2

Wildland-Urban Interface Residents' Views on Risk and Attribution

Patricia J. Cohn, Daniel R. Williams,
and Matthew S. Carroll

Catastrophic wildfires that impact human communities have become increasingly common in recent years. To reduce the potential for damage to human communities, wildland-urban interface (WUI) residents have been encouraged to perform mitigation or firesafing measures around their homes and communities. Yet homeowners have not wholeheartedly adopted these measures, even after their communities have been struck by wildfire. Although some barriers to widespread adoption, such as the need for financial assistance and lack of knowledge, are being addressed, homeowner interest in adopting risk mitigation measures remains tepid.

One factor that may have a role in risk perception and response is the kinds of attributions community residents make regarding the source of wildfire ignitions and the resulting damage to resources and property. Daniel et al. (1997) note that emotional processes prevail during and shortly after wildfires, and people's reactions and comments regarding the event are thus formed in a more highly charged emotional state. Kumagai et al. (2004a) note that victims often oversimplify the causes of natural disasters and the resulting damage. This leads to a cognitive bias that tends to overemphasize the role of human agents other than themselves, such as firefighters or real or imagined human sources of ignition, in explaining the origins of wildfire events and concomitant damage. The authors go on to suggest that such attributions should be expected and recognized as being part and parcel of the psychological aftermath of major wildfire events. The net effect of such attributions, however, may be a misplaced focus on finding human agents to blame for wildfire risk or damage rather than a more constructive emphasis on

firesafing around homes and communities. Thus knowledge of these perceptions and an understanding of how they are formed can help take the focus off blaming others and impel residents and agencies to take responsibility for future prevention and mitigation planning and implementation (Kumagai et al. 2004a).

This chapter examines WUI residents' views on wildfire risk and the role of causal attribution in wildfire risk perception and response, both pre- and postfire. Social psychologists developed attribution theory in the 1970s to describe the kinds of causal explanations people give for events and the effects these explanations have on their judgments about, among other things, success and failure (Weiner 1986). One general finding is that people have a psychological need to assign responsibility for important events, but their judgments about the underlying causality often minimize personal responsibility for negative outcomes. The question here is how these attribution tendencies influence residents' responses to wildfire risk. To this end, we examine the results of six qualitative case studies of communities or sets of communities in the U.S. West conducted in the wake of wildfire events and address the following questions: Where do homeowners place responsibility for prefire mitigation—on their actions or the actions of others? Where do homeowners place responsibility for wildfire damage (to both natural resources and built property)? To what do homeowners who have experienced wildfires attribute the fundamental cause of the wildfire—the actions of self, others (management, perceived suppression policy), or natural conditions (weather, topography)? And finally, where do WUI residents place wildfire risk in the spectrum of risks in their lives, and how does this affect willingness to engage in prefire mitigation measures?

Background

The disaster and risk perception literatures are varied and diverse, but until recently, research on wildfire as a natural disaster and wildfire risk perception was uncommon. Several key themes in these literatures are applicable to wildfire risk perception and attribution: the risk perception gap between laypersons and experts; risk perception and motivation for preparedness; perceived nature of disaster events; recovery processes; and causal attribution, often leading to blaming behavior. All of these play a role in WUI homeowners' wildfire prevention or mitigation actions. The technological characteristics of wildfire and beliefs about its controllability contribute to risk perception and mitigation actions. A desire to place responsibility for the disaster event and resulting damage on the actions of others, rather than consider the role that one's own actions played, is especially prominent. WUI residents absolve themselves of responsibility through the attribution and blaming processes, regardless of whether these perceptions are accurate. Brief reviews of the above

themes are useful in developing an understanding of WUI residents' views and emotional reactions concerning wildfire damage, as well as determining what can be done to minimize its attendant risks.

Risk Perception Gap

The risk perception gap between experts and laypersons is well documented. Slovic (1987) detailed the approaches both groups used in perceiving and calculating risk and found that experts focus on quantitative aspects, such as the number of deaths or injuries that might be expected or the probability of an event happening, whereas laypersons incorporate both quantitative and qualitative aspects. In addition to considering the numbers, they focus on qualitative aspects of risk, such as ability to control the hazard, knowledge of the hazard, experience, and intuition. But perhaps more important, for laypersons, risk reflects individualized experience with the specific hazard and differs by place as they move from one locale to another. This is in contrast to a more technical, fixed risk that exists for a given place and hazard, such as a floodplain or a fire-prone forest, as perceived by experts (Burton and Kates 1964). This individualized risk perception may lead people to be overly optimistic, underestimate risk, and delay or fail to initiate preventive actions such as purchasing flood insurance or clearing trees: it allows them to reduce uncertainty or even eliminate the hazard by denying that it exists. In the WUI, residents have a "remarkable ability to live in hazardous places with relative equanimity—either by denying that a hazard is likely to occur or by discounting its potential impacts" (Beebe and Omi 1993, *22*), an observation echoed by Kumagai et al. (2004c).

Risk Perception and Motivation for Preparedness

Studies of risk perception about wildfire are beginning to emerge, although more is written about risk perception in relation to other types of natural disasters, such as hurricanes and floods. Experience with and awareness of the hazard appear to have a large influence on risk perception in general (Kasperson et al. 1988; Kunreuther 1978; Wenger 1978) and actions that WUI homeowners are willing to take or support in order to reduce the risk of or control the wildfire hazard in particular (Beebe and Omi 1993; Cortner et al. 1990; Shindler and Reed 1996; Winter et al. 2002).

Gardner et al. (1987) found that longer tenure among WUI landowners increased their awareness of the wildfire hazard. Those homeowners who had more opportunities to experience wildfires also supported preventive measures to reduce fire hazard, especially those that placed this burden on public resource management agencies. In another study, however, an experience with a prescribed fire-turned-wildfire left homeowners viewing wildfire as uncontrollable and randomly destructive. These WUI residents thus believed

that taking preventive measures to reduce wildfire damage would be useless (Winter and Fried 2000b).

Awareness and experience may be overridden by risk dampening—the tendency of those who have experienced a wildfire to assign a very low probability to the occurrence of another in the distant future (Gardner et al. 1987). This inclination to reduce the perception of future risk from environmental hazards has been noted in other studies as well (Halpern-Felsher et al. 2001; Kumagai et al. 2004c; Sattler et al. 1995).

Perceived Nature of Hazards and Disaster Events

Natural and technological hazards and disasters are characterized as low-frequency, high-consequence events (Kunreuther 1978; Pijawka et al. 1987–1988), and although they may share characteristics, they are perceived differently (Pijawka et al. 1987–1988). For example, Axelrod and McDaniels (1999) found that technological hazards and disasters, such as chemical spills, were perceived as having more severe impacts on humans, animals, and plant life than natural hazards. They also found that technological hazards were perceived as more avoidable and controllable than natural hazards, but the consequences of the latter were considered to be more visible, predictable, understandable, and comprehensible. Technology may be seen as more controllable than forces of nature; however, Baum et al. (1983) suggest that it is the *loss* of control that makes technological hazards seem riskier in the eyes of the layperson.

Wildfire has the characteristics of both natural and technological hazards and disasters (Beebe and Omi 1993; Kumagai et al. 2004a). Wildfire may be caused by an act of nature, such as a lightning strike, or by a human action. A wildfire and its course of action are certainly more immediate, visible, and comprehensible than a technological disaster. Weather and climate cycles and particular fire regimes are also factors in the natural domain. On the other hand, the technology associated with logging practices and wildfire suppression has been instrumental in creating the excessive fuel buildup and current forest conditions that are usually blamed for the catastrophic nature of today's wildfires (Beebe and Omi 1993). Suppression technology also may create a false sense of security, thus influencing the prefire mitigation or firesafing measures undertaken by communities and individuals. The successful use of such technology contributes to the belief among some WUI residents that all but the largest or most severe wildfires can be contained or controlled in most situations. Many rural residents also pay for fire protection via property taxes and expect a certain level of response and protection.

This dual natural-technological nature of wildfires also informs the postfire recovery and response (Carroll et al. 2005), and a community may experience both the social cohesion or "therapeutic community" commonly found after natural disasters (Cuthbertson and Nigg 1987; Quarantelli and Dynes 1976) and the social conflict found after technological disasters (Cuthbertson and Nigg 1987; Kroll-Smith and Couch 1990; Quarantelli and Dynes 1976).

Postfire Recovery Processes

Postfire recovery processes include restoration and rehabilitation of landscapes and human-built infrastructure and preparation and mitigation activities that address future events. In addition to the social cohesion and conflict that affect recovery, the particular social and physical attributes of the community, such as the level of political organization, economic base, local leadership, experience with the disaster, historical circumstances, and relationship with the land management agency, play a role (Carroll et al. 2005; Peterson 1999). Although reconstruction of damaged infrastructure, restoration and rehabilitation of the land (such as by erosion control and planting), and the recovery from emotional impacts dominate the recovery process, preparation for the next wildfire event, including maintaining risk perception and raising awareness, are vital.

Blaming Behavior

Blaming behavior is common after both technological and natural disasters (Quarantelli and Dynes 1976). A natural disaster may be an "act of God" and beyond human control, but if a responsible agency is perceived as being unaware of the impending event or failing to provide adequate warnings and preventive actions, the victims may resort to blaming. The field of social psychology tells us that there is also a tendency to find a human agent to blame or hold responsible after one experiences a severely disruptive event, such as a wildfire (Kumagai et al. 2004a, c). This blaming behavior is quite evident after wildfires, and perhaps the most obvious targets of blame are the igniters of a human-caused fire (Carroll et al. 2005). Affected residents often direct some blame at the land management agencies leading the wildfire suppression efforts, but not necessarily the firefighters themselves. The perceived inaction or ineffectiveness of firefighting strategies and tactics are often blamed for damage to personal property and the surrounding forest (Carroll et al. 2000, 2005; Kumagai et al. 2004a). Affected residents have also blamed federal land management agencies for prefire land management practices that they claimed led to unhealthy forests and a buildup of fuels (Carroll et al. 2005). Residents are less likely to blame themselves for failing to undertake adequate prefire preventive measures (Kumagai et al. 2004c).

Policy Issues

Risk perception also has a policy dimension. Wildland fire management is inseparably entwined with broader issues of forest policy; managing public

forest lands to reduce the risk of catastrophic wildfire is the latest chapter in a longer-running dispute over national forest management. In terms of wildfire, the debate is over how national forests arrived at their current condition. For some, current forest conditions are seen chiefly as a function of the reduction of active management generally, and logging in particular, on national forest lands. For others, fire exclusion and past silvicultural practices are the culprits. The debate continues over treatment methods for reducing fuel loads and catastrophic wildfire risk, such as mechanical treatment or prescribed burns. In sum, political views influence how one evaluates wildfire risk and assigns blame.

Methods

The data in this chapter are drawn from case studies of six communities affected by wildfires. The goal of that study was to discover the local social impacts of wildfire at different levels of organization: individuals, households, neighborhoods, and communities. From the larger study, we selected and analyzed the subsets of data relevant to this chapter—wildfire risk and the role of causal attribution in risk perception and response.

The interview data for these case studies were gathered and analyzed using grounded theory, a qualitative, inductive approach to understanding social phenomena (Glaser and Strauss 1999). The process builds an increasingly complex representation of the social dynamics under study through interview questions. In this approach, insights emerge from the data, in contrast to using data to test predetermined hypotheses. Typically, observed patterns emerge early in the data collection and interpretation process and are then tested with additional observations. Data collection is suspended only when patterns stabilize and no novel information is forthcoming from later observations (Strauss and Corbin 1990).

In total, 316 in-depth, semistructured interviews across the six cases were conducted by three experienced field workers. The use of a written question guide allowed for recording reliable, comparable narrative data (Bernard 1994) and the expression of a diverse array of views and personal experiences with wildfire that could not be found through the use of a survey or hypothesis testing approach.

Interviewees were asked about the following topics: economic and health impacts, property damage, preparedness, information and communication, community capacity, rehabilitation and salvage, attribution, and perceived wildfire risk. Interviews were tape-recorded and later transcribed verbatim. The interviews were coded using the AtlasTi (Scientific Software Development 1997) qualitative data analysis software program. The codes or themes emerged from the question topics; selected codes used for this chapter are risk, fundamental cause or attribution, resource and property damage, responsibility,

prefire mitigation, and risk spectrum. Because of the qualitative and inductive nature of the study, interviewees were selected using theoretical or purposive, rather than statistically based, sampling (Charmaz 2000; Glaser and Strauss 1999). Theoretical sampling focuses on identifying and then sampling from relevant categories of interview subjects rather than on the basis of their statistical frequency or distribution in the population. Thus categories of subjects relevant to the social phenomenon under study are identified and sampled, rather than subjects being randomly selected from a given population (Singleton and Straits 1999). Because it is purposive, this sampling method captures the diversity of stakeholders and viewpoints in a given population rather than focusing on a numeric estimate of the frequency of their occurrence. This approach allowed for the capture of a broader and richer range of local experiences from these fire events than would have been possible using random sampling. In these studies, the categories of interview subjects included firefighting personnel, evacuees, full-time and seasonal residents (some who suffered property damage, some who did not), local physical and mental health care providers, business owners, representatives of assistance organizations, and local, state, county, and federal government officials. Initial interviewees were selected on the basis of referrals from Forest Service officials, with additional names obtained via chain referral. Interviewing took place in the summer of 2002.

Study Areas

The wildfire events studied occurred in 2000 and 2002 in Arizona, Colorado, Idaho, two sites in Montana, and Utah (Table 2-1). The wildfires burned both public and private land in a variety of forest types and terrain and ranged from 8,000 to more than 450,000 acres in size. Three of the fires were human-caused, two were started by lightning, and one was of undetermined origin. Evacuations took place in several sites, and homes were lost in three of the study areas: Arizona, Colorado, and western Montana. Appendix 2-1 describes the communities and wildfires in more detail.

Each study area had one or more communities, which were as diverse as the wildfires that affected them and included interface subdivisions, resource-based communities, and vacation- or tourism-oriented towns. Only a few of them were incorporated, but all had some level of organization, such as homeowners' associations, school and fire governing boards, or community action groups.

All of the communities also had a relationship to nearby federal lands. Resource extraction from national forests in the form of logging and grazing had been an important part of the local economy in several sites. Residents in all communities exhibited a strong place attachment to the nearby national forest lands, which included favorite places for hunting, fishing, camping, and hiking that long had been used by year-round and seasonal residents.

TABLE 2-1. Summary of Case Studies of Communities Affected by Wildfires, 2000 and 2002

Communities	*Wildfires*	*Acreage*	*Population*[a]	*Evacuation*	*Number interviewed*
Show Low–Pinetop–Lakeside, Heber-Overgaard–Forest Lakes, Clay Springs–Linden–Pinedale, Arizona	Rodeo-Chediski complex	460,000	18,750	yes	76
Teller County, Colorado	Hayman	138,000	11,000	yes	55
Salmon, Idaho	Clear Creek and Wilderness complexes	400,000	3,100	no	56
Ashland, eastern Montana	Tobin and Fort Howes	68,000	500	no	43
Helena, Canyon Ferry Lake, Townsend, Basin, Montana City, western Montana	Canyon Ferry and Boulder complexes, and Maudlow-Tolston	137,000	14,400	yes	50
Santaquin, Utah	Mollie	9,000	5,000	yes	34

[a]Population of communities in study area.

Results

This section presents the results of the interviews with residents in the fire-affected case study communities regarding risk perception, attribution, property and resource damage, and mitigation measures.

Changing Perceptions of Wildfire and Risk

Technical definitions of risk often focus on the probability that a hazard, such as a wildfire, will occur. The primary focus of the interviews was on broad perceptions of the wildfire hazard and its potential consequences, with opinions on the probability of future fires often embedded in these perceptions. Interviewees were asked questions about their perception of wildfires and the possibility that a wildfire of a similar magnitude would occur in the future. Residents were asked if their perception of wildfires had been changed by the one they had recently experienced. For some, it had not; they stated that their respect for wildfires was strengthened, but they were not surprised by the extreme

behavior. Some of them accepted the role of fire on the landscape and thought it beneficial, whereas some still thought all fires were bad and destructive. For others, their perception of wildfires changed dramatically—they were in awe of the power, speed, and extreme behavior of wildfires and the resulting damage. They were more respectful and at the same time more fearful of wildfires. Quite a few noted that experiencing a wildfire close up left one feeling very vulnerable. These fire events raised the awareness of the wildfire hazard, their vulnerability, and the importance of mitigation measures. The extreme behavior, destructiveness, unpredictability, and uncontrollable aspects of wildfire strengthened people's fear and respect and made them feel less safe.

Yet despite this increased awareness, views were somewhat divergent about the possibility of a future wildfire, particularly one of a similar magnitude. People were aware of and stated that the nature of any specific fire would depend on the weather, the site-specific fuel conditions, and topography. Most respondents thought the possibility of any type of wildfire was very likely, but regarding a wildfire similar to the one they had recently experienced, some respondents in all sites said they had experienced their 100-year fire event and a wildfire of a similar nature would not happen again in their lifetimes. In Ashland and Salmon, most respondents thought that a future wildfire was inevitable but would not likely be as catastrophic, in part because everything, or all of the forest, had burned. Santaquin responses were more evenly split, with some respondents saying that the possibility of a future, but less extreme, wildfire was highly likely, and others that the possibility of another wildfire was low because everything had burned and future development would reduce fire risk, with less brush and more infrastructure.

In Colorado, most respondents thought that there would not be another fire of that magnitude for many years because there was nothing left to burn. The forest would not reach the prefire fuel conditions during their lifetimes. In Arizona, there were some geographic differences. Residents of the Show Low–Pinetop–Lakeside and Clay Springs–Linden–Pinedale community complexes overwhelmingly responded that, yes, there would be another fire of that magnitude in the future. In Heber-Overgaard–Forest Lakes, responses were split between "No, because there's no fuel/we've had our 100-year event," and "Yes, because there are many areas that didn't burn."

Recent experience with wildfire increased awareness of fire risk, the vulnerability of living in the WUI, and the potential use of mitigation measures in these communities. Yet many residents still thought that mitigation measures were unnecessary.

Causal Attributions about the Wildfire

Because the ignition sources of the fires were well established in most cases, the questions about the perceived origins of the event were phrased as follows: "What was the fundamental cause of the fire?" and "What was the fundamental

cause of the damage caused by the fire?" Several fundamental causes emerged: forest management and forest conditions, natural conditions, and human agents, such as federal firefighters and igniters.

Forest Management and Forest Conditions. Respondents said that existing forest conditions of dense, overstocked stands of small trees and high fuel loads contributed to the magnitude and intensity of the fires that affected their communities. What was in dispute was how the forests came to be in such a condition. A very small number of environmentally minded respondents claimed that years of fire suppression and silvicultural practices that favored the removal of large trees had led to those forest conditions. According to most other respondents, these forest conditions were the result of a lack of management activities by the Forest Service, such as prescribed burning, logging, thinning, and grazing. These activities had been curtailed over the last 15 to 25 years because of litigation by environmental groups.

This latter viewpoint was strongest in those communities that were traditionally resource-dependent: Salmon, Heber-Overgaard–Forest Lakes, and Clay Springs–Linden–Pinedale, as well as Colorado, which sustained heavy damage to human communities. There were no comments about environmentalist activism from Santaquin respondents, a community with no history of forest resource extraction. Respondents from the traditionally resource-dependent communities thought that because logging and thinning projects had not been implemented, fuel loads were abnormally high, and the resulting fire was more devastating than it might have been if the projects had taken place. In Salmon, some respondents also said that environmentalists had prevented some fire suppression activities from taking place in a timely manner, which in turn led to more damage. For example, environmental concerns prevented construction of firelines and the use of some waterways as sources for water drops. Respondents in this community also listed wilderness designation as a factor that restricted active management. Such comments were strongest and most frequent in the sites that had sustained the most damage or had a history of timber extraction: Idaho, Arizona, and Colorado.

Natural Conditions. Another attribution factor asked about was natural conditions, such as weather, topography, and fuels, and their contribution to the fire's magnitude and damage. In all sites, respondents noted that extremely dry conditions accompanied by strong or erratic winds, along with inaccessible or steep terrain, contributed to the magnitude of the fire. This was especially so in Colorado and Arizona; respondents there remarked on the years-long drought, which had left standing green trees that were "drier than kiln-dried lumber." They also exhibited a somewhat fatalistic attitude; a number of respondents noted that the actual ignition source could have been anything—a cigarette out a car window, an abandoned campfire, or a catalytic converter. The fire was bound to happen, "a time-bomb," according to one Arizona respondent.

Effectiveness of Firefighting. In some instances, respondents held the federally led fire management teams responsible for the damage to resources and human-built structures as a result of perceived ineffective firefighting tactics. In these cases, the federal firefighting teams were blamed for what respondents saw as a weak initial attack. Many respondents thought that the fire that affected their community was controllable in the early stages, and if the federal firefighters, who were the initial attack resources in most cases, had been more aggressive, the fires could have been put out while they were relatively small. But once the fires got going, nothing was going to stop them until they ran out of fuel or rain or snow put them out.

The most critical comments addressed the federal firefighting teams' perceived lack of use of the local resources of volunteer fire departments to protect residential areas. In this regard, the federal teams were accused of letting homes burn by not allowing firefighting equipment into threatened residential areas well before the fire arrived. Some respondents were aware of the recent pressure placed on federal firefighting agencies to avoid unnecessary risk to firefighters but nonetheless thought that homes and forest land would have been saved if federal firefighters had been more aggressive. In Ashland, rancher interviewees noted that in the past, they had always gone on initial attack, with or without the federal firefighters. In recent years, however, they had been told they could not do so because they did not have the basic firefighter training and red-card certification. The ranchers believed that if they had been allowed to go on the fires in question, they could have kept the fires to only a few acres. Many respondents also commented on the waste and inefficiency inherent in such large federal firefighting operations and about the daily shift changes and equipment checks that resulted in downtime when people and equipment were not being used, thus leading to additional property loss and damage.

In all sites, respondents commented about the seeming ineffectiveness of the firefighting and questioned the actions and motives behind some of the tactics. For example, respondents in several sites claimed that backfires were not conducted under ideal conditions and escaped, resulting in more unnecessary damage. In Santaquin, residents claimed the Forest Service lit a backfire that got out of control and started burning toward residential areas after the wind shifted. The seeming lack of communication and coordination among firefighting agencies, as well as jurisdictional squabbles, contributed to the perception of a lack of aggressiveness in the initial attack, according to respondents.

> I think it took them hours to decide what they were going to do because the fire started on the Indian reservation. And the Indians have control of the reservation and no one else can touch it. And I think that there were several hours' interval before they came to some kind of understanding and by that time it was just gone. . . . I believe that they said it took them 14 hours to come to an agreement.

Another common comment was that federal firefighters and local firefighters under federal command were sitting around and not doing anything. In the sites with the largest fires and most damage, many questioned why one house burned and not another, and why the fire suppression team leaders apparently turned away or delayed requesting equipment such as bulldozers or slurry bombers. Arizona respondents were quite critical, and several from the Heber–Overgaard–Forest Lake area thought that their community had been, in their words, sacrificed in order to save the economic hub of Show Low–Pinetop–Lakeside. Others believed that areas with expensive homes had received more suppression support than areas with mobile homes. There were also hints of conspiracy theories: the federal land management agencies allowed the fire to get so big in order to cause a lot of damage and "teach the environmentalists a lesson" or so that they could then turn over management of the now treeless land to the state.

Igniters. Another target of attribution in three of the fires was the person who started the fire, or the igniter. Western Montana, Arizona, and Colorado had human-caused fires. In western Montana, very little or no blaming behavior was directed against those who started the two human-caused fires. In Arizona and Colorado, however, respondents expressed much anger and disbelief over the events and a desire to understand how these fires had happened. In both places, a few respondents thought it would have been easier to accept the loss and damage if the fires had been caused by lightning instead of humans. And some isolated comments even expressed compassion for the igniters and what they were going through.

Colorado respondents exhibited disbelief that someone whose job it was to prevent fires had started such a devastating one. Some indicated that their anger was mollified or they had reached some resolution because of the arrest and arraignment of the igniter. In Arizona, an igniter was charged and later prosecuted for starting the Rodeo fire; charges against the igniter of the Chediski fire were dropped after an investigation. "Greed and stupidity" were listed as the motivations of these igniters. As in Colorado, respondents appeared to feel some satisfaction that one igniter was being punished, and they did not direct as much anger or blaming toward this person. Not all residents of the Heber–Overgaard–Forest Lake area had reached resolution, however. They had many questions over the sequence of events the igniter described, the subsequent actions of the rescuers, and the initial attack. Some expressed a desire for prosecution or an apology; others had moved on.

Assigning Blame. Attribution of the fundamental cause of the fire and the resulting damage was linked to several factors, with all but one (natural conditions) having a human component, giving respondents the opportunity to blame a human agent for the disaster. The blaming behavior was strongest in those sites that had sustained the most damage, Arizona and Colorado, giving

credence to Homan's remark that "the greatest need to understand comes from those that have experienced the greatest losses" (2003, *147*). This tendency to blame a human agent after a disaster or other severely disordering event is common (Kumagai et al. 2004c).

Resource and Property Damage

The amount of real property damage varied at each site and is briefly described in Appendix 2-1. Just as devastating as the loss of homes and property was the resource loss—the landscape, special places, and the big trees in particular. Interviewees mourned these losses and lamented that the area would never return to a prefire state in their lifetimes.

> There were pine trees up there that were hundreds of years old. I have probably hiked up there as much or more than anyone and there were pine trees up there that were huge, monstrous, that were 100–200 years old. They are gone and we will never see them again in our lifetime.

The question in the interview guide addressing responsibility for the damage asked, "Do you think anyone/any entity was responsible for wildfire damage? If so, who was responsible?" Most respondents generally viewed people—firefighters, the government, and homeowners—as responsible for resource and property damage. The bulk of the comments came from the areas that had sustained the most property damage—Ashland, western Montana, Arizona, and Colorado.

Some said that the firefighters were not aggressive enough in the initial stages, but others thought that they had done the best they could. Further, some respondents thought that firefighters, especially those from federal agencies, were limited in what they could do to save structures because of their training, equipment, limited numbers, and the extreme fire behavior.

Comments about government responsibility were similar to those addressing fundamental cause and forest conditions. In general, they said that if the federal firefighters had been more aggressive on the initial attack or had been actively managing the forests beforehand, the fires would not have been so damaging.

> If the consensus was to get back into harvesting timber and controlling fuel loads and getting on these fires in a quick response-type situation instead of a wait and see, I think a lot of things could be better.

Respondents admitted that homeowners had a responsibility to clean up their property and implement firesafing measures, and many acknowledged that those who lived in interface areas had to accept the risk of wildfire. No one stated, however, that his or her own actions or inactions resulted in damage. Interviewees noted that homeowners were responsible for obtaining insurance, and that residents in one site had not taken advantage of education

and information before the fire. Respondents from western Montana were quite adamant that WUI residents had to accept the risk of living in such areas and take responsibility for cleaning up their property to prevent or reduce damage from wildfires. Several said that they did not want their tax dollars to "pay for the stupidity or lifestyle" of people who lived in the woods and didn't prepare for fires.

As with the fundamental cause of the fire, respondents generally attributed property loss and damage to a human agent at some level, usually the suppression response or firefighting agency. Residents were willing to accept the risk of living in the WUI and the responsibility of undertaking firesafing measures, but they did not include themselves as responsible agents for damage to their homes and property.

Pre- and Postfire Mitigation Actions

Firesafing or mitigation measures were familiar to respondents in all sites, and all reported doing such things as keeping weeds down, having a greenbelt or gravel–dirt firebreak, trimming branches, and using fire-resistant building materials before their particular wildfire event occurred. They reported that firesafing messages were especially prominent after the fires, and that many residents thinned and cleaned their properties afterward. The most awareness and use of recommended measures occurred in the more heavily forested environments—western Montana, Arizona, and Colorado—which also had the most active firesafing and defensible-space programs. In fact, residents in the other sites, which were within city limits or in grasslands, sagebrush, oak brush, or other nonforested areas, thought that mitigation measures were more appropriate for those who lived in forested areas and were not necessary in the environments where they lived, where wildfires were believed to be more easily controlled. Yet even in the forested areas, people were reluctant to cut trees.

> You know, when you live out here, it's so nice to be around the trees; that is the whole point of being here. And that is why everybody . . . they build in the trees, don't want to knock the trees down.

This reluctance was due to a strong preference for a forested environment by full- and part-time residents and by their belief that thinning around their homes and on their properties would not have made a difference given the extreme fire behavior.

Preparing for the Next Wildfire

Respondents' comments about preparing for the next fire were interesting and reflected the oft-mentioned risk-dampening or dissipation effects. Most residents in all sites mentioned that the fire had raised their awareness,

but neither they nor their neighbors were taking additional firesafing measures beyond what they were already doing. "We are not to the point where we really have all that much risk. We are not right adjacent to a forest," said one respondent.

The exceptions are western Montana, Arizona, and Colorado. Although a number of residents did not think such measures were necessary, given that the forest around them was gone, others reported that the fire was a wake-up call. They were thinning trees and clearing brush and observed that neighbors were doing the same. Some communities were applying for grants and using incentives to get residents to undertake firesafing. Respondents commented, however, that it was emotionally difficult to cut trees. In Colorado, some comments reflected a fatalistic attitude: one respondent's house burned down despite having done "everything right." Another said that one could not prepare for a wildfire; to do so was to give up or invite a fire. Instead, you had to go about your business and hope for the best.

Risk Spectrum

This case study project asked no direct questions about where WUI residents placed wildfire risk in the spectrum of risks in their lives and its relationship to their willingness to engage in prefire mitigation measures. Nevertheless, some comments addressed this topic, and we coded them as issues of firesafing or ones that hindered or aided firesafing efforts, a few of which (such as risk dampening) were mentioned in previous sections. No obvious trends appeared across or within sites regarding barriers or aids to implementing firesafing measures by homeowners. Two themes did stand out, however: that residents needed to be more aware of their environment and that forested and unforested areas alike were flammable. WUI residents also had to change their attitudes about cutting trees. Residents liked the forested environment, wanted to be in a natural setting, and were reluctant to cut trees on their property, particularly if someone else told them to do so. This was said to be especially true of part-time residents in general and part-time Arizona residents in particular. Related to this was the opinion that it did not make sense to do firesafing measures if one's neighbors, including land management agencies, did not treat their property as well. As one respondent stated, "It is pretty hard to defuel around private property, if just next door to you are public lands with large amounts of fuel."

A few respondents commented that day-to-day life held more pressing things than undertaking firesafing, especially in the economically depressed sites of Salmon and Ashland. In the latter community, a couple of respondents felt strongly that the overwhelming social pathologies in the community and the surrounding area, such as drug and alcohol abuse, domestic violence, and unemployment, as well as the more pressing needs for health care and communications, made firesafing measures seem relatively unimportant.

Residents were familiar with existing firesafing programs in their areas, and many had attended workshops but had not followed through with work on their own homes. Some had requested on-the-ground advice or home assessments, which were not available in their communities; others needed help, both physical and financial, to do the work. Maintaining the firesafing work was listed as important.

One other trend was general agreement that homeowners were responsible for doing the prevention work on their own property, while land management agencies and state, county, and local governments were responsible for treating public land. Agencies were also responsible for planning, prevention and mitigation of interface fires, and fire education programs. County and local governments were singled out as being responsible for creating and enforcing building and zoning codes for interface areas. Some believed that such codes and policies would be more acceptable to local residents if they originated at the local or county level rather than from what respondents perceived as manipulative federal or state regulations. Public involvement and interagency or intergovernmental cooperation were deemed important. Insurance companies also had the role of offering incentives to homeowners for doing firesafing work.

When it came to paying for public and private planning, education, and firesafing work, there was common agreement that the various government entities should pay for the planning and education efforts, and the respective land or property owners should pay for the work done on their land. A few respondents in each of the sites thought that there should be subsidies or grants for residents, especially the elderly or those with a low income.

Throughout all the sites, it appeared that residents desired to attribute the magnitude, damage, or cause of the fires to others, the acts of others, or natural processes. Some acknowledged that blaming someone else felt good to some extent. Nevertheless, respondents did not link their own lack of action, such as in taking mitigation measures or using fire-resistant housing materials, or that of other residents to the resulting property damage. One Arizona respondent resented that outsiders had blamed affected residents for their losses because of their choice to live in the WUI. Throughout all of this blaming, respondents exhibited a need to understand what had happened and how human actions before and after the fires had contributed to the extent of the loss and damage independent of the ignition source.

In summary, respondents across all sites recognized a need to raise awareness of the flammability of their environment. The reluctance to cut trees because of a strong attachment to a forested environment was noted as a significant barrier to wider implementation of firesafing measures in some areas. Other, less significant obstacles included the need to maintain the firesafing or thinning work and the fact that wildfire risk and firesafing were relatively less important on the risk spectrum and less pressing than other needs and problems in the day-to-day lives of residents. Respondents

strongly believed that both public and private landowners had the responsibility of doing and paying for firesafing and fuel-reduction work on their respective lands.

Conclusions

In this chapter, we have attempted to characterize WUI residents' views of wildfire risk and reactions based on more than 300 interviews with residents of communities that have had recent experience with large, community-threatening wildfires. The respondents' understanding of wildfire risk was less likely to have been based on abstract and vicarious notions garnered from sensational media coverage, and more likely rooted in proximate and concrete, if not firsthand, experience. Thus if any residents of the WUI are capable of sober assessments of fire risk, respondents in this study should be so qualified.

Given this context, it may seem rather disheartening to note several factors that appear to dampen WUI residents' perceptions of and reactions to wildfire risk. First, the experience of a recent wildfire appears to lead to the perception that another fire is less likely to occur any time soon. This effect may be somewhat unique to wildfire, and with good reason. For many kinds of natural hazards, such as floods, hurricanes, and tornadoes, the underlying stochastic patterns of the events are unaffected by recent occurrences—in other words, they are statistically independent. In contrast, the occurrence of wildfires depends on fuels, which are indeed consumed by previous events, thereby reducing the near-term probability and severity of a future fire. Second, both interviews and anecdotal evidence suggest that homeowners are reluctant to invest in vegetative mitigation to reduce fire risk for aesthetic or lifestyle reasons. In contrast to other hazards, wildfire mitigation is not merely a matter of a one-time investment in improved building design and siting, but is a potentially expensive and never-ending investment in fire-safe landscape maintenance. Third, attribution theory teaches us that it is human nature to deflect responsibility for negative events. Here again, wildfire events seem particularly ripe for projecting blame elsewhere, as wildland fire management policy is hopelessly entangled with very contentious forest management policies and complex suppression tactics. Following attribution theory, it may be easier to blame the problem on a public failure to properly manage the forest and downplay the inherent risk of living in the wildland-urban interface.

Two key lessons of the relatively long history of hazards research, however, are that any risk perception gap between citizens and experts should not be simplistically attributed to an uninformed or irrational public; and the gap is not easily closed using education and outreach efforts (Slovic 1999b). First, it is not evident from our findings that residents are uninformed or irrational;

they may simply emphasize different factors in their assessment of risk. For example, when wildfire risk is placed within a larger spectrum of the everyday life of household members, other, more pressing risks may take precedence. Second, in the absence of specific research, professionals involved in wildfire risk mitigation appear to emphasize lack of awareness, knowledge, and incentives as barriers to mitigation and respond by investing in education and outreach targeting homeowners.

In his recent literature survey of the "risk-assessment battlefield," Slovic (1999b) identifies a variety of contextual factors to explain the risk perception differences between lay and expert groups. Both lay and professional judgments of risk are colored by emotion and ideologies. These differences contribute to a lack of trust, which Slovic sees as a key reason for the limited effectiveness of risk communication efforts; likewise, the strong human need to assign responsibility for events and outcomes described in attribution theory also underscores the importance of trust. As Slovic points out, an essential feature of trust is that it is a lot easier to destroy trust than to rebuild it. Trust-destroying events are more visible and noticeable and carry more weight than trust-building events. For example, trust-destroying news and information tend to be seen as more credible than sources of good news. Distrust, once initiated, tends to reinforce and perpetuate distrust.

In conclusion, we echo Slovic's argument that scientific literacy and public education are important but are not the central factors affecting residents' perception of wildfire risk. In the world of natural hazards, defining risk is as much an exercise in power as it is an effort to educate and inform others to see it the way the experts do: "Whoever controls the definition of risk controls the rational solution to the problem at hand" (Slovic 1999b, *689*). Thus risk management needs to redirect its focus away from closing the risk perception gap and instead on introducing more public participation into both risk assessment and risk management as a way of maintaining and restoring trust. This alternative model, emphasizing the social construction of risk, seems particularly appropriate given that wildfire risk is entwined with complex and contentious forest management issues and ideologies.

This chapter has identified some of the contextual factors that influence risk perceptions, suggesting that the public construction of risk is not wrong, uninformed, or irrational, but instead is the product of evaluating the risk situation in a different context. Strategies for increasing homeowner adoption of risk mitigation measures need to move beyond the communication, education, and persuasion approaches that currently dominate most efforts and focus more attention on maintaining trust before, during, and after wildfires, recognizing people's need to assign responsibility for negative events. Greater emphasis on public participation and dialogue may do more to enhance trust and shift residents' ideas of personal, household, and institutional responsibility than incentives for adopting mitigation measures.

Appendix 2-1: Descriptions of the Study Sites and Associated Wildfires

This appendix describes the six case study communities and the fires that affected them, and gives a summary of the resource and structure damage.

Santaquin, Utah: Mollie Fire

Santaquin is an incorporated bedroom community located 20 minutes' driving distance from Provo and one hour from Salt Lake City. It has a few small businesses, including a medical clinic, but most services are located in the Salt Lake City valley. The Mormon Church has a strong presence here, with four LDS churches. The city is divided into two areas by Interstate 15. The west side is the older part of town, with the city offices, businesses, and longtime residents. The east side, a newer residential area, is adjacent to Forest Service land and was threatened by the fire.

The Mollie fire occurred in August 2001 on undeveloped land on the east side of town. It was likely human-caused, but the investigation was inconclusive. Dry conditions and strong winds caused the fire to grow rapidly toward the subdivision, and some 30 households were evacuated. The fire threatened the community for about 12 hours before the wind shifted and blew the fire over the mountains and away from town. No homes were lost or severely damaged. The fire reached 8,000 acres and was declared contained after two weeks.

Teller County, Colorado: Hayman Fire

The Hayman fire affected several counties—Teller, Park, Jefferson, and Douglas—but this case study focused on Teller County, which experienced the most property damage in terms of both numbers of homes lost and real property value. This county also had the highest percentage of acreage burned (Graham 2003). Teller County is located in eastern Colorado, south of the Denver metropolitan area and west of Colorado Springs. The outlying, unincorporated subdivisions north of U.S. Route 24 and along State Route 67 were the hardest hit by the Hayman fire. These areas were evacuated for up to two weeks, and several subdivisions were severely damaged. Most of the 600 structures lost in the fire, including 82 of the 132 residences, were in Teller County subdivisions. The larger towns in Teller County—Woodland Park, Cripple Creek, Divide, and Florissant—had no structural or property damage from the fire.

The human-caused Hayman fire started on the afternoon of June 8, 2000; a Forest Service employee was charged with starting the fire. It became Colorado's largest fire in recorded history, at 137,760 acres. Extremely low fuel

moisture conditions brought about by several years of drought and high winds pushed the fire out of control in a short time and made it difficult to control. It was finally declared controlled on July 18 (Graham 2003).

Ashland, Montana: Tobin and Fort Howes Fires

Ashland is a small ranching community of 500 people on the eastern Montana plains, bordering on the Northern Cheyenne Indian Reservation. This unincorporated community has few services; most residents go to Billings, Montana, or Sheridan, Wyoming, for shopping and other needs. The St. Labre Mission School, a boarding school for Native American students, is the major employer in the area.

Ashland had two large fire complexes in 2000: the Tobin (9,000 acres) and Fort Howes (59,000 acres) complexes. These lightning-caused fires burned on national forest land to the east and south of Ashland, respectively. Four Forest Service outbuildings and one homesteader's cabin were burned, yet the biggest impact from the fire was the loss of grazing pasture for the 2000 and 2001 seasons. A few ranchers lost cattle in the fire, and most lost range improvements, mainly fences, as well. Some ranchers suffered additional damage later in the year, when severe rainstorms led to flooding and debris flows that closed local highways and streamed into pastures.

Salmon, Idaho: Clear Creek and Wilderness Fire Complexes

The national attention placed on the year 2000 fires in Salmon and Montana's Bitterroot Valley was superseded only by that on the Cerro Grande fire in Los Alamos, New Mexico. The lightning-caused Clear Creek and Wilderness fire complexes burned more than 200,000 acres each of national forest lands west of Salmon (population 3,100), from late June until snowfall in October. There was no fire damage within or near the town itself. Starting in July, the community was inundated with thick smoke, which did not abate until September. Residents experienced respiratory problems attributed to the smoke and described feeling depressed because they could not see any farther than across the street. The recreation and tourism industry in the area suffered, as sensationalized news stories that "all of Idaho was on fire" kept river runners, backpackers, hunters, campers, and other recreationists away. At the time of the study two years later, this sector had not fully recovered.

Navajo County, Arizona: Rodeo-Chediski Fire Complex

The Rodeo-Chediski fire complex started as two separate human-caused fires that eventually burned into one, burning almost 500,000 acres of forest on the Apache-Sitgreaves National Forests and the Fort Apache Indian Reservation in the Mogollon Rim country of Arizona. This was the largest

fire in Arizona history. Three distinct community clusters were affected by the fires: Show Low–Pinetop–Lakeside; Heber-Overgaard–Forest Lakes; and Clay Springs–Linden–Pinedale. The Rodeo fire started on June 18, 2002, and affected the first two community clusters; the Chediski, which started two days later, affected Heber-Overgaard and Forest Lakes. Extreme fire weather conditions, low fuel moisture, heavy fuel loads, and few firefighting resources contributed to the catastrophic nature of the fires. In all, 30,000 people in 10 communities, including all of those in the study area, were evacuated for up to three weeks (USFS 2002).

In the Heber-Overgaard area, 303 structures were lost, the greatest numeric loss of buildings of all communities affected by the Rodeo-Chediski fire complex. The Clay Springs–Linden–Pinedale communities and neighboring unincorporated subdivisions suffered the bulk of structural losses from the Rodeo fire: 166 structures in this area were burned, most (106) in the Timberland acres subdivision (Navajo County 2002). No structures were lost in Show Low and Forest Lakes.

Broadwater and Jefferson Counties, Montana: Canyon Ferry and Boulder Fire Complexes, Maudlow-Tolston Fire

The fires in the Bitterroot Valley received the most attention of Montana's fires in the year 2000, but many other fires occurred throughout the state. Broadwater and Jefferson Counties in western Montana were the sites of the Canyon Ferry and Boulder complexes and the Maudlow-Tolston fire.

The human-caused Bucksnort–Cave Gulch fires comprised the Canyon Ferry fire complex in Broadwater County, burning about 44,000 acres of private and public lands and destroying 13 homes in a residential and resort area at Canyon Ferry Lake near Helena. The Boulder fire complex burned more than 12,000 acres of state and private forest and grasslands near Basin and Montana City, in Jefferson County. The Maudlow-Tolston fire near Townsend in Broadwater County was started by sparks from a farmer's combine and burned more than 81,000 acres, including two structures (Pacific Biodiversity Institute 2000).

References

Axelrod, L., and T. McDaniels. 1999. Perceptions of ecological risk from natural hazards. J. Risk Res. 2(1): 31-53.

Baum, A., R. Fleming, and L.M. Davidson. 1983. Natural disaster and technological catastrophe. Environ. Behav. 15(3): 333-354.

Beebe, G.S., and P.N. Omi. 1993. Wildland burning: The perception of risk. J. For. 91(9): 19-24. Bernard, H.R. 1994. Research methods in anthropology: Qualitative and quantitative approaches. Walnut Creek, CA: Alta Mira Press

Burton, I., and R.W. Kates. 1964. The perception of natural hazards in resource management. Nat. Resour. J. 3: 412-441.

Carroll, M.S., P.J. Cohn, D.N. Seesholtz and L. L. Higgins. 2005. Fire as a galvanizing and fragmenting influence on communities: The case of the Rodeo-Chediski fire. *Soc. Nat. Res.* 18(4): 301-320.

Carroll, M.S., A.J. Findley, K.A. Blatner, S. Rodriquez-Mendez, S.E. Daniels, and G.B. Walker. 2000. Social assessment for the Wenatchee National Forest wildfires of 1994: Targeted analysis for the Leavenworth, Entiat, and Chelan Ranger Districts. Portland, OR: USDA Forest Service Pacific Northwest Research Station, Gen. Tech. Rep. PNW-GTR-479.

Charmaz, K. 2000. Grounded theory: Objectivist and constructivist methods In Handbook of qualitative research, eds. N. K. Denzin and Y. S. Lincoln. Thousand Oaks, CA: Sage, 509-535.

Cortner, H.J., P.D. Gardner, and J.G. Taylor, 1990. Fire hazards at the urban-wildland interface: What the public expects. Environ. Manage. 14(1): 57-62.

Cuthbertson, B.H., and J.M. Nigg. 1987. Technological disaster and the nontherapeutic community: A question of true victimization. Environ. Behav. 19(4): 462-483.

Daniel, T.C., Meitner, M., Weidemann, E. 1997. Human desires and fears in ecologically rational wildland fire management. In Fire effects in Southwestern Forests: Proceedings of the second La Mesa Fire symposium, ed. Allen, C.D. GTR RM-286.

Gardner, P.D., H.J. Cortner, and K. Widaman. 1987. The risk perceptions and policy response toward wildland fire hazards by urban homeowners. Landscape Urban Plann. 14: 163-172.

Glaser, B.G., and A.L. Strauss. 1999. The discovery of grounded theory: Strategies for qualitative research. New York: Aldine de Gruyter.

Graham, R. (ed). 2004. Hayman Fire case study. Ogden, UT: USDA Forest Service Rocky Mountain Research Station, Gen. Tech. Rep. RMRS-GTR-114.

Halpern-Felsher, B.L., S.G. Millstein, J.M. Ellen, N.E. Adler, J.M. Tschann, and M. Biehl. 2001. The role of behavioral experience in judging risks. Health Psych. Special Issue. 20(2): 120-126.

Homan, J. 2003. The social construction of natural disaster: Egypt and the UK. In Natural disasters and development in a globalizing world, ed. M. Pelling. London: Routledge, 141-156.

Kasperson, R.E., R. Ortwin, P. Slovic, H.S. Brown, J. Emel, R. Goble, J.X. Kasperson, and S. Ratick. 1988. The social amplification of risk: A conceptual framework. Risk Anal. 8(2): 177-187.

Kroll-Smith, J.S., and S.R. Couch. 1990. The real disaster is above ground: A mine fire and social conflict. Lexington, KY: The University Press of Kentucky.

Kumagai, Y., J.C. Bliss, S.E. Daniels and M.S. Carroll. 2004a. Research on causal attribution of wildfire: An exploratory multiple-methods approach. Soc. Nat. Resour. 17: 113-127.

Kumagai, Y., S.E. Daniels, M.S. Carroll, J.C. Bliss, and J.A. Edwards. 2004b. Causal reasoning processes of people affected by wildfire: Implications for agency-community interactions and communications strategies. West. J. Appl. For. 19(3): 184-194.

Kunreuther, H. 1978. Disaster insurance protection: Public policy lessons. New York, NY: John Wiley and Sons.

Navajo County. 2002. Listing of affected structures. http://www.co.navajo.az.us/Rodeo-Chediski%20Fire/StructuresDamagedTally_NCBOS.pdf.

Pacific Biodiversity Institute. 2000. Assessment of summer 2000 wildfires: Landscape history, current condition, and ownership. http://www.pacificbio.org/pubs/wildfire2000.pdf

Petterson, J. 1999. A review of the literature and programs on local recovery from disaster. Federal Emergency Management Agency Natural Hazards Research Working Paper #102. Boulder, CO: Natural Hazards Center.

Pijawka, K.D., B.A. Cuthbertson, and R.S. Olson. 1987-88. Coping with extreme hazard events: Emerging themes in natural and technological disaster research. Omega. 18(4): 281-297.

Quarantelli, E.L., and R.R. Dynes. 1976. Community conflict: Its absence and its presence in natural disasters. Mass Emerg. 1: 139-152.

Sattler, D. N., M.G. Adams, and B. Watts. 1995. Effects of personal experience on judgments about natural disasters. J. Soc. Behav. Personality. 10 (4):891-898.

Shindler, B., and Reed, M.A. 1996. Forest management in the Blue Mountains: Public perspectives on prescribed fire and mechanical thinning. Corvallis, OR: Department of Forest Resources, Oregon State University.

Scientific Software Development. 1997. Atlas Ti: Visual qualitative Data analysis management and model building, Version 4.2. Berlin.

Singleton, R.A., and Straits, B.C. 1999. Approaches to social research. New York: Oxford University Press.

Slovic, P. 1987. The perception of risk. Science. 236(4799): 280-285.

Slovic, P. 1999. Trust, emotion, sex, politics and science: Surveying the risk-assessment battlefield. Risk Anal. 19(4): 689-701.

Strauss, A. and Corbin, J. 1990. Basics of qualitative research: Grounded theory procedures and techniques. Newbury Park, CA: Sage Publications.

United States Forest Service (USFS). 2002. Rodeo-Chediski Post Fire Information, Apache-Sitgreaves National Forests [online]. http://www.fs.fed.us/r3/asnf/.

Weiner, B. 1986. An attributional theory of motivation and emotion. New York: Springer-Verleg.

Wenger, D. 1978. Community Response to Disaster: Functional and Structural Alternations. In. Disaster: theory and research, ed. Quarantelli, E.L. Beverly Hills, CA: Sage Publications,17-48.

Winter, G.J., and J.S. Fried. 2000. Homeowner perspectives on fire hazard, responsibility, and management strategies at the wildland-urban interface. Soc. Nat. Resour. 13(1): 33-50.

Winter, G.J., C. Vogt, C., and J.S. Fried. 2002. Fuel treatments at the wildland-urban interface: Common concerns in diverse regions. J. For. 100(1): 15-21.

Citation: Cohn, P., Williams, D. R., & Carroll, M. 2008. *Wildfire risk and attribution: Viewpoints of wildand-urban interface residents.* In W. Martin, C. Raish, & B. Kents (Eds.), Wilfire risk: Human perceptions and management implications (pp. 23-43). Washington, DC: Resources for the Future.