Wildfires, Communities, and Agencies: Stakeholders' Perceptions of Postfire Forest Restoration and Rehabilitation

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Wildfires, Communities, and Agencies: Stakeholders' Perceptions of Postfire Forest Restoration and Rehabilitation

Robert L. Ryan and Elisabeth Hamin

ABSTRACT

After wildfire, land managers are often called on to undertake complex restoration activities while also managing relations with wildfire-devastated communities. This research investigates the community–US Forest Service agency relations in the postwildfire period in three western US communities. In each community, we interviewed key informant representatives from government, business, environmental organizations, and recreation groups and conducted focus groups to gather input from residents located near burn areas. The goal was to understand how forest restoration and rehabilitation efforts and agency outreach were perceived by stakeholders who were recently affected by wildfire and how these perceptions were related to underlying community and fire conditions. Our findings suggest that four vectors interact to determine the level of expectations and need for agency–community engagement in the postfire period: (1) the extent and characteristics of the fire; (2) community economic, recreational, and emotional connection to the forest; (3) the history of agency–community relations; and (4) the level of volunteerism in the community. We provide a schematic of different types of collaboration relevant to the postfire period in which, generally, residents preferred action-oriented collaboration, while other agency personnel were more amenable to collaborative planning. On-the-ground volunteer restoration activities helped restore community spirit and improve agency–community relations, and increased education and outreach were desirable. The model developed in this research argues for agency responses that consider both the social and the ecological communities when planning postfire restoration projects.

Keywords: wildland–urban interface, western United States, postwildfire forest rehabilitation, collaborative planning, place attachment and natural resources

Communities' experiences with wildfire can be divided into prewildfire planning for prevention and mitigation, the trauma of the fire itself, and postwildfire restoration and rehabilitation of both the forest and the community itself, both physically and socially. Significant literature has been developed on prefire community and agency engagement, but the issues that arise in the postfire period are less well explored. Although many findings may be the same, others may be different; a general goal of this research is to contribute to the emerging scholarship of postwildfire community and agency engagement. The research uses key informant (KI) interviews with local experts and community leaders and focus groups with the public living near to postwildfire areas to investigate what makes the postfire period relatively positive in terms of community–agency relations. To help forest managers in their efforts to restore both forests and communities after wildfires, this research explores stakeholders' perceptions of postfire forest restoration and rehabilitation in three western communities with a focus on the planning/outreach process and management outcomes.

Background

Reasons to Restore the Forest. Traditionally, forest managers were responsible for preventing forest fires but not necessarily for revegetating the forest after a fire except in the case of high-production timber areas.

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Intervention efforts by the US Forest Service's Burned Area Emergency Rehabilitation (BAER) programs have focused on minimizing soil erosion on burned areas and protecting water quality in nearby streams and rivers (Richards et al. 1998, Robichaud et al. 2000). Recently, the growing population of seasonal and year-round residents near public forestlands means that foresters in wildland–urban interface regions perceive postfire treatments as essential to reduce threats to life and property (Robichaud et al. 2000). Moreover, given a historic policy of fire prevention, many wildfires now are more catastrophic and thus negatively impact scenery (Taylor and Daniel 1984), ecology, and forest commodity productivity, increasing the impetus for costly restoration activities. Implicit in this is the assumption that the public agencies have a duty to rehabilitate the forest, but there is little research to date to say that the public clearly has that expectation. Research does suggest that postfire forest rehabilitation efforts may prove to be just as critical and contentious as hazard reduction and fire management efforts conducted before a fire (Winter et al. 2002), particularly if they involve salvage logging (Graham 2003, Mendez et al. 2003, Robbins 2003, although see Ryan and Hamin [in press] for an alternative perspective). With regard to when and where to take action, the public expects more fire suppression and prefire mitigation action at the wildland–urban interface where structures and lives are at risk (Winter and Cvetkovich 2008, Gardener et al. 1987). However, certain management strategies such as prescribed fire are very controversial near existing communities (Winter et al. 2002). Shindler and others (2002, p. 4) discuss the need for land managers to understand the social acceptability of forest management practices, which they define as an "aggregate form of public consent whereby judgments are shared and articulated by an identifiable and politically relevant segment of the citizenry." The social and ecological context of nearby communities is critical to stakeholders' perceptions and acceptance of postfire rehabilitation (Sturtevant and Jakes 2008). Despite an overall decline in trust in government, the public continues to look to the US Forest Service and related land-management agencies to take the lead in fire management (Gardener et al. 1987, Cohn et al. 2008, Winter and Cvetkovich 2008).

The social characteristics of a community may influence responses to fire management decisions (Winter et al. 2002, Cohn et al. 2008, Sturtevant and Jakes 2008). Communities with more social capacity are better poised to respond, plan, and collaborate with agencies about wildfire (Steelman et al. 2004). A community's economic reliance on the forest may also be a factor. One study found more support for particular postfire action, such as salvage logging and other extensive thinning treatments from business groups and more natural resource-based communities than from more tourism-based communities (Mendez et al. 2003).

Literature suggests that professional positions, economic interests, and worldviews and values all can influence public perspectives on appropriate policies for forest management (Winter and Cvetkovich 2008). Experts and agency personnel tend to be more supportive of more-intensive forest management than is the general public or those with environmental advocacy orientations (McCool et al. 1986, Ribe 2002). The closer the alignment of personal goals and values and those of an agency, the stronger the public support for agency fire management action (e.g., Winter and Cvetkovich 2008). Thus, we would expect to find differences in attitudes between different stakeholder groups in the current study.

Community–Agency Outreach and Collaboration. In prewildfire planning, research suggests a need for increased communication and collaboration with local residents about fire recovery plans (Daniels et al. 1996, Machlis et al. 2002, Burns et al. 2008). The goal of collaborative planning is to improve decisions, build support for the forest planning process and subsequent plans, and reduce the likelihood of appeals and litigation (Daniels et al. 1996, Wondolleck and Yaffee 2000, Blatner et al. 2001). Sturtevant and Jakes (2008) studied both fire-affected and threatened communities and propose a model of collaborative planning that encompasses several key factors, including the community's social and ecological context, the collaborative process, and outcomes. Daniels et al. (1996) argue that the postfire period is a good opportunity for managers to engage in collaborative fire planning. Less research has been conducted on evaluating the collaborative actions taken during the postfire recovery period (Blatner et al. 2001).

Residents of postfire communities may be more receptive and interested in engaging in mitigation strategies to reduce future wildfires (Gardner et al. 1987, Sturtevant and Jakes 2008, Burns et al. 2008). However, Cohn et al. (2008) found that those who have experienced a recent fire believe that fire danger is lessened and thus are less willing to undertake mitigation; likely, the differences between these studies are based on the unique characteristics of each fire experience. The public's receptivity to agency communication and attitudes toward prefire mitigation is affected by their previous experience and trust with the agency (Shindler and Toman 2003). Likewise, a community's relationship and prior history with an agency may affect perceptions of postfire recovery (Carroll et al. 2005, Sturtevant and Jakes 2008).

Volunteerism, Place Attachment, and Connections to Postwildfire Restoration. Many people have a strong emotional connection (i.e., place attachment) to public lands, including particular special places in nearby forests (e.g., Williams et al. 1992, Mitchell et al. 1993, Ryan 2005). Land managers have used volunteer stewardship programs to help build a connection between local residents and nearby forests and other natural areas (Grese et al. 2000, Ryan et al. 2001). The devastation of a community and its forests by wildfire is a traumatic event that can have a significant impact to a community's special places (Burns et al. 2008, Cohn et al. 2008, Sturtevant and Jakes 2008). Burns and others (2008) found that implementing postfire forest restoration plans with volunteers was a key strategy to help a community recover from a major fire. These collaborations focused more on implementation rather than forest planning per se. It is important for foresters to know in what manner postfire volunteer efforts rebuild the connection that local resident have for nearby public lands.

Summary of Existing Literature. In summary, previous research has shown that

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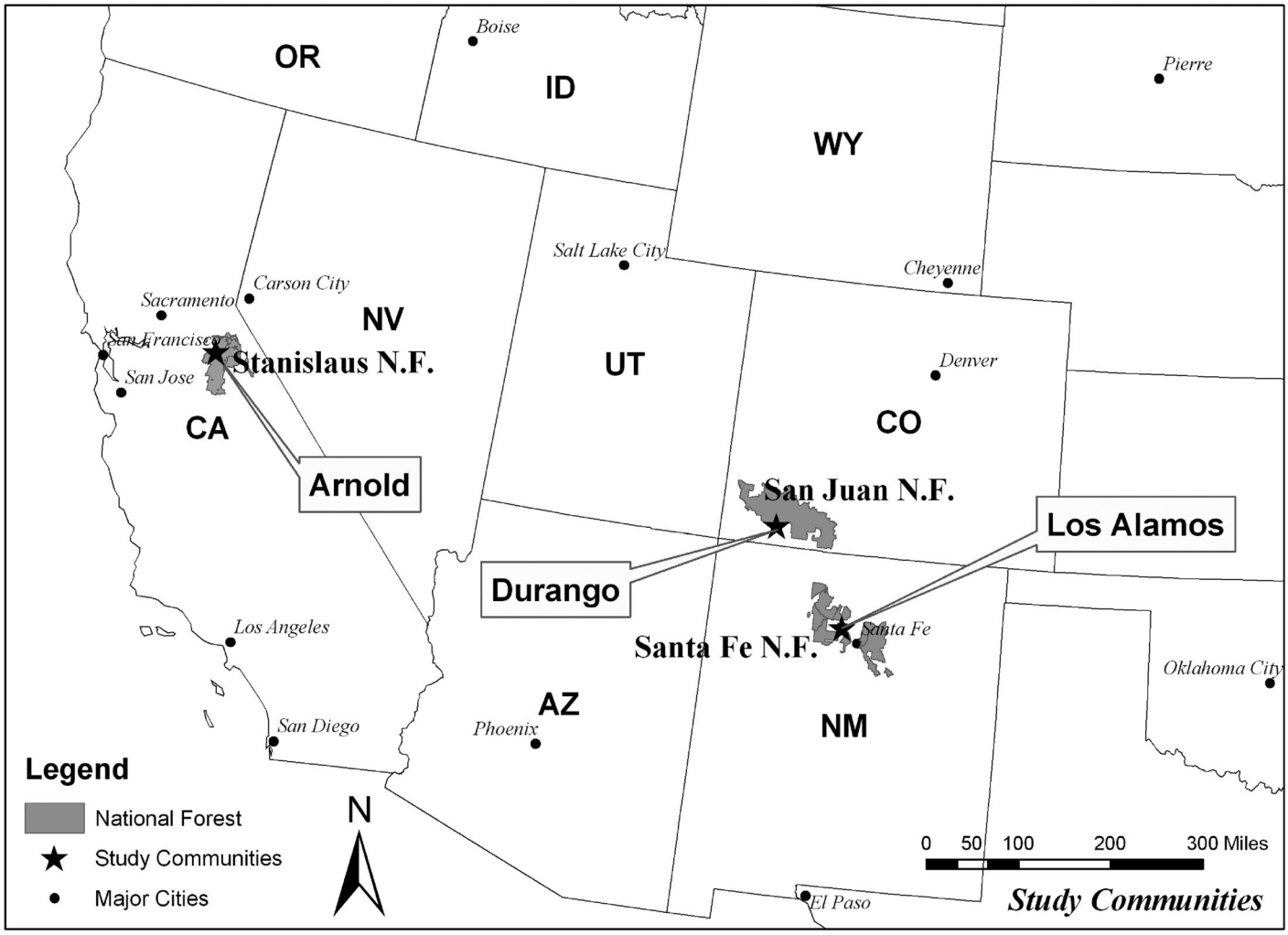

Figure 1. Location map of study areas.

the public's perceptions of natural resource agencies and management actions are influenced by several key factors including preexisting trust in the agency, previous history with the agency, community characteristics, and individual's environmental viewpoints (Winter et al. 2002, Carroll et al. 2005, Sturtevant and Jakes 2008). Researchers have clearly documented the importance of prefire collaborative planning (Sturtevant and Jakes 2008), but it is not as clear that community members expect or desire collaboration in the postfire period. Still, agency actions in the fire and postfire period can strongly influence long-term perceptions of the agency (Cohn et al. 2008). One area of collaboration in the postfire period that appears most promising is in agency encouragement of voluntary actions to rehabilitate the forest.

Based on these findings, we organized our study along three initial research questions:

1. Reasons to restore forests. From the public's perspective, how much obligation do public agencies have to restore the forest after wildfire? Does this perceived obligation go beyond agency mandates to mitigate hazards to human development, such as flooding, to include restoring forest ecological health, habitat, and scenic beauty?
2. Postfire planning process and collaboration. How much and what sort of collaboration in postfire decisionmaking do various key stakeholders expect? What sorts of postfire outreach activities does the public expect, and how do they influence perceptions of the agency?
3. Restoring communities and their special places. In what manner have postfire rehabilitation efforts undertaken by the agency assisted in reconnecting communities to special places in the wildland interface areas that were damaged by wildfire?

In our conclusions, we differentiate among appropriate collaborative activities for given partners (e.g., the public, other agencies, tribal governments, and more) and propose a model that builds from the literature and our findings to summarize key factors influencing perceptions of postwildfire recovery. These models will help foresters more effectively anticipate what agency actions will be most important in which postwildfire situations.

Methods

Our goal was to understand and compare stakeholder views about the postfire restoration and rehabilitation in communities affected by wildfire. Because this topic has received little study, we sought to understand it from a range of perspectives: community members, local interest groups, and agency personnel. Although the literature guided us to important research questions, given our interest in understanding commu-

Table 1. Case study wildfires and communities.

Fire name	Cerro Grande	Missionary Ridge	Darby
National forest/community	Santa Fe National Forest Los Alamos, NM	San Juan National Forest Durango, CO	Stanislaus National Forest Arnold, CA
Area burned	47, 650 ac (19,284 ha)	70, 475 ac (28,521 ha)	14, 288 ac (5,782 ha)
Structures burned	235 homes/structures	57 homes	1 trailer/public water supply
% High severity[a]	35%	24%	67%
Restoration cost	$ 105 million	$ 5.2 million	$ 192,000
US Forest Service BAER (other federal)	($992 million)	(+ $1.9 million- NRCS)	(Additional private land)
Postfire treatments	Seeding, mulch, log erosion barriers, tree planting, hazard	Aerial seeding, log erosion barriers, mulch, hazard trees	Salvage logging, some mulch, no seeding
Postfire volunteering[b]	High	Medium	Low

[a] As determined by US Forest Service, 2002a, 2002b, and Buckley et al. 2003.
[b] As determined by KI interviews and review of volunteer project reports.
BAER, Burned area emergency rehabilitation; NRCS, Natural Resource Conservation Service.

nity perspectives and the relative newness of the research area, it was essential to also allow immanent themes to arise (Glaser and Strauss 1967). Thus, qualitative methods were determined to be the best technique to understand the range of issues and viewpoints (Creswell 2003).

Case Study Selection. To represent some diversity in the fire experiences, this study was conducted in three areas across the western United States that had experienced a major wildfire in the past 3–5 years and had undergone postfire forest restoration and rehabilitation (Figure 1). Initially, we reviewed the census of wildfires and respective rehabilitation projects reported by the US Forest Service in the appropriate time period. Case studies were first selected as those in which at least 1 year but less than 5 years had elapsed since the fire to allow the treatments to grow, but not too distant in time to tax the memories of study participants; those in the wildland–urban interface, because residents needed to be significantly affected by the fire at a minimum through experiencing it in their viewshed; and those who had some community–agency engagement, so that we could explore questions of agency actions. We then interviewed forest managers and fire planners both nationally and regionally and conducted pilot site visits, to determine the three fires that best fit our study criteria. We selected three study areas that varied in their extent and type of rehabilitation techniques (specifically including one that had used salvage logging), damage caused by the fire, level of volunteerism, and community involvement (Table 1). All of the fires affected nearby communities burning both public and private forestland, as well as structures. Our final selections were Los Alamos, site of the 2000 Cerro Grande Fire; Durango, Colorado, site of the Missionary Ridge Fire of 2002; and the Sierra Nevada community of Arnold, California, where the Darby Fire burned in the fall of 2001. More detail on each case study site is presented in the Appendix.

Interview and Focus Group Sample. The study, conducted in 2005, used structured interviews and formal focus groups to determine stakeholders' perceptions of postfire rehabilitation and long-term forest restoration projects. We structured KI interviews as the first phase to generate factual background regarding the fire and restoration efforts, thereby allowing better interpretation of the focus group results, as well allowing for community–expert and expert–expert comparisons. We undertook study of the public who lived near the burn areas by focus groups, to allow a broader spectrum of perspectives to emerge as we were able to include more persons than we would have been able to interview. This structure provides triangulation of data with which to interpret the thematic analysis (Yin 1989). As suggested by qualitative methodology (Schensul et al. 1999), both interviews and focus groups investigated the same fairly tightly defined domain of interest—postfire restoration. The topics covered in each interview and focus group included the following:

1. General attitudes toward forest management and use.
2. Perceived need for postfire restoration.
3. Agency–community relations before and after the fire.
4. Perceptions of rehabilitation treatments in terms of both aesthetics and effectiveness. [1]
5. Future recommendations for other postfire situations.

For stakeholder interviews, the first question generally dealt with the participant's role in their organization and their forest use. Forty-five KI interviews were conducted with representatives from government agencies, Native American pueblos, business groups (including natural resource–based industry and ranchers), environmental organizations, and recreation groups. Interviews lasted, on average, 1 hour and used a set of open-ended interview questions that were mailed to interviewees ahead of time. Interviews were recorded, [2] reviewed and summarized, with key quotes transcribed verbatim. The interview results were then compared across research questions for similarities and differences in participants' responses and for emergent themes.

For phase 2 of the project, the authors conducted six focus groups, two per study area, with a total participation of 55 area residents. [3] Respondents were selected using a composite snowballing technique, usually beginning by requesting from our interviewees and local community/neighborhood leaders the names of residents most geographically impacted by the wildfire and its treatments. This was supplemented by ground-truthing by one author, who drove through neighborhoods near the burn areas and noted addresses of local residents to include in the sample. Those who agreed to participate, not surprisingly, tended to be older (average age, 58 years) and 40% had some property burn during the relevant wildfire. [4] One focus group in each study area involved local residents who live near the burn area, while the other involved a special user group important in postfire issues. In Los Alamos, New Mexico, this involved recreationalists and volunteers who under-

took postfire restoration work; in Durango/Vallecito Lake, Colorado, it was tourist-related businesses affected by the fire; and in Arnold/Sonora, California, wood products industry and wise-use interests were affected. [5] Focus groups were recorded, transcribed, and initially analyzed by research question, and then for emergent themes crosscutting the questions. For both KI and focus group participants (FGP), the following quotes are anonymous and were selected as the most complete and articulate representations of broadly held opinions, unless otherwise stated. When findings were representative for both KIs and FGPs, they were described generally as stakeholders.

Results

Reasons to Restore Postfire Forests. Our first question to KIs and focus groups was very general: Should the US Forest Service undertake restoration, or should it "leave nature alone" after a wildfire? This question was about wildfire recovery in general and not with regard to their specific fire. A typical answer for FGPs as well as KIs was, "That would have to depend on where the fire is" (Los Alamos FGP). [6] Most stakeholders felt that government agencies had a mandate to mitigate the worst consequences of the wildfire for nearby human populations. Thus, agencies should stabilize slopes and minimize postfire flooding in the wildland–urban interface. One reason for the widespread support for agency action in the postfire forest was that most respondents did not consider the nearby forest to be pristine nature, particularly in the wildland–urban interface. Consequently, they perceived the severity of recent wildfires to be a direct outcome of previous suppression efforts:

> Los Alamos FGP: Fires are natural, but this was sort of an unnatural fire. Not in how it started, but just in the conditions of the forest. It burned so hot and the soils were so destroyed that the idea that something [e.g., natural reforestation] would come back and keep erosion from happening in its own time, it wouldn't. It needed a little help.

A second reason stakeholders were receptive to restoration near their communities was their own experiences with flooding and mudslides near their homes:

> Darby KI: Once again the fire was so catastrophic, you need to allow nature to take its course, but erosion at that amount doesn't seem to be that natural. You should do some [restoration]—because we were the ones who allowed the forest to get that dense, we also had a fire that was also quite extensive. So yes, in my opinion we should come in and do something to control the erosion.

In contrast, a few environmentalists, ecologists, and relative newcomers to the areas perceived the forest as a more idealized form of "nature." They thus indicated that even near interface communities natural revegetation should be allowed to occur, even if natural processes resulted in a different successional ecosystem, such as scrubland, rather than forest. These differing views of what is a natural forest make simple generalizations of forest management problematic (Shindler et al. 2002).

Even for stakeholders who felt the US Forest Service has a duty to undertake forest rehabilitation near their homes, most indicated that agency action in the backcountry should be a much lower priority or should not occur at all. Two primary reasons were voiced for this. For many, it was a fairly straightforward question of efficient use of scarce agency money considering limited budget, rugged terrain, and the huge extent of these major wildfires. For others, however, backcountry restoration raised more fundamental issues. Although they acknowledged that humans had affected the fire cycle even in remote areas, they still felt that these areas were more representative of pristine nature and had more trust in nature's long-term ability to heal the landscape: as stated by a Los Alamos FGP, "nature has her way even if there isn't much soil left."

Some stakeholders, especially those who were longtime rural residents or members of a wise-use group, viewed the human's role in the forest as more stewardship centered. Several stakeholders alluded to the forest as a "garden" or "farm" and used agricultural metaphors to describe the relationship between people and the land. As one longtime stakeholder involved in the restoration effort describes it, "I think the overgrowth is just too much. You've got to manage forest. It's just like growing a garden." Nature also appears to need humans' help to speed up the restoration process as noted by another Missionary Ridge KI and longtime resident, "I've heard people say, 'let Mother Nature take its course', well, you know, that's good. There's nothing wrong with Mother Nature taking her course, but it takes about twice as long." Furthermore, the majority of timber industry and wise-use KIs saw little difference between the urban–wildland interface and the backcountry and believed that the whole forest should be replanted after a wildfire.

We thus found that most of our stakeholders wanted foresters to take action in the urban–wildland interface, where most acknowledged that the landscape is deeply influenced by humans. Beyond the interface area, there was less consensus. It is clear that the question of whether or not to restore is deeply dependent on whether one views the part of the forest in question to be natural or commodified and whether one views fire and its consequences as natural.

Postfire Planning Process and Collaboration/Outreach. Collaboration and community process are often characterized as shared development of formal plans, and this planning was a topic of inquiry for us. In addition, however, there are other important arenas for postfire collaboration and outreach with the public. At our case study sites, these included coordinating with and enabling local volunteers to undertake remedial actions to rehabilitate and restore the public forest; educating local landowners about restoration, mitigation, and prevention actions they can take on private lands; and ongoing outreach to educate the public about the outcomes of restoration activities, about which many are intensely interested. The collaboration between agencies and volunteer groups generally increased in the postfire period, with important forest rehabilitation projects being undertaken as the agency provided resources and technical knowledge, while the citizen groups provided labor and outreach.

Beyond work with the public, the postfire period at the sites also required collaboration among agencies to maximize results from restoration and rehabilitation actions, and financial arrangements to share staff and resources for the postfire period actions, among other actions. To some degree in all three study areas, previous collaborative relationships existed between the US Forest Service and other federal agencies, local government, and nonprofit citizen groups. However, the amount and quality of collaboration varied a great deal. The wildfire events and postfire rehabilitation and long-term restoration efforts often led to increased collaboration in the form of more meetings between different agencies, as well as more collaborative hazard mitigation plans. For example, collaboration between agencies on postfire rehabilitation resulted in the same seed mixes being used across multiple ownerships to reseed burn areas in both New Mexico and Colorado. In some instances, this increased need for coordina-

tion has led to conflicts or friction. Native American pueblos, e.g., felt that federal agencies were insufficiently respectful of their traditions and land because many projects required cross-boundary work.

With the pueblos as a possible exception, we find that for many stakeholders, the postfire period resulted in more positive feelings about the US Forest Service:

> Missionary Ridge FGP: The US Forest Service is doing a fine job and they have since this fire, and I think it's largely due to the coordination they have with the other agencies in the area. I know there is a lot more education of people in the communities [than before the fire].

Although in many ways the increased visibility of the US Forest Service after the wildfire was a positive experience, there were areas of contention between community members and public land managers. In particular, volunteers and community leaders were especially frustrated by the slow response of government agencies to remove dead, hazardous trees on public land, especially alongside roads, trails, and other highly visible areas. Also, in some cases, local leaders criticized the agency for not keeping people informed about the process and for not creating a more reciprocal relationship between the public and the agency:

> Missionary Ridge FGP: If they could help us learn what we can do to help ourselves and then also teach us how to help them. How to get through the bureaucracy, how to get them more funding. What we can do to make their jobs easier. Because we're all trying to make it better.

Based on the literature described previously, we had generally expected that most people would want to have a collaborative role in postwildfire planning, and, in fact, most KIs from agencies and other organizations viewed collaborative planning positively. As described by one KI from Colorado,

> Missionary Ridge KI: I believe it's absolutely imperative that the local government representative sits with the BAER team people. I know all about my terrain and my turf. They don't know anything. They know fires, they know a lot of things, but they don't know my unique or special worries that occur within my community.

Several study participants suggested a greater need to involve the community in postfire planning: ". . . they just need to listen to the community," said one business owner. This is important because the community has just undergone a traumatic event and is extremely vulnerable.

Table 2. Types of collaboration in the postfire environment.

Collaboration type[a]	Collaborative action	Involve the public	Involve other agencies
Planning	Plan postwildfire treatments in general	No	Yes
Planning	Plan postwildfire treatments for highly used areas (special spots)	Yes	As needed
Actions	Undertake restorations on agency land	Yes	As needed
Educating	Train public on restorations for their own land	Yes	As needed
Informing	Inform public of agency actions during restoration period	Yes	As needed
Informing	Inform public of outcomes of agency actions in postrestoration period	Yes	As needed

[a] Typology is adapted from Arnstein (1969). Note that these are generalized findings, and some members of the public will welcome a postfire collaborative planning effort (see Daniels 1996).

However, overall, we found relatively low levels of interest in more general collaborative planning from local residents. In part, this may have been because residents were tired of attending meetings and the associated high levels of postfire stress:

> Missionary Ridge FGP: I don't go to them [USFS meetings] because I can't deal with the anger. Everybody's angry and nothing ever gets accomplished. And not just with the forest service.

There was, however, significant interest in getting more education on both what the forest service was doing, and on what people could do on their own lands:

> Darby FGP: I would like just a lot more public information about what they are doing and then some recommendations to private owners as well.

The wise-use group, in particular, had no interest in a more collaborative planning process, and instead thought the US Forest Service should focus its efforts on more rapid postfire salvage logging and treeplanting:

> Darby/Sonora FGP: They're [the USDA Forest Service is] very good at getting people together and talk, talk, talk, talk, talk, they try to get the controversy worked out, and by the time the controversy's worked out the brush has grown.

When asked why they were not interested in another collaborative process, wise-use respondents noted that they could influence the process more efficiently and effectively by going through their elected representatives.

US Forest Service personnel tapped groups that had already worked with the agency on previous projects to help with organizing volunteers for a large restoration effort. The federal agency's role was often to provide the equipment and supplies for the volunteers, especially in rugged terrain where equipment such as helicopters are needed to transport supplies. In addition, before volunteers could enter a burned area, public land managers had to cut down hazardous trees and generally make the area safe for volunteers. Volunteer leaders from the nonprofit sector mentioned previous collaborative relationships as essential for mobilizing resources quickly after the wildfires. Thus, volunteer actions to restore the federal land required close collaboration with the US Forest Service, and success rested on outreach to the community:

> Los Alamos FGP: But [the forest service should] have more public meetings post fire, and find out what the local people want and do a cooperative effort, because we had a lot of local volunteer efforts that could have gone into working with the forest service if the missions had been broken loose [open to the community].
>
> ⟨later in that meeting, another speaker⟩
>
> Consider the community a partner as well, because of the volunteer nature here that not only do we want to know what's going on, we'd like to participate in it, so see us as a resource and let us know how we can work together.

In a reciprocal fashion, volunteer projects in many cases helped increase understanding of the challenges of agency restoration efforts. As noted by one Colorado volunteer leader,

> Missionary Ridge KI: We certainly recognize, those of us in the volunteer side of the effort, that the feds did the large expenditure portion of what was done.

In summary, most respondents appeared to feel that collaboration between agencies was important and valuable, as was engagement between agencies and community groups to enable community volunteer actions and outreach to train landowners in how to manage their burned land. There

was, however, less interest in meeting to discuss the postfire *planning*, although the reasons were different for different groups. Table 2 summarizes the various levels of outreach/collaboration that were described by stakeholders and suggests whether in our three cases these were generally viewed as desirable or appropriate for the public or for working with other agencies. Note that with the public, the least demanding forms of participation and collaboration were the most widely popular—informing landowners of actions that were appropriate on their own lands, for instance—while the more time-demanding efforts of the postfire planning were viewed positively by other agencies, but generally as not by the public.

Restoring Communities and Their Special Places. Our initial research did not center on special places, but in focus groups this emerged as an important consideration and thus was analyzed as an emergent issue. KIs and local community participants often saw the neighboring public lands as their recreational backyard. As noted by one Los Alamos KI, "The community is very tied to the forest. We are accustomed to considering it ours and wandering at will." Repeatedly, we heard about the communities' attachment to their local forest, especially in Los Alamos where the forest is the backdrop to the community. As noted by another Los Alamos government leader, "There's so many people here who just grieve at the condition of the forest. And I don't like it either." The traumatic aspects of these wildfires were interwoven through many of the interviews and focus group discussions. In many ways, the wildlfires helped unite the communities; as noted by one Los Alamos volunteer leader, "Everybody together, we had a common experience that most of us knew people and saw houses burning, and this includes Forest Service personnel . . . they all had that experience and had to do something." But people did not want to see continued reminders of the fire: "One of the comments most often heard up here (Missionary Ridge) is people just don't want to see those burned sticks [trees]. It's a constant reminder of the trauma we went through." Community-based restoration activities, especially for those special places that were heavily used, such as nearby trails or lakes, are a way to help heal the community spirit.

Many residents and KIs mentioned special places that had been devastated by the fire and believed that restoring them should be a high priority:

> Los Alamos FGP: If something is destroyed in a forest fire, it affects the community very deeply, and [for the Forest Service] to just pick out a few spots that are special to the community as a sort of a general public kind of place, I think it would be important to restore those places.

In Los Alamos, for instance, the local reservoir where people were accustomed to fishing was heavily burned and at the time of the focus groups was still closed to the community:

> Local government leader (Los Alamos KI): People call me all the time at work. "Why aren't they doing something? They've ruined the only place a youngster could catch a fish. All my kids, my grandkids even, learned to fish up there. And they've cleaned it out once, it's a mess again. It looks terrible."

In some cases, people had visited those places again to see how they were coming back after the fire, whereas others felt that the places had changed irreversibly and visiting them was too painful. Several even mentioned that they hiked or horseback rode less frequently since the fires and had not even returned to several of their favorite trails.

Residents as well as stakeholders viewed volunteer efforts that allowed people back into the forest after the fire as very positive, especially in Los Alamos, because local residents could see the forest regeneration for themselves. Moreover, this volunteering allowed local residents to work on replanting some of their favorite places. As one Colorado volunteer leader noted about the Missionary Ridge burn, "it was important to recognize the emotional significance of particular sites; whether we considered them prime target areas or not, they were important to [local residents], and we had to include them in our project." She went on to note that restoring special places is a key aspect of restoring community spirit: "I would say a restoration of spirit as well as of the land. It was really an idea of giving people something beautiful to see in the midst of all that charcoal. It did that." Furthermore, for some, the restoration of community spirit happened through interaction with the forest itself, while for many others what was important was helping their neighbors.

Several characteristics seemed central to whether volunteer efforts would be undertaken or not. First, the burn area had to be readily accessible to the community. This is a big part of why efforts were so extensive in Los Alamos, where the community could see the burned area, and where the fire was fairly remote from homes such as the Darby fire, volunteering was much less common. In addition, some communities just have a stronger volunteerism ethos than others, and where it is not a central part of community character, volunteering will be less likely. Thus, FGPs in Los Alamos and in Durango described their community as having a volunteer ethos, and Darby speakers lamented the lack of participation in Fire Safe Councils. A third factor that increased volunteer participation was having a greater fire impact on nearby homes and community special places.

In the postrestoration period, those who had participated in volunteer restoration efforts were interested in knowing if the volunteering made any differences scientifically. In many instances, they looked to the US Forest Service to research these issues, although in Los Alamos volunteer groups were also conducting monitoring of restoration areas. Nonetheless, even if "scientifically" the volunteer revegetation made little difference in the burn area recovery, to a few volunteers from both New Mexico and Colorado the benefits for rebuilding community spirit after the devastation of these fires and public education remained valuable.

Discussion and Conclusions

The collaborative model developed by Sturtevant and Jakes (2008) includes a community's social and ecological context, the collaborative process, and outcomes. In general, as noted previously, researchers have found that in prefire situations the key influences on the public's perceptions of natural resource agencies and management actions are preexisting trust in the agency, previous history with the agency, community characteristics, and individual's environmental viewpoints (Winter et al. 2002, Carroll et al. 2005, Sturtevant and Jakes 2008). Our findings suggest that four vectors interact to determine the level of need the community experiences for postfire agency–community engagement (see Figure 2).

The first vector is the extent and characteristics of the fire, particularly whether the fire impacted homes and burned the forest or community areas that were special places. In this case, the interaction between the ecological context and its social impacts is critical. The more the fires affected homes, viewsheds, and local economies, the more opportunity and need there was for the US Forest Service to take management action. Previous research has shown that local resi-

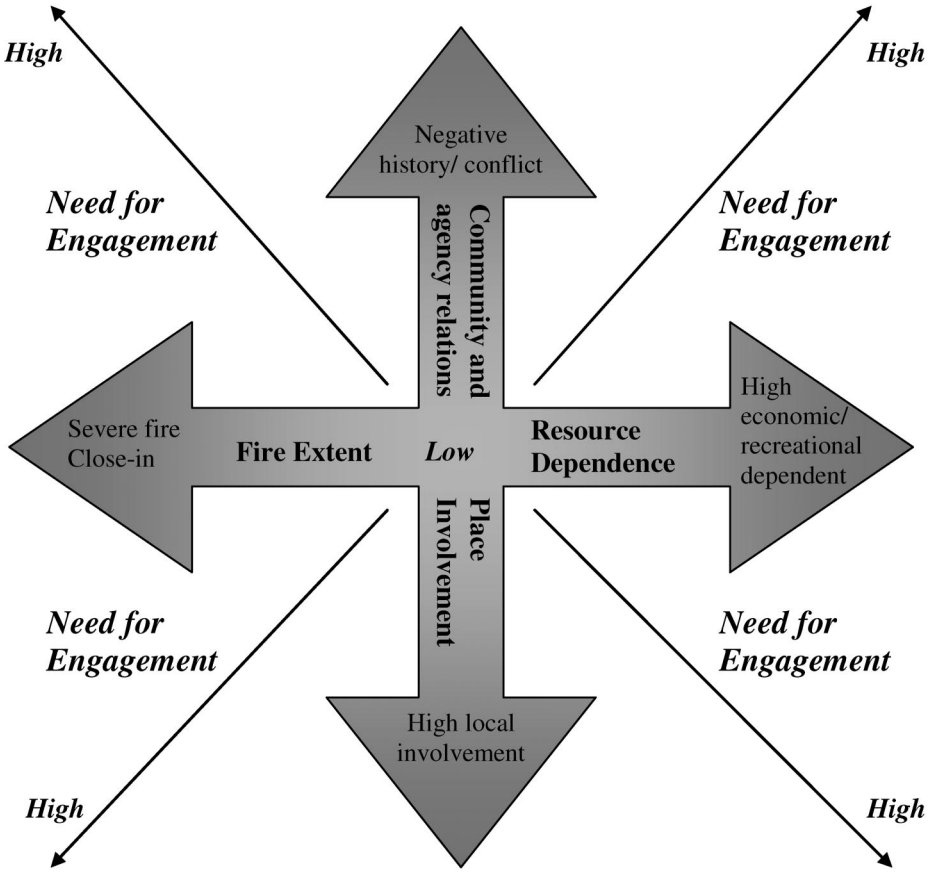

Figure 2. Vectors that influence the need for agency response to postfire rehabilitation.

dents expect the agency to manage fires near interface areas (Cohn et al. 2008), which in the current study appears to extend to the postfire period as well. Most residents and stakeholders felt that the agency had an obligation to restore the forest that was close to homes or that was important for local business, whether for logging or tourism. There was less consensus regarding the desirability of restoration beyond the wildland–urban interface, with most residents and stakeholders viewing this as unnecessary or impractical. Logging interests, not surprisingly, felt that restoration work was important throughout the forest. In addition, the more obvious the burn area was to residents and the more the wildfire impacted high-use areas, the greater was their willingness to volunteer in restoration efforts; and, the greater the damage, the more this volunteering was important to the residents' emotional recovery. Thus, local residents' place attachment to their local forests appears to be an important catalyst for volunteering (Burns et al. 2008). Although place attachment in forest settings has been previously studied (Mitchell et al. 1993, Ryan 2005), the current study sheds new light into its role in postfire settings as proposed by Sturtevant and Jakes' model (Sturtevant and Jakes 2008).

The second vector is the resource dependence of the community and the fire's impacts on the local economy. Although not addressed directly by Sturtevant and Jakes' (Sturtevant and Jakes 2008) social context characteristic, other research has noted the impact of community type on attitudes toward pre- and postfire management (Mendez et al. 2003, Carroll et al. 2005). Both logging-dependent and backcountry tourism–dependent stakeholders had higher expectations for postfire restoration activity, which supports previous wildfire research in other regions (Mendez et al. 2003). Thus, agencies can expect calls for restoration to be greater given more economic impact the burned landscape has on the community. However, even in communities such as Los Alamos, which is not economically resource dependent, but depends heavily on the local forest for recreation, there were strong calls for restoration. Thus, it appears that the most important variable is the community's level and type of forest use and their dependence, whether economic, recreational, or emotionally, on the local forest.

The third vector is the history of agency–community relations, which is another community characteristic that influences the collaborative process (Carroll et al. 2005, Sturtevant and Jakes 2008). Even when the local history of relations between communities and the US Forest Service was strained, many residents reported coming out of the postwildfire period with a better perception of the agency. Thus, the postfire period is a critical one for agencies to regain the trust and respect of local residents (Carroll et al. 2005). Building community trust in the agency has been key to the collaborative process, information dissemination, and implementation prefire plans (Winter et al. 2004, Cohn et al. 2008, Winter and Cvetkovich 2008). This study shows the importance of maintaining trust during the postfire recovery period. One key strategy is engaging the community in implementing postfire planting projects (Duncan 1997, Burns et al. 2008).

The fourth vector is the level of place involvement the community reports. Our findings on this are preliminary but are based on self-assessments made spontaneously by stakeholders; communities with a high level of place attachment and history of volunteerism have a higher expectation of the level of restoration and outreach that will occur in the postfire period. These communities expect the US Forest Service to engage them in planning and restoration activities. In areas with less tradition of volunteering, the agency will face both less call for and less effectiveness in organizing and facilitating volunteer efforts. Land managers need to understand the social capacity of the community in any type of collaborative planning and look for local leadership among both existing individuals and organizations to engage in collaborative implementation projects (Steelman et al. 2004, Burns et al. 2008, Sturtevant and Jakes 2008).

In this study, there were several clear paths to improve community satisfaction in postfire settings. Increased and consistent communications between the US Forest Service and community increased satisfaction with the restoration activities. In particular, residents wanted more knowledge of how the forest restoration activities had actually worked out, and for advice on how to restore their own lands. For land managers, this suggests the importance of communication not just right after the fire, but over a

multiyear recovery period (McCool et al. 2006). Another important factor to consider is the degree to which residents are receptive to expert advice (Shindler and Toman 2003); in our case studies, residents were satisfied to rely on the US Forest Service for the expert opinions on which treatments were most effective. However, residents' desired level of actual participation in planning restoration varied a great deal, with more interest in on-the-ground restoration activities than in a planning process. This mirrors previous studies that the public continues to trust agency expertise in fire management (Winter and Cvetkovich 2008), but this trust is often threatened in the aftermath of a major fire (Cohn et al. 2008).

In burned areas where volunteer actions such as treeplanting are possible, agencies can facilitate community recovery from the wildfire and improve agency–community relations by working with volunteer groups (Duncan 1997, Burns et al. 2008). In addition, increased communication about agency actions and outcomes can be an important part of broader-scale community outreach about fire preparedness activities.

The results of this research are potentially appropriate not just to wildfire-affected communities, but also to communities affected by other natural disasters. It argues for a nuanced agency response to working with communities based on the community's own internal social characteristics and environmental context, as well as the peculiarities of that particular disaster. More extensive suggestions on the relevance of this research to managers' practices are provided in Ryan and Hamin (2006). In the delicate posttrauma period when residents are particularly vulnerable to agency actions, appropriate restoration actions, good communication, and enabling volunteering where appropriate are critical to creating a more positive agency–community relationship after a natural disaster.

Endnotes

[1] The full study included significant investigation into which treatments stakeholders and residents preferred. These photo-based results are discussed in detail in a separate publication (Ryan and Hamin, in press).

[2] Four stakeholders did not wish to be recorded, so extensive notes were taken during those interviews and the notes were used for the analysis. All FGPs gave permission for recording.

[3] The focus groups averaged 9 participants, with a high of 16 and a low of 7 participants. Both authors attended each focus group and shared management of the meetings. Focus groups were held in a community meeting room closest to the participant population, such as the library community room or a local lodge.

[4] We asked participants to fill in a short form that asked their age, profession, use of US Forest Service land, and distance of property to fire/property burned, and asked them to write in any specific comments they wanted to be "sure we heard." These sheets are the source for this data.

[5] This meeting was somewhat different from the others in that it was with an established forestry industry/lobbying group whose administrator invited the group's participants. Although in the other meetings participants often knew a few people, the focus groups were not conducted with established groups and we selected the participants based on snowball sampling.

[6] Comments taken from focus group transcripts are noted FGP (focus group participant), and comments from the stakeholder interviews are designated KI (key informant interviewee).

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Appendix

Case Study Sites. *Los Alamos, New Mexico* was the site of the 2000 Cerro Grande Fire—the largest and most costly fire in the state's history (Interagency BAER Team 2000, Buckley et al. 2003). Since it was important in this study to show variation in fire impacts, the extensive rehabilitation and volunteering after this major fire made Los Alamos a representative example. The community is home to Los Alamos National Laboratory and a highly educated, upper income year-round population. The national forest abuts many neighborhoods in the town and was a highly-used recreational area. The federal government invested heavily in emergency rehabilitation to stabilize soils upstream of the National Laboratory and town, because the fire began as an escaped prescribed fire on Bandelier National Monument. Long-term forest restoration work includes tree thinning on private residential property and public land. In addition to postfire rehabilitation by government agencies, Los Alamos was the site of extensive volunteer efforts with over 55,000 volunteer hours devoted to restoring the burn area (Volunteer Task Force 2004, Burns et al. 2008).

Durango, Colorado was the site of the Missionary Ridge Fire of 2002 (US Forest Service 2002a). The fire burned through the rugged terrain of the adjacent San Juan National Forest and devastated the nearby lakeside community of Vallecito. The forest is primarily used for recreation, wilderness activities, and grazing. While this fire burned the most acreage of the three study areas, it was mid-range in the number of homes burned, extent of postfire rehabilitation, and level of volunteerism. The mixed-conifer and aspen ecosystems of the burn area had only seen infrequent wildfires, so the community was surprised by the fire's extent and intensity. The rugged terrain in the high severity burn areas meant that aerial seeding was used. Proposals by the USDA Forest Service to salvage log the burn area were stopped by an environmental appeal, although many private forest owners did salvage log their property. The impacts on tourism to the small seasonal community of Vallecito encouraged volunteering to speedup the recovery with extensive tree plantings and wildflower seeding, and even a series of sculptural tree carvings around the lake.

The Darby Fire near the Sierra Nevada community of *Arnold, California* burned a mix of chaparral, oak woodland, and pine forests in fall 2001 (US Forest Service 2002b). The popular seasonal resort community with many small cabin neighborhoods is attracting year-round residents as well. The forest is used for recreation and timber production, and has a history of frequent wildfires. The burned area included federal land, as well as private industrial forestland. The fire was contained in more remote areas, but did threaten several canyon edge neighborhoods. Postfire rehabilitation was minimal after the Darby fire with no aerial seeding and limited mulching on steep areas. However, this study area was chosen because the burn area included salvage logging on both federal and private industrial forestland. This smaller fire with minimal budget for postfire treatments is typical of many wildland-urban interface fires.