



FINAL REPORT

SOCIAL SCIENCE AT THE WILDLAND URBAN INTERFACE: CREATING FIRE-ADAPTED COMMUNITIES

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I. ABSTRACT

Considerable social science research has been conducted at the Wildland Urban Interface (WUI) since inception of the Joint Fire Science Program (JFSP) and National Fire Plan (NFP). The current project was designed to meet two primary goals: 1) summarize and prioritize current knowledge pertaining to fire-safe communities, and 2) develop effective tech transfer tools to communicate findings to local agencies and citizen groups. To summarize current knowledge, the research team conducted an extensive review of literature published after 2000. This review provided the basis for discussion at a capstone workshop (Wildland Fire Summit) attended by many of the primary scientists in the field. Workshop discussions highlighted key findings in the collective body of social science research, identified areas where success has been achieved in building fire-safe communities, and also revealed existing gaps in social science knowledge. The literature review and workshop discussions informed development of our primary deliverables: 1) a synthesis of research results that highlights important findings and lessons learned, 2) identification of key factors that influence community support and homeowner behavior, 3) a DVD demonstrating how agency personnel and community leaders have created fire-safe programs in local communities, 4) a field guide designed to accompany the DVD production that provides a stepwise approach to implementation, and 5) development of numerous publications and resources suitable for use by practitioner audiences.

This project provided the impetus for members of the research team to go well beyond expected outcomes. As a result, the project deliverables (26 publications, 43 conference and workshop presentations) exceed the original number anticipated. Examples include a formal report for the Joint Fire Science Program Board of Directors prioritizing future social science research needs, a USDA Forest Service General Technical Report for Partners on Fire Education which addressed eight essential questions of interest, and numerous interactions with other research scientists on related projects.

II. BACKGROUND AND PURPOSE

Prior to 2000, only a handful of social science studies had been conducted on fire and fuels management. Early findings indicated a generally low level of citizen awareness for these programs, but high support for active fire suppression. As fire management became more sophisticated, so too did the public; subsequent research showed increased understanding and support for fire management activities among property owners over time. But while the WUI was recognized as the critical location in fire management success, few early studies evaluated the particular issues and problems associated with fire in interface communities.

This began to change in 2000 with a substantial increase in community-based fire research, largely through JFSP and NFP funded projects. Researchers have explored a broad range of issues and have made sound contributions to the social science knowledge base on the human dimensions of fire. For example, researchers have examined public perceptions of wildfire risk, factors influencing WUI residents to take mitigation actions, public acceptance of fuels management practices, agency communication and outreach strategies, community-agency interactions, community responses to a fire event, trust in management agencies, and wildfire policy and planning. In most cases this research has been conducted by individual scientists or small teams working on separate tracks. Although useful, this approach has resulted in a limited ability to compare concepts and draw conclusions across study areas. This has also meant mixed results in communication of findings to the most significant end users: state and local officials, federal resource professionals, community groups, and homeowners.

As research matured, there was a recognized need to examine the full body of resulting literature to synthesize findings and identify key lessons learned. The current project was designed to meet this need by providing a comprehensive review of existing research that contributes to improving conditions in the WUI. Part of the research design was also to develop deliverables that are useful to both research and practitioner audiences. Specific objectives included:

- 1. Examine and organize the collective social science research conducted at the WUI.** The research team will create a draft synthesis of current research findings. A capstone workshop of primary researchers will be organized so that participants may review and discuss the most relevant findings. Discussions will contribute to focusing on important research results and future research needs.
- 2. Identify and evaluate key factors that influence community support and homeowner behavior.** Following the workshop, the principal investigators will develop a summary of findings that will be reviewed and critiqued by participating scientists. A primary product will be a compendium of research results that highlights important findings and implications for management.
- 3. Identify and examine successful local programs.** Workshop participants will also helped identify locations where local agencies and citizen groups have come together to build fire-safe communities. The research team will select at least four local study sites for additional review. We will draw on workshop results and local experiences to examine factors that have contributed to program success in these settings. Resulting products include a series of recommendations for creating fuel management programs consistent with community needs and expectations that may be applied elsewhere.
- 4. Use digital video technology to communicate and demonstrate the application of findings to state and local officials, resource professionals, homeowner groups, and community members.** A primary objective of this project is to develop effective tools to deliver findings from social science research in a manner they can be applied in at-risk communities. One avenue will be through development of a digital video program (DVD) featuring the experiences of agency personnel and community leaders in successful settings. A companion field guide will also be developed for use by local authorities, citizen groups, and property owners to more effectively build fire-adapted communities.
- 5. Research publications and conference/workshop presentations.** Over the course of the project, the research team will produce publications for research and practitioner outlets. We will also participate in conferences and interactive workshops to encourage thoughtful deliberation of these research topics. Interactions will incorporate agency personnel, NGOs, and community groups as well as an array of researchers from multiple disciplines.

Now, as a result of this project, each of the co-PI's has continued to put this research forward through new research with the JFSP or other funders (e.g., NSF, NFP). They have selected many of the most relevant topics identified here, including smoke risk assessment and management, agency and stakeholder trust-building, homeowner mitigation of fire risk, and interaction of public and private landowners.

III. STUDY DESCRIPTION AND LOCATION

The capstone workshop served as an impetus to organize research from JFSP and NFP study sites. Dozens of settings exist where local agencies and citizens have come together, yielding good results for

developing solutions—or raising questions that still need to be addressed. As part of this effort, the research team completed a review of more than 200 publications of research findings written by well over 100 authors. After an initial synthesis, the research team convened the capstone workshop—the Wildland Fire Summit in Portland, OR—with eighteen of the most prominent scientists who work on fire management issues. Workshop participants evaluated collective findings, identified gaps in knowledge, and discussed locations where success in building fire-safe communities has been achieved. One additional result came from this workshop and its collective expertise—the group provided a formal report to the Joint Fire Science Program Board of Directors that prioritized future social science research needs.

This literature review and workshop discussions informed our understanding of current research, led to additional collaborations among participating scientists, and ultimately resulted in development of our primary deliverables: 1) a compendium of important research findings, 2) an annotated bibliography of 242 research publications, 3) a report to the Partners in Fire Education program addressing eight essential questions of interest, 3) a DVD demonstrating how agency personnel and community leaders have created fire-safe programs worth modeling elsewhere, 4) a field guide designed to accompany the DVD production that provides a stepwise approach to implementation, and 5) a series of new research publications and presentations.

1. Summary of Existing Research

The research team conducted an extensive search of existing wildfire social science literature. Studies were included in the review if they met the following inclusion criteria:

- a) Addresses one or more issues related to fire management using an established social science approach. Economic studies were excluded from the review due to fundamental differences in approaches and resulting data.
- b) Published in peer-reviewed or editor reviewed literature (including USDA Forest Service General Technical Reports and Conference Proceedings).
- c) Published or in “in press” status between January 1, 2000 and July 31, 2008 for the workshop, and between January 1, 2000 and December 31, 2010 for the research synthesis document.

Using these criteria, literature searches were conducted using several online databases (e.g., Web of Science, Treearch, Google Scholar) using pre-identified keywords (e.g., wildfire, social, public, perception, mitigation, community, thinning, prescribed burn, evacuation, communication). Searches were also performed on the most prominent social scientists active in studying fire management issues and in the journals that most often publish fire social science literature. The resulting database of articles was provided to an external group of scientists who reviewed for completeness. Additional articles suggested for inclusion were reviewed for consistency with the above criteria.

Through these efforts, the research team ultimately completed a careful review of approximately 242 publications of research results presented by well over 100 authors. Each article was analyzed for key findings using an approach similar to grounded theory (a systematic methodology that applies a set of rigorous procedures to identify conceptual categories and their interrelationships (see Glaser and Strauss, 1967). Findings from individual articles were then organized into overarching themes, such as perceptions of risk, homeowner mitigation, public perceptions of fire management, trust, communication and outreach, etc. Preliminary results from this analysis were provided to an external group of scientists for review prior to the capstone workshop and served to organize discussion during

the workshop held in Portland, Oregon in August, 2008 (see below).

Following the workshop the original themes were consolidated into five themes to better reflect the continuity of subject areas along the fire timeline. The principal investigators developed a summary of findings that was reviewed and critiqued by many of the scientists who had participated in the workshop. Themes in the final synthesis document include: community/homeowner preparedness, public acceptance of fuel treatments on public lands, homeowner behaviors during fire and perceptions of fire management practices, post-fire recovery, and wildland fire policy and planning.

2. Capstone Workshop

In August 2008, a core group of social scientists engaged in research on a variety of issues pertinent to fire-safe communities participated in a two-day workshop in Portland, Oregon. An effort was made to include scientists from both universities and government agencies from different regions of the country. Participants included:

- Jim Absher, USDA Forest Service, Pacific Southwest Research Station
- Dale Blahna, USDA Forest Service, Pacific Northwest Research Station
- Mark Brunson, Utah State University
- Jim Burchfield, University of Montana
- Matt Carroll, Washington State University
- Terry Daniel, University of Arizona
- Linda Kruger, USDA Forest Service, Pacific Northwest Research Station
- Sarah McCaffrey, USDA Forest Service, Northern Research Station
- Cassandra Moseley, University of Oregon
- Kristen Nelson, University of Minnesota
- Carol Raish, USDA Forest Service, Rocky Mountain Research Station
- Bruce Shindler, Oregon State University
- Toddi Steelman, North Carolina State University
- Melanie Stidham, Oregon State University
- Victoria Sturtevant, Southern Oregon University
- Eric Toman, The Ohio State University
- Alan Watson, USDA Forest Service, Rocky Mountain Research Station
- Dan Williams, USDA Forest Service, Rocky Mountain Research Station
- Greg Winters, Cornerstone Strategies

Prior to the workshop, participants were sent preliminary findings from each of the 11 thematic areas in order to prepare for thoughtful discussion. The first day of the workshop included discussion of each thematic area. Participants were asked to further examine the essential factors that influence proactive public response to fire management and mitigation. The second day was focused on gaps in knowledge and identification of local “success stories.” Following the workshop, the research team organized discussion material into an assessment of future research needs. This document was sent to participants and agency managers for further input and review. This document was subsequently given to the JFSP Board of Directors.

3. PIFE Synthesis

At midpoint of the current project, a second form of inquiry was initiated to respond to the executive team of Partners in Fire Education (PIFE). We were asked to identify how research could best inform the group's outreach efforts to increase public understanding of fire's natural role in ecosystems and the benefits of fire management to ecosystems and public safety. Two team members (McCaffrey and Olsen) subsequently undertook a study to address eight essential questions that reflected on the public and fire management:

- What is the public's understanding of fire's role in the ecosystem?
- Who are trusted sources of information about fire?
- What are the public's views of fuels reduction methods and how do those views vary depending on location in the WUI or elsewhere?
- What is the public understanding of smoke effects on human health, and what shapes public tolerance for smoke?
- What are homeowner views of their responsibilities for home and property protection and mitigation, e.g. defensible space measures?
- What role does human health and safety play in public perceptions of fire and fire management?
- What are public views on the role/importance of costs in wildfire incident response decisions?
- How do findings differ among ethnic and cultural groups, and across regions of the country?

4. DVD Production and Field Guide

The research team worked closely with federal partners to identify a range of effective partnerships in which fire-adapted communities were emerging. This included contacting appropriate management personnel and community leaders at each site. Five locations were selected for inclusion in a DVD program to highlight effective strategies: Prescott, Arizona; Taylor, Florida; Rich County, Utah; Colville, Washington; and Grand Teton National Park, Wyoming.

Beginning fall 2008, the research team traveled to study locations to conduct interviews with selected participants and shoot footage of the community and representative fire protection activities. To augment prior research, a series of qualitative interviews were conducted with agency personnel and local residents to explore variables identified in the capstone workshop and examine their influence across locations.

The resulting DVD consists of targeted interviews with community leaders and agency officials. Participants related their own stories and highlighted the factors and activities contributing to their success. The program also includes specific examples of successful actions and lessons learned to provide guidance to those working to improve conditions in the WUI. The DVD examines how partnerships develop, how different entities make contributions, and resulting changes on the ground.

A companion field guide was developed to further describe and expand upon concepts introduced in the DVD. It is designed to better enable local officials, agency managers, and community members to come together to build fire-safe communities in their local areas. The guide provides a series of proven guidelines and checkpoints as well as steps for implementation. Thus far, 1000 copies of the DVD and guide have been distributed to JFSP partners and collaborators.

IV. KEY FINDINGS

Our review of the literature illustrated a substantial breadth of research as well as the complex nature of human dimensions of fire and fuels management. From an initial emphasis on citizen attitudes towards agency fire management activities, this research has expanded to include specific factors that contribute to social acceptability of fire and fuel management activities by federal agencies, the adoption of behaviors by individuals and communities to reduce their risk to wildfire, behaviors and factors influencing perceptions of fire management during fires, and post-fire recovery of communities following fires. Key findings within each of these areas are described below. The publications listed in the Deliverables Crosswalk Table (p. 16) provide in-depth discussion of these findings.

Public Acceptance of Fire and Fuels Management

At a general level, research finds a high level of public support for wildfire risk management activities on threatened lands. While acceptance of specific treatments (mechanized thinning, prescribed fire, grazing, or some combination) overall is quite strong, public preferences are often contextual. Key factors vary by location and include landscape type, jurisdiction (public vs. private lands), proximity to developments, local perceptions and understanding of risk (e.g., wildfire, escape of prescribed fires), adverse impacts (e.g., smoke, aesthetics, special places), trust and confidence in agency personnel, and opportunities for public involvement in planning processes. Effective communication and outreach programs are judged to be essential to program success.

Public Perceptions of Wildfire Risk

Consistent with findings in the wider field of risk perception, the limited research on wildfire risk shows that the public generally has a high wildfire risk perception and that public responses to risk are affected by multiple factors including: spatial and temporal considerations, perceived likelihood of fire occurring, perceived vulnerability and ability to make sufficient changes, and other personal considerations such as risk tolerance and balancing trade-offs between the risk and benefits of exposure (i.e., living in the forest).

Community/Homeowner Preparedness and Mitigation

A growing body of research demonstrates that individual residents in fire prone communities are beginning to take action to protect their properties. A small number of recent studies show direct evidence that risk reduction activities are the result of community-based programs (e.g., Fire-Safe, Fire Smart, Firewise, Community Wildfire Protection Plans). Results suggest a diversity in the processes used to develop such plans. Regarding individual homeowner mitigation, findings show decisions are influenced by the interaction of a number of factors including: perceived severity of the risk, perceived effectiveness of risk reduction behaviors, local ordinances, collaboration with agencies, collective actions of neighbors, and capacity to implement and sustain mitigation efforts. Also significant are tradeoffs with other lifestyle values such as aesthetics and desire for privacy as well as other competing threats and demands on limited time, effort and resources.

Community Capacity

A moderate body of research has found that community capacity can play a key role in preparedness for, and recovery from, wildfire events. Community capacity is the interaction of human capital (skills/knowledge of individuals within the community), social capital (civic responsibility and social ties) and organizational resources (networks and leadership) which can be mobilized to benefit the community. Physical infrastructure and financial capital strengthen the resource base for community capacity to function. High capacity is generally associated with increased ability to both prepare for and recover from a wildfire. In some cases communities low in human and financial capital are able to draw on social capital, leadership, and local networks to leverage planning assistance and engage in fuel mitigation activities.

Communication and Outreach

Substantial research demonstrates that well-designed communication programs can be effective at increasing public awareness and understanding of wildfire risk, can improve community relations with management agencies, and potentially can influence attitudes and behaviors. Successful outreach efforts are tailored to address these multiple objectives and audiences. Different communication strategies (i.e., unidirectional one-way messages, interactive methods) are required to achieve different goals. Research indicates that when agencies invest in internal strategic planning, select appropriate outreach personnel, and commit adequate resources (funding and time), they experience program success more often.

Community-Agency Interactions

The substantial work that has been completed in this area demonstrates the importance of open and interactive communication between agency personnel and the public on fire management issues, either through collaborative decision-making or more discrete efforts. Multiple interactions—hosted by communities as well as agencies—can enhance understanding and build trust among participants, both of which are associated with increased support for management practices. All findings point to the importance of managers knowing their stakeholders and providing opportunities for face-to-face communication.

Homeowner Behaviors During and Immediately Following a Wildfire Event

The limited research completed in this area suggests that accurate, timely information during fire events is critical for affected citizens. Residents particularly want personalized information related to fire danger, level and areas of containment, evacuations, houses lost, etc. Effective communication programs that are built prior to wildfires and continue through an event are key factors influencing public cooperation for post-fire recovery actions. Allowing citizens to directly participate in post-fire recovery efforts, especially in areas significant to the community, aided in individual and community recovery.

Trust in Management Agencies

Substantial research points to the importance of trustworthy relations between agencies and citizens. When trust is present, stakeholders are more likely to work together and communicate openly. Without trust the public often feels disenfranchised and withholds support for management decisions and

policies. However, trusting relations are multi-dimensional and can derive from numerous factors (e.g., shared values, inclusiveness, sincere leadership, articulation of plans and treatments, successful implementation, perceived commitment to community processes). Research suggests that building trust with stakeholders most often comes through the interaction process, particularly when citizens are able to see their own ideas and concerns are taken into account.

Policy

The federal approach to wildfire policy has expanded from a predominant focus on fire suppression to a multi-tiered approach including restoration of fire-adapted ecosystems, hazardous fuel reduction, and promoting WUI community involvement and assistance. In the decade or so since the new policies have been implemented, allocation of budget resources has predominantly gone to suppression and hazardous fuel reduction with far less going to ecosystem restoration and community assistance. However, many communities have taken advantage of a provision in the Healthy Forest Restoration Act (HFRA), authorizing them to develop a Community Wildfire Protection Plan (CWPP). While specifics of the CWPP are dictated by local circumstances, if they choose to communities can delineate their own WUI boundary and propose and prioritize fuel reduction projects within the boundary. Projects specified in a CWPP qualify for expedited environmental review, as do certain other projects authorized under HFRA. As of 2009 approximately 10% of at-risk communities had completed a CWPP. Involvement of the U.S. Forest Service or other implementing agency during plan development has been essential to success. Further research is needed to determine if CWPP identified projects are implemented by the agencies, and if communities that develop a CWPP are more resilient to wildfire than those who do not.

Organizational/Agency Capacity and Barriers

Work specifically on this topic is limited but suggests that internal barriers from lack of support (e.g., funding, staffing, and leadership) can significantly limit an agency's ability and/or willingness to engage in the full range of fire mitigation activities. Funding policies (suppression dominated) and an absence of personnel to adequately engage citizens and organize community efforts are significant concerns. One specific area of research has focused on implementation of wildland fire use (WFU). While WFU is authorized under current wildfire management policy, it is not implemented in many areas because: 1) WFU requires extensive planning and personnel for which expertise, resources and motivation are not always present; 2) risks of personal liability; 3) acres burned through WFU do not count as "acres treated;" 4) WFU does not qualify for emergency stabilization funds if things do not go as planned; and 5) attitudes in the fire management community are still focused on suppression.

V. MANAGEMENT IMPLICATIONS

Before Fire

Many WUI residents are taking action to reduce their fire risk: Property owners in WUI communities across the U.S. are aware of their fire risk and are taking action to reduce that risk. Behaviors include preparedness activities to reduce the threat of fire within their community through changes to vegetation or human structures, as well as response activities such as development of an evacuation plan, phone trees, and lists of residents with special needs. Activities that required a low level of commitment such as keeping vegetation near the home mowed and irrigated, raking needles, removing needles and debris from roofs were the most widely adopted. Indeed, many property owners referred

to these as normal yard maintenance behaviors similar to how urban residents may view lawn mowing. In many cases, property owners had also taken action to reduce the density of trees on their properties. Residents tended to view preparedness activities as a multi-year activity and planned to take additional actions in the future.

Awareness of fire risk does not automatically lead to adoption of risk reduction behaviors: Residents understand that living in the WUI carries certain risks and generally agree those risks are their responsibility. However, awareness of their fire risk, while an important contributor to risk reduction behaviors, on its own it is often not sufficient to prompt action. Property owners balance their fire risk and potential risk reduction activities with the other values they hold for their properties. Property owners weigh the perceived risks of potential fire activity against the tradeoffs of risk reduction activities. These decisions may also be further constrained by financial, physical, temporal, or other limitations. Property owners are more likely to adopt those behaviors they perceive as compatible with their other values as well as those they believe will provide enough benefits to outweigh any perceived costs.

Permanent and part-time residents often have different perspectives on fire preparedness actions: However, it appears that this often results from the different values they hold for their property, different constraints they face, and, in some cases, different levels of investment at risk rather than a lack of awareness of the fire risk. The amount of time required to complete preparedness activities, in particular, is a substantial deterrent given the reduced time they spend on their properties. While in some cases, their awareness of the local fire risk may be lower than those who live there permanently, part-time residents still generally expressed positive evaluations of preparedness actions. On the other hand, absentee landowners who never or rarely visited their properties were more likely to be disconnected from the local situation and take few fire preparedness actions on their properties.

While adoption is high, the current and future challenge is to ensure maintenance of activities: Nearly all of the research on fire preparedness activities has focused on initial adoption of behaviors. This work has demonstrated generally high levels of understanding among WUI residents of their fire risk and awareness of actions they can take to reduce those risks. However, this does not mean the communication job is done. To be effective, most risk reduction behaviors need to be maintained over time. Moreover, as the WUI population continues to grow, new residents will benefit from outreach programs that build their understanding of the local fire situation and help them adapt their ideas of appropriate preparedness activities to their new context.

There are generally high levels of public acceptance of fuel treatments on public lands: Overall, research has shown that prescribed fire and mechanical thinning are, at some level, acceptable management practices for the vast majority of the public. The primary variables shaping acceptance are: levels of understanding of a practice, particularly its ecological benefits, and level of trust in those implementing a practice. Contributing factors are treatment location and outcome concerns (e.g., prescribed fire escape), however these seem to be more contextual constraints. These findings, combined with findings that “no action” is consistently the least preferred alternative and that forest health is generally an equal or greater priority to fire risk reduction, suggest that there is greater public support for active rather than passive management in achieving ecological health and fire risk reduction goals.

During/After Fire

Wildland fires are a social as well as an ecological disturbance: As documented in several studies completed during and following fire events, wildland fires have the potential to have far reaching impacts to the surrounding communities. Some impacts are easy to predict, such as financial losses from damaged homes and private property. A host of other impacts may be less obvious, but no less significant, including the stress of evacuation and concern over the potential loss of property to emotional and psychological effects from changes to the landscape surrounding their homes. While evacuated, residents are removed from their normal social networks leading to a loss of support and ability to communicate with neighbors. In many cases, residents and some local businesses will also incur financial losses from their inability to work while evacuated (however, fire management activities may provide financial opportunities to some local businesses). Even if their homes and property are spared, evacuated residents have the real possibility of returning home to spoiled food, smoke damage, and deceased pets and livestock.

Developing local communication networks prior to a fire event can improve during-fire communication: Residents affected by a wildfire have an ongoing need for information on the fire's status and potential impacts on them, their home and property, and places they care about. These needs are not normally met through the traditional, formal sources of information that are generally available during fires. If their information needs are not met through these formal methods, residents will likely turn to other sources to gather information. Residents characterize mass media sources as being overly dramatic and often presenting inaccurate information. Traditional agency fire communications do not fare much better as the presented information is often seen as being overly general and outdated by the time it reaches the public. Evacuations increase the communication challenge as residents disperse broadly making it harder to provide up-to-date fire briefings. Managers can help address these tensions by developing connections with local communication networks prior to a fire event. Examples include identifying local organizations such as a homeowner's association, Fire Safe Council, chamber of commerce, municipal governments, etc. who can help share information via established channels including email listservs, phone trees, websites, etc. Communicating via these channels as well as the more traditional efforts to inform the media and hold fire briefings can help fire managers reach a broader proportion of the public with official fire information.

Citizen perceptions of how a fire is managed can have a lasting influence on acceptance of agency activities: Citizen attitudes, confidence in agency managers, and acceptance of agency activities are linked across the different phases of a fire event. In positive examples, perceptions of how a fire is managed can lead to increased community cohesion and strengthened agency ties following a fire event. However, the opposite is also true; when residents perceive that a fire or immediate post-fire phase is poorly managed, this can lead to reduced confidence in agency managers or acceptance of future management activities. This point reiterates the importance of establishing effective methods of communication during a fire event. By providing information that is relevant to residents, agency managers can help inform the narrative that is developed of the fire event. This also reinforces the importance of developing strong relationships with local residents prior to the fire event. Healthy relationships will be more resilient to concerns that emerge over how the fire was managed.

While there is increasing interest in alternatives to evacuation, little is known about their likely effectiveness in U.S. communities: Evacuations cause a significant disruption to affected communities. In weighing their decision to evacuate, residents consider several factors including the perceived seriousness of the fire event, the nature of the evacuation order (e.g., mandatory vs. voluntary), the fire

readiness of their home and property, previous evacuation experiences, and complicating factors such as ownership of pets and livestock, age and health of family members, etc. The evacuation process, although designed to reduce the risk to residents, also carries risks of its own due to potential hazards during transportation. While interest has increased in alternatives to evacuations, limited research has been conducted on the feasibility of these approaches in the U.S. The research that has been completed to date has found mixed reactions among fire managers who have expressed concerns that allowing homeowners to remain during a fire event would be a dereliction of duty to others who indicate that properly prepared homeowners could be a strong ally in fire suppression and home protection efforts. Even more importantly, this research has indicated limited awareness among residents of these alternative approaches or of appropriate behaviors to take if choosing to remain on their property during a fire event. Resulting behaviors, such as waiting until the fire approaches before deciding to evacuate or fleeing the protection offered by structures as the flame front passes could result in increased risk of the loss of life. More work with local communities is needed before implementing alternatives to evacuation.

Post-Fire Recovery

Post-fire recovery begins in pre-fire planning, and is directly impacted by decisions made during a fire event: Fire recovery occurs on a continuum of pre-fire planning and during-fire actions and decisions. Where communities and forests have taken action to mitigate risk, developed communication channels, planned for evacuation etc., recovery from a wildfire event has been found to be faster than for places without extensive planning. Decisions made while managing a wildfire can have lasting effects on citizen-agency interactions. The most common complaints reported by research participants have been light initial attack, which led to a large fire event, and underutilization of local firefighting resources. These types of complaints are more common in areas where there was more extensive damage. Similarly, decisions in how and what to communicate to the public during a wildfire event can have lasting impacts on both citizen-agency relations and on individual recovery. Communities that reported being well informed by the USFS during a wildfire event have tended to experience less negative emotion during the fire and less post-fire stress, which led to quicker post-fire recovery.

Communication needs post-fire are different than pre-fire: Large fires are major events in the life of a community and people may be experiencing feelings of loss, sorrow, stress, curiosity, confusion, anger—a range of emotions for which traditional forms of NEPA driven interaction are inadequate. Instead, interactive forms of communication, particularly agency-led field tours, have been well received as sources of information, ways to see and understand the effects of the fire, learn about fire recovery options, and share perspectives with agency personnel. In addition, if there are long forest closures for safety reasons, field tours can still allow public visitation, which can help prevent negative perceptions of the closure. There are several factors that lead to successful post-fire communication including: internal communication plan; use of common language; clear descriptions of reasons behind particular management options; a designated community contact; and opportunities for two-way communication.

Including citizens in on-the-ground post-fire recovery efforts have helped in individual and community recovery: Actions on the ground allow citizens to see firsthand the effects of the fire, and gives them something tangible to do to participate in the forest's recovery, by which they can begin their own recovery. These efforts have been most successful when projects are located in popular recreation spots, around communities, in viewsheds, or other locally important areas. If an agency is aware of the likelihood of groups of citizens will want to volunteer, they can be better prepared and fully utilize this resource.

There are high levels of support for some form of salvage logging: The level of support often depends on the location on the landscape (e.g., not in wilderness), values placed on the trees (economic or ecological), and the perceived risk to the forest with intervention or non-intervention. Generally projects not involving construction of new roads or clear cuts were less controversial. Most studies have reported finding preference for a balanced approach: take some burned trees in order to not waste them and recoup some economic value, but also leave some snags for wildlife and shade for seedlings. Support for harvesting has also been found to be correlated with levels of trust citizens have for the agency, as well as how the fire was managed and handling of post-fire decision-making. Given the time pressure of decision-making post-fire and the potential controversial nature of salvage logging, it is best if post-fire management options are discussed early, preferably prior to a fire event.

Wildland Fire Policy and Planning

Additional work is needed to fully realize the opportunities presented by the new policy framework: Current fire policy has four overarching goals including: 1) improving fire suppression and prevention; 2) reducing hazardous fuels; 3) restoring fire-adapted ecosystems; and 4) promoting community assistance. Thus far only two of the goals have been fully supported with attention and funding primarily going to suppression and hazardous fuel reduction, sometimes at the expense of the other two goals. In order to be fully successful in achieving protection for communities and resources from wildfire damage, all should be fully supported. Suggestions for improving balanced implementation include more equitable funding allocations, and equal emphasis on performance measures for all goals. In addition, an adaptive management approach is recommended to promote research and experimentation for novel approaches to reducing hazardous fuels. The current tool box for pre-fire treatments needs to be expanded or improved upon; current technologies for prescribed burning and mechanical thinning will not likely address scope of treatment needs given current budget allocations.

CWPPs are a new tool for communities to mitigate their wildfire risk: HFRA provides WUI communities with the opportunity to develop CWPPs, through which they can identify mechanisms to reduce structural ignitability within their community, delineate their own WUI boundary, and propose and prioritize fuel reduction projects. Projects proposed under a CWPP do not have to go through a NEPA review, the idea being that since CWPPs are developed collaboratively with multiple stakeholders they already have a significant amount of public input, and should be implemented quickly. A key factor in successful development of CWPPs has been found to be direct involvement and support of the implementing agency (usually the U.S. Forest Service) in plan development. Not only does agency involvement provide the necessary expertise, information and leadership, involvement also provides assurance to the rest of the planning team that the plan will be implemented.

While WFU is encouraged on paper, in practice it is discouraged: Under the right conditions, WFU is thought to be a useful tool to restore fire adapted ecosystems with comparatively minimal cost. However, actual implementation of WFU is low compared to numbers of fire starts where WFU is allowed and under pre-identified conditions. Recommended steps to improve likelihood of WFU implementation include: 1) allow acres burned in WFU to count as “acres treated”; 2) reduce exposure of fire managers to personal liability; 3) allocate adequate resources to extensive WFU planning requirements; and 4) ensure availability of required experts to monitor the fire when it occurs.

VI. RELATIONSHIP TO OTHER RECENT FINDINGS AND ONGOING WORK ON THIS TOPIC

As this project is a synthesis of existing social science research relevant to fire safe communities, it is integrally related to many other recently completed and ongoing projects. Members of the research team are currently involved with numerous projects that build on findings reported here, including:

- **Citizen-Agency Trust in Wildfire Management.** One project concerns advancing knowledge about citizen-agency trust in wildfire management, comparing findings in Australia, Canada and the U.S. Results of the research will lead to an explanatory framework of trust for each phase of fire management, built by researchers, managers and community members.
- **Developing a Comprehensive Guide for Fuel Management Decisions.** This project draws on scientific expertise of the research team, fire ecologists, and wildfire biologists, along with direct interactions with practitioners to develop a comprehensive guide and decision-aiding tool to help balance the multiple objectives (e.g., hazard reduction, ecological restoration, habitat improvement, commodity production, and influences on recreation opportunities and amenity values) for the implementation of fuels treatments in mixed white and red pine forests in the Great Lakes region.
- **Public perceptions of smoke.** This ongoing project examines public perceptions of smoke emissions from fire management practices in three study locations: Francis Marion NF (SC), Kootenai NF (MT), and Fremont-Winema NF (OR). Using a case study design, this project will compare communities where smoke (from wildfire or prescribed fire) has impacted citizens and examine the factors that influence acceptance levels, including communication strategies and other forms of public engagement.
- **The interface of public forests and private land.** This project looks at managing multi-functional landscapes at the intersection of public and private lands. It utilizes ongoing research in the U.S. and Australia to advance our understanding through a comparison of experiences.
- **Coupled natural-human systems in fire-prone landscapes.** This project examines changing ecological landscapes and human reactions to climate change in fire adapted communities. It is interdisciplinary in nature and utilizes a model-based system to evaluate different scenarios that could play out over the long-term. Primary research sites are in central and eastern Oregon; however, a workshop with international science cooperators is planned.
- **Relational risk assessment and management.** This project investigates local capacity within wildfire response networks. It focuses on developing a better understanding of communication and coordination among responding agencies and organizations.

VII. FUTURE WORK NEEDED

Based on discussions at the capstone workshop, the PI's compiled a set of potential future research needs. Each included a set of research questions or issues raised by workshop participants. This document was distributed to participating scientists for review, comment, and identification of the most important questions for future research. On the suggestion of JFSP Program Manager John Cissel, the PI's also assembled a diverse group of agency personnel to capture their perspective on these same

issues. Eleven individuals in a range of positions received the document and provided enthusiastic cooperation and feedback. At the same time, three external scientists reviewed the complete package and offered suggestions.

Reviewers were asked to provide feedback on the appropriateness of the research needs and whether any important topics were missed. From the total of 37 separate research needs, they were also asked to select the six questions they felt represented the highest priority for future research. Overall feedback from both scientists and managers indicated the provided list was comprehensive and reflective of current needs. Nearly all topics received some level of support and many participants noted it was challenging to limit their priorities to only six choices. After compiling responses, the PI's ranked the future research topics into four levels of priority. In addition to these rankings, several interesting points emerged. First, both scientists and managers were in agreement on many items, particularly those in the first tier. Second, there were certain questions that were clearly more important to managers, while others were more important to scientists. In addition, managers were generally more spread out in their choices than scientists, perhaps reflecting different issues they face in their respective management units. The highest priority research needs are included below; all four levels are available as a JFSP report titled "Social science at the wildland urban interface: future research needs for creating fire-safe communities."

Fire preparedness and mitigation

- Synthesize findings from research at both the individual homeowner and community level. This analysis would help clarify influencing factors and processes regarding preparedness, assess differences in approaches in how CWPP's are developed and implemented, identify related barriers, and examine how trade-offs are made between conflicting values.
- How do public perceptions of risk (short-term and long-term) differ from the risks that management agencies contend with? How do these change over time? How does risk perception vary across cultural and social groups?

Fire management and public response

- Thus far, research has shown concerns about smoke to be primarily a health issue, and, in some areas, a traffic management issue. What public communication approaches can enable managers to work through the complexities of smoke from various sources (i.e., prescribed burns, wildfire, manager-controlled wildfire) to more effectively achieve fire management objectives? Develop guidelines (or a checklist) of important considerations for making smoke-related decisions.
- Evaluate pros and cons of evacuation and alternative models to evacuation. For example, examine the "prepare to leave or stand and defend" as well as other models and their considerations for effectiveness in the U.S.
- To better place research on trust in context there is a need to synthesize what has been learned to date specifically related to fire management. Such work would develop a better understanding of complexity and multiple components of trustworthy citizen-agency relations specific to fire. For example, how do the basic tenants of trust (e.g., honesty, fairness, openness, competence) found in other agency-public interactions apply to different stages of fire management? Develop a set of

“dimensions of trust” from which managers can self select and adapt to a given situation to improve performance and relationships.

Temporal connections

- Limited research indicates that communication needs and opportunities for engaging the public differ before, during, and after a fire event. Which communication and outreach strategies are most effective at each stage and how are they influenced by factors facing managers (e.g., time, funding, immediacy, community resources capabilities, credibility, relations with local citizens)?

Coordination of planning efforts

- Examine the influence/effectiveness of local level planning efforts related to wildfire and also National Forest planning processes. How has local/state/county/multi-scale land use planning worked to reduce wildfire exposure? Assess factors contributing to success.

Organizational effectiveness

- To build a better understanding of relationships and points of opportunity identify methods to “map” the fire management system (i.e., pre-fire, during an event, post-fire). Such work could include communication networks, linkages between people and agencies, types of required training and experience of members, critical inputs, the role of local fire personnel (city/county, volunteer fire departments), etc.
- What are the consequences when federal land management agencies focus most functions around the fire problem, particularly suppression? For example, is fire becoming a separate entity within federal agencies, thereby becoming isolated from other management units? How does this segregation of fire management affect other forest management functions? How does it affect public engagement strategies?

VIII. DELIVERABLES CROSSWALK TABLE

Proposed	Delivered	Status
Final project report	Shindler, B., E. Toman, and S. McCaffrey. 2012. Social Science at the Wildland-Urban Interface: Creating Fire-adapted Communities. Final report for JFSP Project 07-1-6-12.	Completed
Social science synthesis and bibliography	Toman, E., M. Stidham, S. McCaffrey, and B. Shindler. 2012. Social Science at the Wildland Urban Interface: 2000-2010 Annotated Bibliography. JFSP report. http://hdl.handle.net/1957/34537	Completed
Researcher Capstone Workshop	Wildland Fire Summit: A Decade of Social Science Research, August 5 – 7, 2008, Portland, Oregon. Interactive workshop of the nation’s leading social science researchers on wildland fire.	Completed
Advisory report to JFSP Board of Directors	Shindler, B., E. Toman, and S. McCaffrey. 2009. Social science at the wildland urban interface: future research needs for creating fire-safe communities. JFSP Advisory Report	Completed
Compendium of research findings and results	Toman, E., M. Stidham, S. McCaffrey, and B. Shindler. <i>In Press</i> . Social Science at the Wildland-Urban Interface: A Compendium of Research Results to Create Fire-Adapted Communities. USDA Forest Service Northern Research Station General Technical Report, NRS-GTR-xxx.	In Press with USDA For. Serv. Northern Research Station

Digital video program	Gordon, R., B. Shindler, S. McCaffrey and E. Toman. 2011. Collaborating for Healthy Forests and Communities: Building Partnerships Among Diverse Interests. A DVD presentation showcasing on-the-ground experiences of federal and state land managers and their community partners: 30 minutes. 1000 copies distributed nationwide. http://hdl.handle.net/1957/29896	Completed
Tech transfer field guide	Shindler, B., R. Gordon, S. McCaffrey and E. Toman. 2011. Collaborating for Healthy Forests and Communities: A Guide for Building Partnerships Among Diverse Interests. A companion guide to the DVD program. 1000 copies have been distributed nationwide	Completed
Refereed research publications	<p>McCaffrey, S., E. Toman, M. Stidham, B. Shindler. 2012. Social science research related to wildfire management: An overview of recent findings and future research needs. <i>International Journal of Wildland Fire</i> . http://dx.doi.org/10.1071/WF11115 .</p> <p>McCaffrey, S. and C. Olsen. 2012. Research perspectives on the public and fire management: a synthesis of current social science on eight essential questions. USDA Forest Service Northern Research Station General Technical Report, NRS-GTR-104. 53p. http://nrs.fs.fed.us/pubs/41832.</p> <p>Gordon, R., A. Mallon, C. Maier, L. Kruger, and B. Shindler. 2012. Building a citizen-agency partnership among diverse interests: the Colville National Forest and Northeast Washington Forestry Coalition experience. USDA Forest Service Research Paper, PNW-RP-588. Pacific Northwest Research Station, Portland, OR.</p> <p>Wilson, R.S., T. Ascher, and E. Toman. 2012. The importance of framing for communicating risk and managing forest health. <i>Journal of Forestry</i> 110(6):337-341.</p> <p>Olsen, C.S., Mallon, A., and B. Shindler. 2012. Public acceptance of disturbance-based forest management: factors influencing support. <i>ISRN Forestry</i>. doi:10.5402/2012/594067.</p> <p>Stidham, M., E. Toman, S. McCaffrey, B. Shindler. 2011. Improving an inherently stressful situation: The role of communication during wildfire evacuations. In McCaffrey, S.M., Fisher, C.L., eds. <i>Proceedings of the second conference on the human dimensions of wildfire</i>. Gen. Tech. Rep. NRS-P-84. Newtown Square, PA: USDA Forest Service, Northern Research Station: 96-103.</p> <p>Toman, E., M. Stidham, B. Shindler and S. McCaffrey. 2011. Reducing fuels in the wildland-urban interface: community perceptions of agency fuel treatments. <i>International Journal of Wildland Fire</i> 20:340-349.</p> <p>McCaffrey S., M. Stidham, E. Toman and B. Shindler. 2011. Outreach programs, Peer Pressure, and Common Sense: What motivates homeowners to mitigate fire risk? <i>Environmental Management</i> 48(3): 475–488</p>	Completed

	<p>Olsen, C. and B. Shindler. 2010. Trust, acceptance, and citizen-agency interactions after large fires: influences on planning processes. <i>International Journal of Wildland Fire</i> 19(1): 137-147.</p> <p>Shindler, B., E. Toman and S. McCaffrey. 2009. Public perspectives of fire, fuels, and the Forest Service in the Great Lakes Region: a survey of citizen-agency communications and trust. <i>International Journal of Wildland Fire</i>, 18:157-164.</p> <p>Toman, E., B. Shindler, J. Absher and S. McCaffrey. 2008. Postfire communications: the influence of site visits on local support. <i>Journal of Forestry</i> February:25-30.</p> <p>Toman, E., B. Shindler and C.S. Olsen. 2008. Communication Strategies for post-fire planning: lessons learned from forest communities. In Chavez, D.J., Absher, J.D., and P.L. Winter (eds.). <i>Fire social science research from the Pacific Southwest Station: studies supported by National Fire Plan funds</i>. USDA Forest Service General Technical Report PSW-GTR-209. Albany, CA: Pacific Southwest Research Station. Pages 165-180.</p> <p>Olsen, C. and B. Shindler. 2008. Citizen-agency interactions in planning and decision-making after large wildfires. USDA Forest Service General Technical Report, PNW-GTR-715. Pacific Northwest Research Station, Portland, OR.</p> <p>Toman, E. and B. Shindler. 2008. Wildland fuel management: principles for effective communication. In S. McCaffrey (ed.) <i>The Public and Wildland Fire Management</i>. USDA Forest Service General Technical Report, NC-GTR-001. Northern Research Station.</p>	
<p>Other research publications and reports</p>	<p>Shindler, B., R. Gordon, S. McCaffrey and E. Toman. 2011. Collaborating for Healthy Forests and Communities: A Guide for Building Partnerships Among Diverse Interests. A companion to the video program <i>Collaborating for Healthy Forests and Communities</i>. Joint Fire Science Program. Oregon State University. 18p.</p> <p>Stauth, D. 2011. Fire brings communities together across the West. An associated press story about the current research project on building fire-safe communities. Oregon State University News and Research Communications. Corvallis, OR. June 30.</p> <p>Shindler, B., E. Toman and S. McCaffrey. 2010. Changes in Public Responses to Wildland Fuel Management Over Time: Lessons from Forest Communities. Joint Fire Science Program <i>Fire Science Brief, Issue 102</i>.</p> <p>Shindler, B., A. Mallon, R. Gordon and L. Kruger. 2010. The Northeast Washington Forestry Coalition: a citizen-agency partnership that works. Joint Fire Science Program <i>Fire Science Brief, Issue 121</i>.</p>	<p>Completed</p>

	<p>Shindler, B., E. Toman and S. McCaffrey. 2009. Social science at the wildland urban interface: future research needs. Advisory report for the Joint Fire Science Program Board of Directors.</p> <p>Shannon, P. and B. Shindler. 2009. Agency communication and planning strategies following large fires. Oregon State University Research Report. Corvallis, OR. 29p.</p> <p>Maier, C. 2012. Building Social Capital through Community-Agency Collaboration. Masters Thesis. Oregon State University.</p>	
<p>Conference and workshop presentations</p>	<p>Toman, E., M. Stidham, S. McCaffrey, and B. Shindler. 2012. People and fire: a review of social science research. Presentation at the Janet Meakin Poor Research Symposium. Chicago, IL. October 26.</p> <p>Stidham, M., S. McCaffrey, E. Toman, and B. Shindler. 2012. Community perceptions of fuels management in the wildland-urban interface. Presentation at the Fifth International Fire Ecology and Management Congress: Uniting Research, Education and Management. Portland, OR. December 3-7.</p> <p>McCaffrey, S. 2012. The public and wildfire: conventional wisdom versus reality. Plenary presentation at the Fifth International Fire Ecology and Management Congress: Uniting Research, Education and Management. Portland, OR. December 3-7.</p> <p>Shindler, B. 2011. Agency-community interactions at the wildland urban interface: a changing dynamic. Presentation at the Society of American Foresters Conference—<i>Forest Restoration beyond Fuel Reduction: What is the Vision?</i> Bend, Oregon. October 12-14.</p> <p>McCaffrey, S. 2011. Effective communication in the WUI: Selected findings from social science research. California Department of Forestry and Fire Protection's Fire and Resource Assessment Program, Sacramento, CA. June.</p> <p>McCaffrey, S. 2011. Social aspects of wildfire. Keynote presentation at the Northern Rockies/ Great Basin Fire Education and Prevention Conference. West Yellowstone, MT. April.</p> <p>McCaffrey, S. 2011. Effective communication in the WUI. Building a Fire Adapted Community Network. Presentation at the Forum for Leaders in the Wildland Urban Interface. Reno, NV. March.</p> <p>Maier, C. and B. Shindler. 2011. Building social capital through community-agency collaboration. Presentation at the 17th International Symposium on Society and Resource Management. Madison, WI. June 4-8.</p> <p>Stidham, M., S. McCaffrey, E. Toman, and B. Shindler. 2011. Defensible space outreach programs: a tale of six communities.</p>	<p>Completed</p>

	<p>Presentation at the 3rd Human Dimensions of Wildland Fire Conference. International Association of Wildland Fire. Seattle, WA. April 16-19.</p> <p>Stidham, M., E. Toman, S. McCaffrey, and B. Shindler. 2010. Improving an inherently stressful situation: the role of communication during wildfire evacuations. International Association of Wildland Fire 2nd Human Dimensions Conference, San Antonio, TX: April 26-29.</p> <p>Olsen, C. S. and B. Shindler. 2010. Citizen Acceptance of Post-Fire Management Strategies: Community Responses After Two Large Fires in Oregon. Presented at the 2nd Human Dimensions of Wildland Fire Conference. San Antonio, Texas. April 26-29.</p> <p>McCaffrey, Sarah. 2010. Fire and society: selected findings from social science studies related to fire management. Symposium Up in Flames: Fire in a Changing Environment. AAAS Annual Meeting. San Diego:February 18-22.</p> <p>Toman, E, J. Bennett. 2010. Longitudinal Analysis of Public Response to Wildland Fire and Fuel Management. Presented at 16th International Symposium on Society and Resource Management. Corpus Christi, TX. June 4-7.</p> <p>McCaffrey, S. 2010. Social acceptability of fire management: Selected findings from social science research. California Interagency Fire Prevention Conference. Rancho Mirage, CA. May.</p> <p>Toman, E., M. Stidham, S. McCaffrey, and B. Shindler. 2010. Improving an inherently stressful situation: The role of communication during wildfire evacuations. Presented at 2nd Human Dimensions of Wildland Fire Conference. San Antonio, TX. April 26-29.</p> <p>Shindler B., E. Toman and S. McCaffrey. 2010. Longitudinal Analysis of Public Response to Wildland Fire and Fuel Management. Presented at 2nd Human Dimensions of Wildland Fire Conference. San Antonio, Texas. April 26-29.</p> <p>McCaffrey, S., E. Toman, and B. Shindler. 2010. Homeowners and Defensible Space: Motivation to maintain and the role of local programs. Presented at 2nd Human Dimensions of Wildland Fire Conference. San Antonio, TX. April 26-29.</p> <p>McCaffrey, S. 2010. Talking fire without getting burned: Selected findings from social science research. Northern Region Coordinating Group, Connecting the Dots Workshops. April.</p> <p>McCaffrey, S. 2010. Selected fire social science findings. Presentation to Regional Fire Prevention Coordinators Meeting. Washington, DC. February.</p>	
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	<p>McCaffrey, S. 2010. Talking fire without getting burned: Selected findings from social science research. NIFC Public Affairs/Public Information Officer Webinar. February.</p> <p>Shindler, B. 2010. Challenges for communities at risk of wildfire: Comparing U.S. and Australian experiences. Charles Sturt University Research Forum, New South Wales, Australia. November 5.</p> <p>McCaffrey, S. 2010. Findings from social science studies related to fire management. California Fire Alliance. Fresno, CA. March 24.</p> <p>Shindler, B, E. Toman, and S. McCaffrey. 2010. Longitudinal analysis of public response to wildland fire and fuel management. Humans Dimensions of Wildland Fire Conference. International Association of Wildland Fire. San Antonio, TX. April 26-29.</p> <p>Gordon, R., B. Shindler, E. Toman, and S. McCaffrey. 2010. Creating fire-safe communities: building partnerships within the WUI. Humans Dimensions of Wildland Fire Conference. International Association of Wildland Fire. San Antonio, TX. April 26-29.</p> <p>Toman, E. 2009. Impacts of Fire Social Science Research: Information for Managers. School of Environment and Natural Resources. The Ohio State University and Ohio Agriculture Research and Development Center. April 15.</p> <p>Bennett, J., E. Toman, B. Shindler, and S. McCaffrey. 2009. Wildland fire and fuel management: an analysis of factors influencing public acceptance. Society for Risk Analysis Annual Meeting. Baltimore, MD. December 6-9.</p> <p>Shindler, B. 2009. Social Science Fire Research in the United States. Charles Sturt University Community Stakeholder Workshop, New South Wales, Australia. August 10.</p> <p>McCaffrey, S., E. Toman and B. Shindler. 2009. Public views of fire management – from prescribed fire to suppression. Joint Fire Science 10 Year Symposium, 4th International Fire Congress. Savannah, GA. December 1-4.</p> <p>McCaffrey, S., B. Shindler, and E. Toman. 2009. Longitudinal analysis of public responses to wildland fire and fuel management. Poster presented at 4th International Fire Ecology and Management Congress. Savannah, GA. Dec 1-4.</p> <p>Toman, E., B. Shindler, S. McCaffrey. 2009. Public perspectives of fire, fuels, and the Forest Service in the Great Lakes Region. Poster presentation at Midwest Jack Pine Symposium. Odanah, WI. August</p> <p>Toman, E. and B. Shindler. 2008. Agency outreach and fire management: communicating the wildland fire message. Presentation at the California Interagency Prevention, Mitigation, and Education Conference. Sacramento, CA. November 15.</p>	
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	<p>Olsen, C. and B. Shindler. 2008. Citizen-agency interactions in Oregon communities after large wildfires. Presentation at the International Symposium on Society and Resource Management. Burlington, VT. June 3-6.</p> <p>Shindler, B., S. McCaffrey, E. Toman, and M. Stidham. 2008. Organized and conducted the national workshop <i>Wildland Fire Summit: A Decade of Social Science Research</i>. Eighteen of the top research social scientists working on wildland fire issues, many for the JFSP, convened to consider and examine our current knowledge about creating fire-safe communities. Portland, OR, August 4-6.</p>	
Courses developed	FOR 454/554—Managing at the Wildland-urban Interface: Creating Fire-Safe Communities. Course for undergraduate and graduate students at Oregon State University. Taught 2010-2012 by Bruce Shindler and Christine Olsen.	Ongoing
Field Tours and Demonstration	<p>Shindler, B., S. McCaffrey and C. Olsen. 2012. Fuel reduction strategies in the wildland urban interface. Field tour for scientists/managers associated with JFSP research projects. Deschutes NF, September 18.</p> <p>Shindler, B. 2010. The role of citizen-agency collaboratives in planning fire management strategies and fuel reduction activities. Central Oregon Interagency Outreach Program. Bend, OR: September 15-16.</p>	Completed