response to the risk of wildfire. This process allowed us to choose communities that have had different proximities to large fires and different community and organizational characteristics.

Community leaders were identified by the CWSS and contacted for in-depth, semi-structured interviews. These interviews were intended to explore both individual level perception and behaviors regarding wildfire and wildfire mitigation for each community leader as well as community level information regarding structure, composition, and other organizational information. Interviews with community leaders were then used as a forum to ask for contact information for potential study participants.

The advantages of using this approach are several. Most importantly, the experience and work history of the CWSS made his expertise invaluable to this research endeavor. The CWSS is an expert in wildland fire and the threats to wildland-urban interface communities. Second, he has been working on wildland fire issues at both the community level and with individual residents. Third, his experience with these communities makes him a reliable expert in identifying key informants who can report on both community and individual level fire mitigation activity.

Despite these advantages, there are some disadvantages of this approach. Initial reliance on the CWSS for identifying key informants limited us to individuals who interact with the CWSS. This may be an issue since many interviewees suggested that government distrust is widespread among members of their communities.

Another possible disadvantage with relying on the CWSS to help identify key informants is that both formal and informal positions in such communities may be highly politicized. Several study participants reported that “small town politics” played a significant role in their communities, and the CWSS may not be privy to how these dynamics may facilitate or undermine participation among those identified, or more importantly, lead to biased suggestions for potential interviewees.

Finally, the researchers’ association with the CWSS, a Larimer County employee whose charge it is to promote wildfire mitigation activities, may lead study participants to report a higher level of mitigation behavior than actually practiced. Further, asking community leaders to identify those who do and do not engage in mitigation could appear to be a witch-hunt to those who do not participate.

Study Area

Larimer County has experienced a high rate of population growth in recent years. Between 1970 and 2000, the population of Larimer County grew 179 percent. As 50 percent of the County is public land (see figure 1), much of the population growth is occurring in the wildland urban interface.

Programs Available

All communities in our study have the option of accessing Larimer County’s Wildfire Safety Program grants, which are designed to “assist homeowners, homeowner groups and fire departments to reduce the threat of wildfire on their properties and districts.” These program grants function at both the community and individual homeowner level. For the community, the grants may assist in the development of community collection sites in which the material will be chipped or ground by outside contractors or by Larimer County personnel. Further, they may provide fire departments up to \$1000 to burn collected materials at the community collection site.

For individual homeowners, the grants may provide up to \$1000 for forest management work on their property and require a 50 percent match that can be accomplished with professional or volunteer workers. More information on this program may be found at http://www.co.larimer.co.us/wildfire/2003_grant.htm

Various communities have utilized existing organizational structures for fire education and to promote community-level activities. Interviews conducted in the summer and fall of 2003 were intended to explore homeowner knowledge, familiarity, and participation in such community-level activities.

Larimer County, Colorado

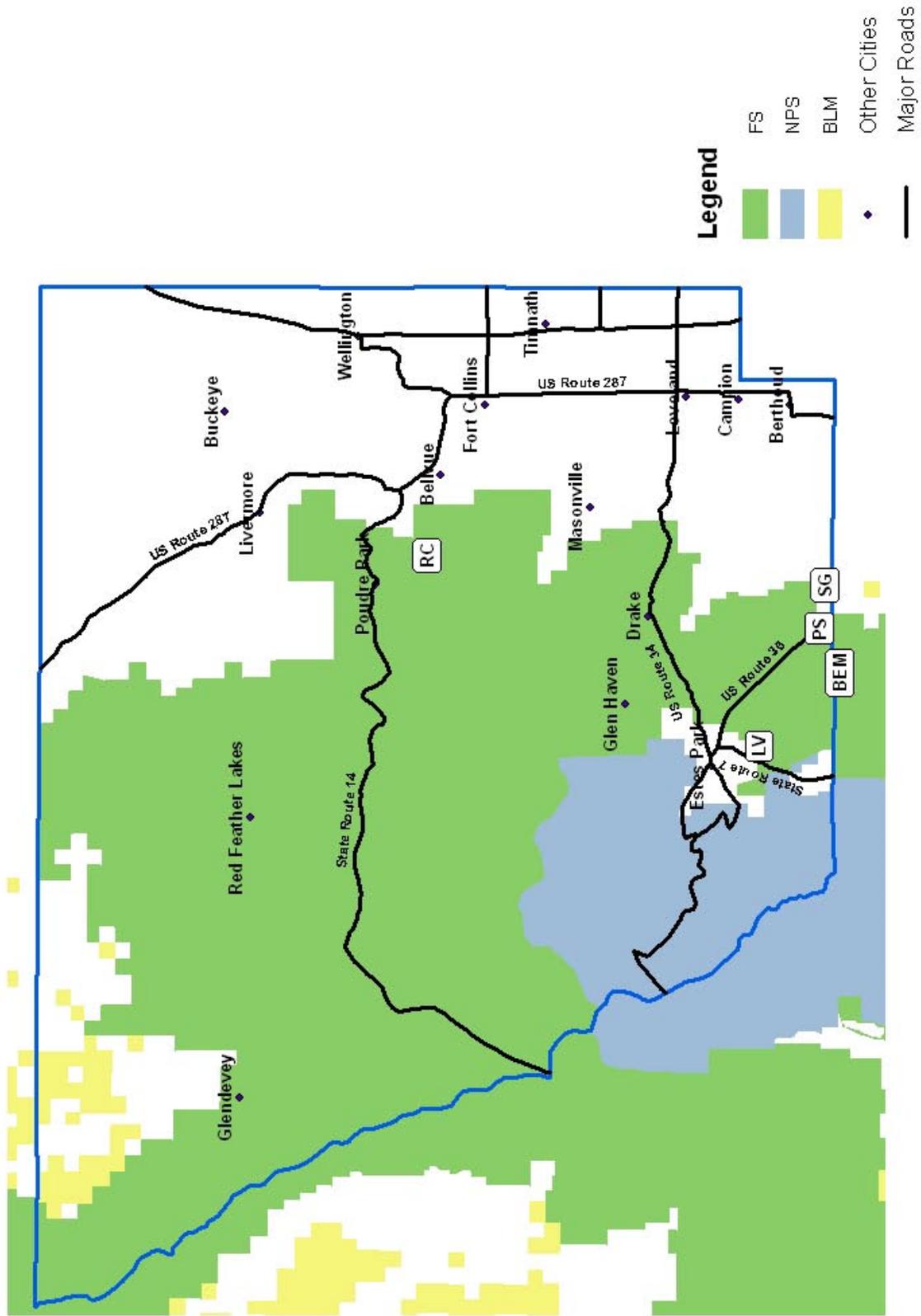


Figure 1—Public lands in Larimer County.

Community Descriptions

Five Larimer County communities were targeted based on their fire experience, proximity to recent fires, and community organizations. (See figure 1 for location of communities on Larimer County map.)

Big Elk Meadows (BEM)

Big Elk Meadows is a gated community on the Boulder County/Larimer County line. It is located off Highway 36, on County Road 47 (32 miles from Boulder, 26 miles from Longmont, and 14 miles from Lyons).

The community contains about 150 homes with 52 of those occupied by year round residents. The part-time residents stay for varying lengths of time and most of these residents visit during the summer season.

The total BEM private acreage is 400 acres. Most of the lots vary from 1/4 acre to 2+ (but usually under 3). Some homes are on two lots and the community has two large landowners: one with 35 acres, another with 30 acres. Big Elk also has common areas such as the lakes and a greenbelt of public area to the rear of all properties. National Forest land surrounds the community and there is one road that crosses the community.

There are two significant community organizations in BEM: the Volunteer Fire Department (VFD) and the Big Elk Meadows Association (BEMA). All study participants belong to the BEMA and many also belong to the VFD. Both organizations have publications that are released on an approximately quarterly basis, detailing community events and news. Through the homeowners' organization and the VFD, the Larimer County Wildfire Safety Specialist has supported a slash pile and education efforts. The homeowners are working directly with the Colorado State Forest Service on the slash site and the education efforts. The VFD burns the slash. About 60 percent of the homeowners participate in these efforts.

The VFD began building a fire station in the summer of 2003 and has been working to bolster its fire response capacities by applying for grants for improved equipment. The VFD is operated through donations from study participants as well as from outside sources. For example, the Cherryvale Fire Department in Boulder County donated one of the trucks used by the VFD in BEM.

The VFD relies heavily on volunteers to fight fires and support firefighters by controlling traffic, announcing evacuations and managing other fire related tasks. Since the Big Elk fire in 2002, the department boasts having 20 trained wildland firefighters and approximately 30 other volunteers.

The Big Elk fire struck the community in the summer of 2002, during which half the valley burned. It was evacuated twice through reverse-911 calls.

Little Valley (LV)

Off of Highway 36 and Fish Creek Road in the mountains just southeast of Estes Park, Little Valley rises out of the valley, affording amazing views of the Estes Valley. The community is surrounded by National Forest land and public access to both Johnny Park and Pierson Park is possible on Little Valley roads.

The community is composed of 76 property owners and approximately 80 lots, with lot sizes averaging less than one acre. Several members of the community own more than one lot and there are many undeveloped lots within the community. Approximately half of the homeowners are part-time residents.

The community has existed since the mid 1960s. The primary community organization is the Little Valley Home Owners' Association (HOA), though community members play important roles in the Road District that encompasses both Little Valley and the surrounding area between LV and 36. The HOA is active and boasts a high level of participation. In 2001, the HOA Board rewrote the community covenants, updating them to include strict restrictions on building and building materials in the community. The covenants were passed at a community meeting and more than 90 percent of the residents have signed on to the new covenants.

The HOA serves as the primary mechanism for organizing community events, many of which involve education about wildfire and wildfire mitigation and is considered a "success story" by the CWSS.

Little Valley received a reverse 911-evacuation order in the summer of 2002 in response to the threat of the Big Elk Fire. The community depends on the Estes Park emergency response services for fire protection and other emergency services.

Pinewood Springs (PWS)

Pinewood Springs is situated along the Highway 36 corridor that runs from Lyons (8 miles to the southeast) to Estes Park (13 miles to the northwest). This community also encompasses Estes Park Estates (EPE). While technically a separate subdivision, EPE relies on PWS for emergency services and is part of the same Fire District and served by the same Fire Board. EPE does have a distinct Water and Road Board. Lot sizes in PWS and EPE vary, with the average lot between 1-10 acres.

Primary organizations include Special Improvement District (Road Board) and Water Board, Fire Board, and Home Owners Association (HOA). The HOA is a small, voluntary organization that has historically played only a small role in community activities and organizing.

The Volunteer Fire Department of Pinewood Springs plays a role in fire risk and mitigation education, though the VFD's time is often consumed by activities related to Highway 36, such as motor vehicle accidents.

While this community has been generally characterized as inactive in terms of community level response to wildfire threat, interviews indicate that there was a flurry of mitigation activity in the summer of 2002, as the smoke and flames of the Big Elk fire were just over the ridge. During the fire, PWS received a reverse-911 prepare to evacuate call, but was never ordered to evacuate.

After the Big Elk Fire in 2002, there was much more interest in mitigation activities. In October 2003, PWS had a Wildfire Awareness Event. Volunteers from the Red Cross went door to door with the members of the VFD to invite homeowners to the Wildfire Awareness Event. The VFD began offering site assessments and subsidies for the work needed to mitigate properties, charging \$100 to implement the needed mitigation work (performed by volunteers from the Fire Department). The Larimer County Wildfire Specialist used money from the National Fire Plan (NFP) to match funds that the VFD collects such that the VFD receives both \$100 from each participating homeowner and \$100 from Larimer County. This has become a profitable fundraiser for the VFD.

The Larimer County Wildfire Specialist has also used NFP money to provide a chipper and crew to deal with the slash removed from properties. The program has been so successful (currently 43 homeowners have requested a site assessment) that the Colorado State Forest Service and the Larimer County Wildfire Specialist are training members of the VFD to do site assessments.

Rist Canyon (RC)

The Rist Canyon area includes Stratton Park, Davis Ranch, and Whale Rock northwest of Fort Collins. It is an area of approximately 90 square miles and has properties that average over 10 acres. Several property owners are tree farmers and may own over 100 acres. The area has about 750 households, though only 250-300 actually live in the community. The rest are absentee landowners or seasonal residents.

With 26 active volunteers, the VFD of Rist Canyon plays a vital emergency response role in the area. The VFD responds to motor vehicle accidents, health emergencies, and fire calls in a 120-square-mile response area. The Rist Canyon Volunteer Fire department receives no tax revenues. It functions based on public donations, a yearly art auction, and occasional grants.

Characterized as the "country club of Rist Canyon," the VFD also plays a vital social role in the area. Fire risk and mitigation education has been an important part of community activities and the VFD has organized a community collection site. The Larimer County Wildfire Specialist has funded the use of a chipper to process the slash from the collection site.

Spring Gulch (SG)

Spring Gulch is located off County Road 71, off of Highway 36 and just north of Lyons. The dirt roads of this community are private, limiting the number of non-residents in the area. Lots in Spring Gulch average around 12-15 acres though they can vary from 5 to over 50 acres. The high meadows and forested areas are marked by distinct rock outcroppings.

The residents of Spring Gulch have focused much more on preparedness for a wild-fire than on mitigation. The residents organized the 116 families into emergency groups for Y2K. These groups now constitute emergency groups, each with group leaders. Emergency measures that have been implemented in the community since the organization of these groups include a train whistle, which is sounded when a fire is spotted, and red flags that rest at the two entrances of the community that alert residents coming into the community if there is a fire. A Watchline, which allows residents to call in to receive up to date information of fires and other emergencies, was also established. During the Big Elk Meadow fire, the Watchline received over 900 calls.

In addition to the Emergency Preparedness Group (EPG), Spring Gulch has a Road Board that charges each household a yearly fee for road maintenance, which includes plowing and gravelling by volunteers in the winter and road base maintenance in summer. The community does not have a homeowners association or any covenants.

Spring Gulch's emergency services come from the Lyons Volunteer Fire Department. In 2003, the VFD worked with Larimer County Wildfire Specialist to set up a collection site. Colorado State Forest Service paid to chip and burn piles on private property. In 2003, there was apparently little to no interest in money from the Larimer County Fire Specialist or CSFS. The Emergency Preparedness Group has, however, worked with the Lyons VFD to learn what to do and not do in the event of a fire. When fires occur, members of the EPG meet the VFD at the entrance of the community to help the response team navigate the roads and arrive at the fire along the most efficient route.

The Interviews

Interviews with community leaders led to snowball sampling, in which each community leader was asked if he or she had contact information for individuals in the community who were both active and inactive in terms of fire mitigation. Each community has a community phonebook with names, addresses, and phone numbers, such that study participants were not strictly bound to only reporting acquaintances. It is anticipated, however, that the contact information given generally tended to represent those who were more active and socially involved in the community than those who were not. Anecdotal evidence supports this in that many study participants reported knowing of neighbors who did not mitigate, but the contact information for such residents was very difficult to obtain and once obtained, the response rate was extremely low. All of the study participants reported having done some kind of fire mitigation work on their property.

Sample

The sample consisted of 35 study participants obtained through 29 interviews representing 30 distinct households. The age of study participants varied from mid 30s to mid 70s with an average age in the early 50s. Almost all study participants were White, with one Hispanic (Larimer County is 93 percent White and Colorado is 83 percent White, according to US Census 2000). Nineteen of the study participants were women and 16 were male. While most of the interviews were one-on-one, five couples were interviewed together.

Methods

Interviews lasted from 45 minutes to 2 hours. All interviews were tape recorded and later transcribed. Contextual notes were taken by the interviewer and inserted into the transcripts during transcription.

Twenty-two of the interviews were conducted in the respondents' homes, three were interviewed at their workplace, and four were interviewed in alternative locations such as restaurants and coffee shops. Interviews in respondents' homes allowed the respondent to describe, point to, and show important topographical, land use, and proximity concerns. All interviews were opened with a general question regarding fire, fire

mitigation, and fire risk. This approach was used to allow respondents to define the issues that were most relevant to their understanding and response to fire in their community. After an initial dialogue had begun, the interview switched to a semi-structured approach in which basic demographic information was collected. This information was collected in a conversational style, allowing the respondent to explain and tell relevant information related to key themes that included:

- History of residence
- Experience with wildfire
- Knowledge of wildfire risk before and after moving to the WUI
- Knowledge of mitigation options
- Mitigation activities and motivation
- Perspectives on fire risk, insurance, responsibility

While the project began with a set of loose questions, it was approached as an exploratory research project, meaning that as issues emerged from interviews, they were incorporated and explored in subsequent interviews. Thus, while we began with an initial set of questions, these remained loosely defined and were intended to explore general themes more so than to extract particular information, ideas, or notions. These questions were subject to change, allowing the study participants to help shape the reformulation.

Findings

While this project originally intended to focus on the institutional factors, such as formal programs and homeowner insurance, that promote or impede wildfire mitigation activities, in-depth interviews revealed that homeowners were involved in a much more complex set of decision-making processes. While institutional factors reportedly play a small role, homeowners consistently stressed three non-institutional factors: (1) the informal social processes by which they learn about and form opinions about wildfire risk; (2) their perceptions of the biophysical landscape including fuel load and topographical features of their property, the community, and nearby public lands; and (3) perceptions of mitigation options particularly in terms of the efficacy of household adjustments in reducing the risk of wildfire ignitions and severity.

It was also clear that among the study participants:

- There is a fairly sophisticated understanding of fire, fire behavior, and fire risk.
- Generally, there is a sense that there is an abundant amount of information available about fire, fire mitigation, etc., but the process of implementation was reported to be the challenge. It was described as having an entire manual on how to fix your car: all the information may be available, but actually popping that hood and getting out the tools and getting to work is a daunting task.
- Study participants were very clear on reporting the biophysical characteristics of their properties including the lay of the land, location of the house, and proximity to unmitigated property as factors that they use to assess their fire risk.
- Though some study participants reported supporting insurance company plans to drop homeowners who do not properly mitigate according to their criteria, most study participants reported a sense of frustration and even betrayal at the idea. Some expressed concern that they have been paying into a system that is now obliged to cover them. Overall, however, study participants reported that they would change insurance companies if they are asked to make changes they weren't comfortable with.
- Many study participants reported having fire-contingency plans, though these plans vary considerably across households. Overall, study participants reported making lists to use to organize a quick evacuation. Some study participants reported having emergency mitigation plans in which if a fire comes and is truly threatening, they would cut favorite trees that they otherwise were unwilling to cut.
- Most study participants felt that their fire mitigation efforts have made a difference in terms of their fire risk, but those close to National Forest land reported feeling that their efforts will only prevent property damage if fire starts on their property, not if it starts on National Forest land.

- It was clear that study participants understood that wildfire risk does not occur on an individual property scale. Study participants suggested that mitigation on private properties, through the creation of defensible space, for example, would do little if that property were surrounded by private or public land, such as National Forest land, that was not mitigated. In some cases, such as Little Valley, this situation rallies some neighbors to get involved; among other study participants in the same community, however, it seems to leave a sense of “why bother?”
- Interviews with couples unexpectedly provided the opportunity to gain insight into the ways in which divergent attitudes between the couple on mitigation are discussed. Wildfire mitigation actions were the result of the couple negotiating on the issue. Rather than simply weighing out technical information regarding wildfire risk and mitigation options, decisions about cutting trees or making changes to landscapes appear to involve sentimental and emotional considerations that were clearly negotiated between married couples.
- Study participants reported concern with the number of access roads, the quality and accessibility of these of roads, and distances to services such as fire departments.
- One-on-one information tailored to a particular property seemed to move people to actually take action. This type of information was largely provided by the CWSS. Nonspecific general information, such as pamphlets or presentations at town meetings, did not emerge as information that motivated homeowners to take action.
- The source of information matters. Study participants said they trust the information they receive from the CWSS but are not sure if they would take action based on the advice of someone from the insurance company or other source considered to be less trustworthy.

Implications for Wildfire Mitigation Programs

The qualitative approach used in this study does not allow us to make generalizations about all Larimer County residents living in WUI communities. Given the diversity among these communities, such generalizations may not be appropriate in any case. Many of the study participants recognized the risk of wildfire and made some effort to reduce the risk on their property. The formal programs within Larimer County have likely contributed to this situation. It appears that the individualized information provided by the CWSS is what moves individuals who are ready to take action to actually undertake mitigation activities. Study participants felt they knew what they should do in general to mitigate the risk of wildfire but did not necessarily know how to go about actually developing and implementing a mitigation plan. The CWSS was mentioned by many study participants as an important person for providing the needed information. Individuals who had followed the advice of the CWSS expressed pleasant surprise with how flexible mitigation efforts could be and experienced some unexpected benefits such as improved wildlife viewing.

At this time, homeowner insurance does not play a big role in providing homeowners with incentives to mitigate. State Farm is threatening not to provide insurance to homeowners who do not mitigate their risk of wildfire. At the time of this study, none of our study participants had been threatened with the loss of their insurance. If it is possible to switch homeowner insurance due to such a threat, many homeowners said they would do that. If homeowner insurance is to provide incentives for homeowners to mitigate their risk of wildfire, it may need to be an industry-wide effort.

The fuel loads on proximate National Forests are important. Homeowners seem to have a sense of the landscape-level risk. Some homeowners cited the hopelessness of their own efforts given the current wildfire risk on an adjacent National Forest. While this issue needs to be investigated more formally, fuel treatment programs on public lands may provide incentives for homeowners to take action on their private lands. If a formal investigation finds fuel loads on National Forest lands impact actions on private lands, this is another issue that wildfire education programs could consider capitalizing on.

The emotional, non-rational aspect of mitigation decisions is important to consider when developing programs and dealing with homeowners. The provision of rational, scientific information may not be effective in this situation. As mentioned earlier, individualized information may be most effective.

Caveats

Overrepresentation of those who mitigate against fire risk

The sampling design deployed for this exploratory work was intended to assess homeowners' understandings and concerns regarding wildfire and their knowledge and willingness to engage in mitigation. As an exploratory project, the loose structure of the interviews allowed the study participants to lead the discussion and highlight issues that were most relevant to their wildland urban interface living experience. Ideally, we were interested in interviewing homeowners who were both enthusiastic and actively engaged in mitigation as well as homeowners who had the "let it burn" attitude that was so widely reported.

Contacting those skeptical of mitigation was difficult. While study participants willingly reported on neighbors who were emphatically against mitigation, when asked for contact information for these individuals, they were consistently unwilling or unable to provide such information.

Thus the sample obtained overwhelmingly consists of individuals who engage in or are supportive of mitigation efforts, at least at a general level, and includes several extremely active individuals. There were several study participants who reported engaging in only "some mitigation."

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