

**Human Dimensions Research Related to Wildland Fire:
An Annotated Bibliography**



Vanessa Campbell
College of Natural Resources
Department of Forest
Resources
University of Minnesota
St. Paul, Minnesota

Dorothy H. Anderson
College of Natural Resources
Department of Forest
Resources
University of Minnesota
St. Paul, Minnesota

Pam Jakes
USDA Forest Service
North Central Research
Station
St. Paul, Minnesota

April 2003

Introduction

As the number of people living in forested areas continues to grow, so does the probability that more people living in the wildland-urban interface will experience a wildfire on or near their property at some point in time. Wildfire impacts are costly not only to individuals experiencing them, but also to communities in which these individuals reside. Little research has been conducted that would aid agencies in their efforts to help homeowners and others living in fire-prone areas reduce fire risks to themselves and their property. Most of the research is relatively new and is scattered about in various journals, workshop and conference proceedings, and other gray literature.

This annotated bibliography was prepared for land managing agencies and other stakeholders interested in developing policies and procedures to lessen the effects of wildfires on communities and individuals and also interested in understanding the behaviors of people who have experienced damage to their home as a result of a wildfire event. This bibliography is also intended to assist researchers identify gaps in knowledge about how homeowners respond and why they respond in the manner they do to wild fire events.

The literature included in this bibliography is grouped into six categories:

1. general wildland-urban interface issues (2);
2. community response to wildfire (3);
3. county, state, and federal response to communities experiencing wildfire (6);
4. homeowner attitudes towards wildfire prevention (8);
5. homeowner and community wildfire prevention behavior (5); and,
6. county, state, and federal actions toward wildfire prevention (2).

The number following each of the six categories represents the number of studies we found relevant to the category. As is readily seen, there is not much research in this area. A greater focus on the issues raised in each category would seem appropriate given the number and intensity of and the loss of life and property attributed to wildfires in the past few years.



Fire spares one house, consumes another.
<http://www.tricityherald.com/hanfordfire/art/spared.html>

General Wildland-Urban Interface Issues

Keywords and phrases: urban-wildland interface problems and conflicts, problem background, future suggestions

Cortner, H.J., and R.D. Gale. 1990. People, fire, and wildland environments. *Population and Environment* 11(4): 245-257.

In this article, the authors discuss the urban-wildland interface problem, what has been done to date about the problem, where to go next, and how to work towards a solution. Fires originating in the forest threaten homes in the wildland environment. The presence of people in this environment threatens the wildland resources. The presence of more people and homes in the urban-wildland interface also affects the kind of emergency situations occurring in these settings. For example, wildland firefighting crews respond to structural fires, vehicle and motorhome fires, medical emergencies and hazardous material spills. However, wildland firefighting crews are not equipped nor trained in these situations. In response to the differences in wildland firefighting crews and structural firefighting crews, the firefighting community has begun to share firefighting responsibilities in these areas. But, along with shared responsibilities come difficult questions such as who should pay for fire fighting and who should train firefighters in both structural and wildland firefighting techniques.

Beginning in the mid 1980s, the urban-wildland fire problem came to the attention of several federal agencies. Agencies such as the USDA Forest Service, National Fire Protection Association (NFPA) and the U.S. Fire Administration of the Federal Emergency Management Agency began to join forces and focus resources specifically on urban-wildland fire issues. Since the 1980's several task forces and conferences have addressed these issues. Recurring themes from these groups have called for expanding urban/wildland interface issue to a wider audience, supporting and/or developing technological improvements for the creation of fire-safe buildings, and evaluating available policy options to deal with the urban/wildland hazard.

A 1985 fire in Palm Coast, Florida illustrates the problems and opportunities that occur when wildland fire, people and developments meet. During the 1985 Palm Coast fire, 99 expensive homes were destroyed in only a few hours. A study was conducted shortly after the fire to determine why some houses burned while others did not. The results indicated that when fire burned in the crowns of trees, more homes burned than when fires moved along the ground. Brush clearance around homes and type of soffit vent used in home construction were also related to the risk of fire damage to a home. For instance, fire risk was lessened when brush was cleared around homes and homes that contained fiberglass soffit vents burned more often than those with plastic or metal vents. One change that has taken place since the

fire is the addition of another firehouse in the community. Compared to other fire prevention measures homeowners might take on their lands and in the design and construction of their homes, though, fire experts believe adding another firehouse offers little fire prevention.

Chase, R. 1993. "Protecting People and Resources from Wildfire: Conflict in the Interface." *Culture, Conflict, and Communication in Wildland Urban Interface*. Ewert, A. et al. (eds.).

The author gives a brief background to the wildland-urban interface fire problem. Chase defines the classic wildland-urban interface as the place where urban sprawl places subdivisions of homes and other structures in direct contact with the wildland. Chase goes on to say that the wildland-urban interface fire problem is a result of fire-prone homes, or other structures, and facilities built and maintained in a manner that leaves them vulnerable to fire. On the face of it, this problem seems to suggest a lack of information on how to create and maintain a fire-safe environment. But, the author suggests the main problem is not one of lack of information but rather one of how to motivate people to use the information available to them.

In a 1987 survey of fire managers, the highest research priorities in the wildland-urban interface were: 1) the need to understand why people put themselves at risk in highly flammable areas and 2) what motivational tactics can be used to change this behavior. With regards to identifying responsibility, many groups contribute to unsafe conditions that put homeowners, other occupants, and visitors at risk from wildfire in the interface. The author states that although the burden of responsibility is often assigned to those who live in the wildland-urban interface, the responsibility should be shared by a number of individuals including designers, developers, governmental bodies, insurance carriers and financial institutions. Given the large number of individuals that fail to recognize unsafe conditions or fail to take corrective action, the burden of mitigating fire risks often falls to government and commercial sectors. Yet, some within these sectors may not be well equipped or motivated to assume this role. Chase goes on to say that economic disincentives may also be a reason people risk destructive wildfire events. Disincentives are especially important when the benefits of additional costs to protect homes and property are not or cannot be clearly and objectively demonstrated.

Finally, the author states that no single solution will lead to a reduction in the wildland fire threat to life and property. Residents, community planners, developer, builders, financial institutions, and fire agencies can all work to find solutions by first accepting responsibility for their part in wildland-urban interface issues.

Community Response to Wildfire

Keywords and phrases: fire prevention planning, human services mobilization, resident perceptions and attitudes following wildfires



Benton City residents cope with destruction. <http://www.tri-cityherald.com/hanfordfire/art/victims.html>

Quemazon Communities, Inc. 2001. *Landscaping Master Plan: Cerro Grande Rehabilitation.*
<http://www.quemazon.com/cerrogrande.htm>

In 2000, the Quemazon community (located in New Mexico) was damaged by the Cerro Grand Fire. After the fire, local landscaping experts worked to develop a long-range landscape master plan to restore the area's natural beauty. The plan focused on soil improvement and erosion control, native "fire-wise" plantings, and irrigation to encourage plant growth. The goals of the plan included "stabilizing the area's ecosystem, restoring its natural beauty and minimizing future fire hazards."

Gordon, N. and Maida, C. 1992. *The immediate community response to disaster: The East Bay Hills fire*. Quick Response Research Report QR51. Boulder, CO: Natural Hazards Research and Applications Information Center, University of Colorado.

The authors examine the immediate community response to the East Bay Hills Fires of 1991. Specifically, the authors looked at how human services were mobilized and delivered in the affected communities within one month of the fires' occurrences. An interview form was developed to assess the immediate post-disaster needs. Criteria from the Federal Emergency Management Agency (FEMA) and the National Institute of Mental Health (NIMH) were used to develop the interview form. Once the interview form was developed, interviews were conducted with 40 individuals representing the following groups: 1) sixteen administrative and clinical staff from seven agencies representing public mental healthy and hospital-based mental health, 2) fourteen clinicians from the private sector who volunteered services to public mental health agencies and to the American Red Cross, and 3) ten administrative staff from human services organizations in the non-profit sector who provided a wide range of services to disaster victims.

Results indicated that public mental health agencies delivered a wide range of disaster mental health services for fire victims including crisis counseling, outreach to disaster victims, critical incident stress debriefing, assistance to fire and law enforcement personnel, school-based and hospital-based interventions, community organization, training and education. Paid professional staff and volunteer psychologists, social workers, trained counselors and psychiatrists provided services to fire victims. Within the non-profit sector, service providers included nurses, health educators, social workers and administrative personnel. The media was key in disseminating information to fire victims about available services. All the mental health agencies prepared press releases and public service announcements for print and electronic media.

All agencies began delivery of their services immediately or during the first week after the fire. All of the public and non-profit agency respondents perceived their efforts as effective or very effective in the immediate aftermath of the fires. The demand for services by fire victims varied, though. Fewer demands than expected were received at the Disaster Assistance Center and various other outreach locations.

All respondents reported being well prepared for this disaster because of their participation in previous community-scale crises. All respondents were familiar with the other crisis services available but coordination among the providers varied. Obstacles to service delivery varied among agencies. Some examples of obstacles faced by the providers include: (a) lack of coordination and cooperation with other mental health jurisdictions and emergency services providers, (b) problems in dissemination of information about services, (c) organizational problems in service delivery due to a lack of knowing

where services should be located, (d) staffing problems, (e) confusion about the location of services, (f) too many volunteers, and (g) a lack of sensitivity of some agencies to specific issues such as the needs of the homeless.

Respondents recommended that planning efforts for future disasters should take into account a number of problem areas including: (1) better integration of mental health efforts through ongoing coordination, (2) better assessment of mental health needs, (3) integration of support groups, (4) provision of more comprehensive information to workers regarding where services are available, (5) clarification so that mental health workers can gain access to emergency services, (6) increased disaster planning, training, and availability of funds, (7) fuller access to underserved and vulnerable populations through better coordination, (8) better community-wide coordination, (9) rapid assessment of technical needs, and (10) a phone line set aside exclusively for disaster victims and their needs.

Halvorson, Sarah J. 2002. *The Fires of 2000: Community Response and Recovery in the Bitterroot Valley, Western Montana*. Boulder, Colo.: Natural Hazards Research and Applications Information Center; Quick Response Research Report #151. 18 pp. MT, Bitterroot Valley.

Halvorson examined the impacts of the firestorms of 2000 on western Montana. The study focused on local response and recovery of mountain communities (situated in the wildland-urban interface) of the Bitterroot Valley. The study was an on-site research effort during the fires and for one year afterwards to provide data regarding local residents' knowledge of and reaction to the fire hazard. Three main study questions were investigated: (1) How did local residents perceive the fires and their effects on the valley; (2) in what ways were communities affected by the fires; and (3) what innovative elements of response and recovery were adopted by individuals and/or communities to cope with the firestorms. The study results indicated that everyone, in general, felt impacted by the fires directly or through the loss of property. A major concern of the participants was the impact of the fire hazards, smoke, and road closures on local businesses, work, school activities, and human health. Through interviews and conversations, it was clear that these fires were the most serious natural hazard most residents had experienced and that everyone, especially children and elders, were traumatized by it.

Overall, two themes emerged from the perceptions of fires. The first theme includes an expressed understanding of the ecological role of fire but a need to manage the fires at some level because of the unnatural conditions resulting in fire suppression. A second strong theme was the public's opinion that

the government agencies, public land managers and others just let the fire burn in a senseless and dangerous manner.

Response to the fires included external aid from established governmental and nongovernmental agencies. In addition to these external sources, a number of community-based informal and formal networks established by residents came into action. This participation of residents in the recovery was an opportunity to learn new skills, to get to know other residents and to do “the right thing.” A strong sense of community emerged during and after the fires and was fundamental in the response and recovery process.

The authors offer several recommendations. First, policy responses need to focus on educating the public, especially new residents, about the realities of wildfire hazard and about how to alter their behavior to reduce the risk. Conversations and interviews with long-time residents suggest they understood the fire hazards in their area and have adapted to these hazards. The newcomers seemed more astonished by and outspoken about the fires and were frustrated with the lack of 911 services. Second, policy responses need to reflect the long-term effects of fire-related disasters on residents and the requirement of long-term psychological, emotional and environmental adjustments. Third, support of community-based response networks can facilitate the response and recovery process and enhance the work of external emergency response agencies.

County, State and Federal Response to Communities Experiencing Wildfire

Keywords and phrases: federal directives, resident education, preventive methods, agency response recommendations



Red Cross assists West Richland resident <http://www.tri-cityherald.com/hanfordfire/art/pic1.html>

Bureau of Land Management. 2002. *Communities at Risk: Wildland-Urban Interface.*
<http://www.or.blm.gov/Vale/Fire/communities_at_risk.htm>

In response to the 2000 fire season, the President Bill Clinton directed the Departments of Agriculture and Interior to increase investments in projects to reduce the risk of wildfire in the wildland-urban interface. In response to President Clinton's request, the Vale District of the USDI Bureau of Land

Management (BLM) in Oregon is in the process of forming partnerships with local government to address wildland-urban interface issues. The Vale District which manages 5.1 million acres of public land in eastern Oregon has identified communities at risk and has produced final mitigation recommendations and assessment reports for each (listed on website). The reports identify the goals and objectives, background, existing situation, public comment, need for action, methodology, and proposed projects (and priority) for the particular community at risk. The goals and objectives are similar in all reports. For example, the Jordan Valley, Arock, Rome Assessment Area goals are to evaluate the hazards of wildland fire within the assessment area and then identify specific actions that could reduce the risks and the objectives are to decrease the chances of wildfire spreading from public lands onto private lands, while correspondingly decreasing the risk of wildfire spreading from private lands onto public lands. Recommendations are specific to each at risk community. For example, for the Huntington Assessment Area, recommendations included fuel reduction by installing fuel breaks and initiating fuels reduction/high-moisture replanting; and education outreach by implementing community-wide outreach programs and annual Firewise clean-up day.

Clark, L. and Hardy, K. 1997. 1996 Alaskan wildland-urban interface fire: A catalyst for public involvement. *Fire Management Notes* 57(4): 7-9.

The authors discuss the educational efforts put forth in Alaska after the disastrous Miller's Reach Fire of June 1996. Previous to this fire, Alaskans in general believed that fires burned communities elsewhere but not in their backyard. This attitude drastically changed after the 1996 fire. While the Miller's Reach Fire was still burning, the interagency Alaska Wildland Fire Coordinating Group (AWFCG) began to develop a plan to educate the public about how to protect life and property from future wildland fires. The AWFCG not only wanted to work with the problems of the Miller's Reach Fire but also wanted to meet and share fire protection information with communities across Alaska.

The goals of the AWFCG included teaching people about fire prevention and what they could do to protect their families, homes, and property before wildland fires threatened. The team believed that once homeowners realized they resided in a wildland-urban interface and face threats from not only fires starting within their homes or communities but wildland fires burning into their developed areas as well, they would be willing to learn how to minimize risks from wildfire. Through community meetings and individual home visits, the Fire Protection Teams worked with individual families to identify fire risks and opportunities. The teams also produced a defensible space training program oriented towards Alaska

ecosystems and residents. The efforts put forth by the AWFCG ultimately helped Alaskans understand how to move toward making fire prevention and preparedness a way of life

Cortner, H.J., R.M. Swinford, M.R. Williams. 1990. Wildland-Urban Interface Emergency Responses: What Influences Them? *Fire Management Notes* 51(4).

The FS initiated and jointly conducted a study with the authors that examines agency policy and the actions national forest managers have taken or anticipate they will take to respond, equip, and train wildland firefighting crews in the area of structural fire, search and rescue, emergency medical assistance, and hazardous materials handling. The Forest Service is interested in examining such issues because agency response to structural fires, vehicle fires, vehicle accidents and other emergency situations is increasingly needed. Managers, crews, and cooperators are concerned whether their wildland training and equipment prepare them for such emergency response situations. One major issue is that the public does not see a difference between federal, state, and local jurisdiction for fire fighting and therefore expects agency response to emergency situations regardless of the type of situation. The public does not understand the difference between wildland and structural firefighting and expects help from individuals dressed as emergency personnel regardless of their training and equipment. To avoid the public expectation of agency response to all emergency situations, the authors suggest reducing the presence of federal fire-fighting teams and equipment. The authors suggest one way of reducing federal presence is to contract federal services for wildland fire-fighting to local providers and allow local authorities to oversee both structural and wildland fire-fighting operations. Yet, forest management does not believe this is a good idea. In addition, wildland firefighting teams are increasingly responding to structural fires due to cooperative agreements that require the unit closest to the incident to respond regardless of the jurisdictional boundaries. Therefore, the reducing agency visibility may not be feasible because of such cooperative agreements. Cooperators and forest personnel believe there is no going back; both structural and wildland firefighting crews need each other to survive. Forest Service personnel often travel to areas outside their local area and need to be ready to encounter structural situations as well as other emergency situations even if they are not responsible for this within their community.

The authors also discuss how suppression priorities are not specifically identified by the Forest Service, which leads to individual agency interpretation of the priorities. For example, in Oregon, state officials stated that fire suppression priorities are life, natural resources, and personal property in that order. The authors predict that placing natural resources over personal property will not prove to be

feasible because it is not clear who will be the guardian of the natural resources and speak on its behalf when decisions are made to permit urban expansion into the interface. The authors conclude that policy revisions and clarification, innovative management actions, options to minimize public expectations, and cooperation among all emergency response organizations are needed to prevent, plan for, and respond to interface emergencies.

Duncan, F. 1997. How a community heals: Lessons learned from Buffalo Creek. *Fire Management Notes* 57(3):11-14.

The author, a public involvement coordinator, discusses her observations following wildfire and floods in the wildland-urban interface of Buffalo Creek, Colorado. Six lessons learned from her personal experience as the public involvement coordinator are offered for agencies: 1) let people do what they need to do, 2) be visible and be available, 3) establish and strengthen communication lines, 4) model the behaviors you most want people to practice, 5) act for a reason with a reason, and 6) practice anthropology in community relations. The author points out that people have the ability to react very quickly and effectively during catastrophic events. Their initial fight-or-flight nature dissolves into exhaustion, fear, and anger, and then productivity, organization, focused thoughts, and deeds.

The author gives examples of the six lessons learned. With respect to letting people do what they need to do, the author discovered a highly energized group of community members that had formed the Buffalo Creek Crisis Committee. This group asked to be listened to, so the incident team listened. The team attended the Crisis Committee's meetings each morning. By doing so, the members of the community and the agencies were able to merge goals, objectives, and action plans for their community. With regards to being visible and available, the author believes the agencies' first interactions with the community and their presence on site was extremely important to members of the community. In this case, the Forest Service District representatives and other agency representatives answered questions, led tours, met with friends and neighbors in the community center, and attended community meetings and fundraising events. In addition to visibility, availability, and communication, the author suggests encouraging community members to become involved in all public functions involving the fire area as a means of modeling the behaviors you most want people to practice. For example, the author suggests that community members share their wildland fire experiences with students and scout groups.

As a means of practicing anthropology in community relations, the author contacted a local school about the opportunity to become a participant in the adoption of the drainage area in Buffalo

Creek. This opportunity enabled students to learn more about residents' experiences and scientists' research in their area.

Lavin, M.J. 1997. Managing fire risk to people, structures, and the environment. *Fire Management Notes* 57(4): 4-6.

The author argues that the current need in the wildland-urban interface problem is to recognize that fire risk can be managed and must be managed. Residents of the wildland-urban interface must be aware of the threat of wildfire spreading from forested or wooded areas to their homes. Everyone must work together on this issue including the insurance industry, natural resource management agencies and homeowners. The author states that these entities, along with others, must consider how they can, must, and will manage the risk of fire to people, structures, and the environment. These very same entities often working together with governmental agencies have accomplished some of the best examples of successful reduction of the risk of wildland fire to communities.

The author offers the example of Shenandoah County, Virginia. This community has an interagency partnership funded by the USDA Forest Service and the Virginia Department of Forestry aimed at protecting forest homes. Educational programs are key in helping residents understand how they can make their property "firewise." The most important component of an effective wildland-urban interface strategy is the landowner. Yet, the experts in land management planning at the state and federal levels must also support individual efforts. Perhaps most importantly, insurance companies must also support individual efforts.

An example of such collaboration is evident in the "Wildland-Urban Analysis Rating Plan." This program is sponsored by the State Farm Fire and Casualty Company and carried out by the Insurance Services Office in Orange County, California. The program calls for the collection of information about specific characteristics of a property and develops an overall grade for the risk.

Federal assistance is also a significant support for individual residents or entire communities addressing wildland-urban interface issues. Federal assistance could include: identification of high-hazard areas, fuel modification and reduction, prevention of unwanted fires, firefighter training, and public awareness and education. The author ends by restating that no one entity will be successful in addressing the issues of the wildland-urban interface. The individual homeowner, government agencies, and

insurance companies must join forces, expertise and effort to address the challenges faced in the wildland-urban interface.

Lichtman, P. 1998. The politics of wildfire-lessons from Yellowstone. *Journal of Forestry* 96(5): 4-9.

Lichtman discusses the public response to the 1988 Yellowstone fires. The general public's attitude toward the fire was that the government's fire policy had failed since they were unable to stop the fires. The popular mindset was that the fire was evil and needed to be stopped. Journalists expressed the sentiment that the fires were somebody's fault. The firefighting effort during the fire was largely driven by public outcry from those who saw the fires as a result of policy failure. In response to the public, the federal agencies conducted a number of policy reviews leading to only minor adjustments. The author suggests that if one believes the fires were a policy failure, then one's trust in the land management agencies was betrayed and points to the agencies' response towards the public as one of lies and ultimately cost the agencies the public's confidence and damaged the agencies' credibility.

The authors recommend that the agencies try to restore the public confidence in federal land management and develop processes that allow for genuine public dialogue about issues such as wildfires. In addition, the author recommends the agencies' communicate an honest appraisal of how much control humans have over wildfire to the public.

Homeowner Attitudes Toward Wildfire Prevention

Keywords and phrases: perception of risk, attitudes toward mitigation strategies, media impact on attitudes, knowledge, policy preferences, responsibility, willingness to pay, education impact on attitudes and perceptions



Resident battles blaze. <http://www.tri-cityherald.com/hanfordfire/art/firebenton.html>

Abt, R.C., M. Kuypers, and J.B. Whitson. 1990. Perception of Fire Danger and Wildland/Urban Policies After Wildfire, in *Fire and the Environment: Ecological and Cultural Perspectives: Proceedings of an International Symposium*. Knoxville, TN.

The authors discuss a study conducted after a devastating wildfire burned through Palm Coat, Florida in 1985. The study examined homeowner perception of wildfire threats as well as homeowner attitudes toward various mitigation strategies. A mail survey was used to gather information about the residents and their perceptions of wildfire. The survey was mailed to two groups of people. One group lived in an area that was burned in the 1985 fire. The other group lived in a nearby area unaffected by the

1985 fire. All residents in these two areas were surveyed. Survey questions included: demographic information, residents' perception of wildfire threat, wildfire mitigation measures taken by residents, and residents' attitudes toward mitigation options.

Study results indicate that residents consider wildfire a major threat to their community. The perceived threat of wildfire was related to age, personal wildfire experience, and income. Overall, respondents over 65 years of age and residents who has experienced a wildfire were more likely than the rest of the respondents to consider wildfire an extreme threat. Middle-income (\$40K-\$50K) residents rated wildfires as less of a community threat than others. Seventy-seven percent of respondents reported they had taken some sort of precaution against wildfire. The probability of a resident taking safety measures against wildfire was positively related to whether the resident or a close friend had experienced wildfires. Ninety-three percent of safety measures were taken after the 1985 wildfire. Overall, the residents favored any and all mitigation measures mentioned in the survey. However, highly educated residents tended to be less open to government intervention than the rest of the respondents. The authors offer no recommendations.

Beebe, G.S. and Omi, P.N. 1993. Wildland burning: The perceptions of risk. *Journal of Forestry* 91(9): 19-24.

The article first examines the general realities of wildfire including the impact of media coverage on the general public. The authors discuss how media coverage can elicit both positive and negative effects. For example, media coverage could lead homeowners to clear flammable vegetation from their property, or on the other hand, could lead to widespread opposition to burning even under prescribed conditions. The authors suggest that the general public estimates risk with varying degrees of accuracy and with a tendency to overestimate risk from hazards they fear. Risk estimates by the public are also influenced by the memory of past events. As a result, hazards strongly communicated in the media can seem more threatening to the public than they actually are.

In addressing the Oakland hill area California, the author suggests people have a remarkable ability to live in hazardous places with calmness by denying that a hazard is likely to occur or by discounting its potential impact. Even increased awareness about risk typically causes no behavioral changes. Most faced with the risk of low-frequency natural hazards prefer to wait for the event to occur and then respond, rather than take precautions to minimize risk. Residents of calamity-prone areas can relocate but rarely do. The authors point out that although the cost of rebuilding after a massive disaster

can be expensive, insurance spreads costs among large groups of people, which in turn reduces individual motivation for effective risk reduction. Insurance ultimately encourages continued residence in high-risk areas. In addition, emotional attachment to place or stubbornness may also prevent relocation. The authors suggest that the only sure modifier of risky behavior may be experiencing a wildfire.

Perception of risk tends to run through periods of boom and bust. Much risk literature points to the media as shaping public perception of risk and supporting these bust and boom cycles. Failure of residents to lower risk to their homes may be attributed to the idea that government will protect them from natural hazards. Public reaction to wildfire suggests that many Americans want competent professionals to manage fire flawlessly—reduce the risks to life, property and public lands. The authors conclude that fire professionals must be free to make hard choices and realize the choices may not result in flawless fire management.

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

In this article, the authors present data from a number of previous surveys that looked at public attitudes toward wildfire management at the urban-wildland interface. Comparisons of survey results offers a coherent way to begin addressing the question of what the public expects of the public land management agencies in urban-wildland fire situations. Drawing from analysis done by the authors and from others, the article addresses the following topics: (1) changes in public knowledge and perceptions of fire policies and fire hazards over time, (2) policy responses homeowners prefer as a way of preventing and mitigating urban-wildland fire hazards, and (3) citizens views of their own obligations as participants in urban-wildland fire interface issues. The authors conclude that the surveys conducted to date have demonstrated that public attitudes toward fire have changed over the past two decades. For example, in the late 1960s and early 1970s, the public generally believed all fires to be bad. Studies done in the 1970s began to document a shift toward public willingness to support more flexible fire policies. In the 1980s, studies found that the public believed that fires could have beneficial effects.

The authors found only a few studies focus specifically on public attitudes toward urban-wildland fire issues that could help them determine how aware residents are of the urban-wildland fire hazard and what kinds of risks they assign to potential fire. Studies by Corner and Gardner (1985 and 1988) have found that the majority of homeowners surveyed did not believe the wildland fire situation to be serious at the time they purchased their home. In addition, despite fire experience, impacted communities expressed low awareness of the fire hazard and a belief that fire would not reoccur in the area. Interestingly, the

homeowners in the non-impacted communities assigned a higher probability of future risk and were more aware of the danger of fire than the fire impacted community.

With respect to policy preferences, the authors noted Gardner and others' (1985a) study that found the majority of respondents having done nothing to minimize fire losses on their property. These same respondents were asked to rate public policies as ways to deal with the problem of wildland fires. The results indicated that respondents generally seem reluctant to support programs for which they have to carry the burden (i.e. restrictions on where people can live). Educational options were rated relatively high. Yet, experience is a major way the homeowners reported they were made aware of the wildland fire hazard.

Finally, the authors examined studies that addressed who should pay for the costs associated with wildfire. In general, there is a lack of sufficient homeowner incentives for wildfire prevention strategies. For example, in the circumstance of rebuilding after a fire, Gardner and El-Abd (1984) discovered that the Small Business Administration had given homeowners an economic advantage to not only rebuild, but to rebuild homes of higher quality and larger size. In addition, Hemenway (1987) concluded that the overall effect of insurers is to worsen rather than improve the fire problem.

The authors conclude that the studies done to date provide a starting point for the policy development and educational process. Yet, the research done to date suggests there are significant pitfalls to be avoided or overcome. Modifying individual behavior must deal with the issues of individual incentives, distribution of costs, and policy impacts. The policy design that addresses the urban-wildland interface must address the realities of public expectations as much as it addresses the realities of the biophysical environment.

Fried, J.S., Stewart, S.I., and Gilless, J.K. 1994. Objectives setting in the wildland fire system: What do customers think? In: Sessions, J. and Brodie, J.D. eds. *Management systems for a global economy with global resource concerns. Proc. Symp. on Systems Analysis in Forest Resources*, Pacific Grove, CA, Sept. 6-9, 1994, Oregon State University, College of Forestry. pp. 150-160.

The authors conducted a study to explicitly characterize and quantify benefits of wildland fire protection realized by urban-rural/wildland interface residents. Benefits they identified included reductions in residents' exposure to non-market (i.e. loss of a pretty view, death of a pet, destruction of photographs) and un-reimbursed losses such as the cost of interim housing and meals. The study area included the western townships of Crawford County, Michigan. The study sample was the residents living in highly flammable jack pine forests in the western part of the county. To extend knowledge of

general population contingent value survey reliability into risk situations, residents were stratified into three groups based on their relationship to the 1990 Stephan Bridge fire, which occurred in the study area. The three groups were: 1) unthreatened , 2) threatened , and 3) burned out. This fire damaged more than 100 homes and burned several thousand acres. The authors hypothesized that residents who had been burned out and threatened by the fire would exhibit greater willingness-to-pay (WTP) for risk reduction as a result of their recent, direct experience with wildfire impacts, than would residents who were unthreatened.

Survey results are presented for the 182 residents who made up the “unthreatened” group. The survey consisted of in-person interviews with urban-wildland interface homeowners. Survey questions included questions to assess homeowner’s expected risk of their homes burning in the event of a fire, their perceptions of their risk of house loss, their WTP for risk reduction via public and private projects and payment mechanisms, and other questions to collect ancillary preference, value, perceptual, and behavioral information.

Study results indicate that at least 46 percent of the residents surveyed over-estimated their true risk, indicating a high awareness of fire risk. With respect to WTP, most individuals were willing to pay something less than \$100—many were willing to pay nothing—and a few were willing to pay as much as \$1,000 per year. In addition, the greater the chance of a homeowner’s home being destroyed by fire the more the homeowner would pay to reduce his/her fire risks. Increased property taxes were the proposed payment for achieving the risk reductions. The authors examined residents’ feelings about taxes. Residents with the most negative impressions of property taxes had the lowest WTP. The authors concluded that using property tax in their WTP scenario may have introduced a bias that resulted in artificially low WTP estimates.

Gardner, P.D., and Cortner, H.J. 1988. An assessment of homeowners’ perceptions of wildland fire hazards: A case study from southern California. In: Whitehead, E.E. et al., eds. *Arid lands: Today and tomorrow*. Boulder, Westview Press. pp.643-657.

The authors report on a study of two residential bordering U.S. Forest Service land in southern California. Homeowners in the area were selected and interviewed in 1983. One of the communities had recently experienced a severe wildfire and the other community (located 30 miles from the first community) had no direct experience with this wildfire. Based on the interview results, a questionnaire

was designed and distributed to 120 homeowners in the fire-impacted community and 90 homeowners in the non-impacted community.

Study participants were asked to rate several community descriptors (proximity to work, quality of schools, etc.) in terms of their importance to the participant's decision to live in the community. Study participants were also asked to rate lifestyle factors that influenced their decision to purchase their home. Factors such as area aesthetics, schools, and low crime rates was rated the highest by participants in both communities and appeared to strongly influence participants' decisions to purchase their homes. Participants were asked how helpful several sources of wildland fire information were in making them aware of the risk of wildfire in the area in which they lived. Results indicate that participants were more likely to learn about the wildland fire hazard from actual experience than from information distributed in a variety of forms to them by a variety of entities.

When asked about fire characteristics, respondents recognized natural conditions (i.e., wind, climate) as important elements influencing wildfires in their respective communities. However, study participants indicated that they expect fire prevention and control technology to control the fire situation in their area. With respect to fire event responsibility, homeowners in the fire-impacted area considered state and county fire agencies more responsible for fire protection than the federal government. Participants from the non-impacted community rated the California Department of Forestry (a state agency) as most responsible followed by the U.S. Forest Service (a federal agency). Respondents from both communities were more likely to support fire protection programs sponsored by higher levels of government rather than take responsibility themselves.

With respect to awareness of the wildland fire problem, homeowners in the fire-impacted area had a lower awareness of the potential for wildfires where they lived than respondents in the non-impacted fire area. Several respondents in the fire-impacted area commented that another fire would not occur in their neighborhood. Within the non-impacted area, respondents thought that their community has the potential for a serious fire.

Respondents were asked to rate the importance of sixteen policy options for reducing wildfire risks. Four policy factors were commonly indicated as important: hazard planning, vulnerability-loss adjustment, hazard modification and control of exposure. Multiple stepwise regression was used to determine what factors influence homeowners' awareness of wildland fire hazards, their perceptions of risk posed by such hazards and their support for policies aimed at those hazards. There were noticeable differences between communities as to the factors predicting awareness, risk and response. These differences imply that contextual variables (wildland habitat, community structure, etc.) may be important determinants in policy development.

The authors conclude that people do not completely understand the physical and biological relationships of the environment in which they choose to live. Instead of modifying their behavior to live compatibly with the environment, they place more importance on technological solutions. As population continues to grow, so will the wildland fire issue.

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

The authors investigate the risk that wildland fire hazards pose to homeowners in the urban-rural interface. A survey was designed to elicit homeowner preferences for policy alternatives related to potential fire hazards and the management implications of homeowner risk perceptions and policy preferences for development and implementation of wildland fire programs. The survey included questions that addressed the homeowners perception of wildland fire risk at the time the homeowner moved into the neighborhood and their perceptions of risk at the present. The questionnaire was given to residents from two communities in Southern California's San Bernardino County. The Panorama fire had recently affected one of these communities; the other community had no direct experience with wildland fires. Questionnaires were given to 120 homeowners in the fire-affected community and 90 in the non-affected community. The results indicate that overall homeowners have a low initial awareness of the wildland fire hazard in their area. In most cases, the amenities associated with hillside residences outweigh the costs associated with a possible future fire occurrence. Awareness tends to increase over time as homeowners personally witness fire or obtain media information about fires. For the fire-affected community, results suggest residents tend to become complacent and ignore the possibility of future fires. Overall, homeowners prefer policies that physically alter the wildland landscape (i.e., a technological fix) to policies that limit their residential living options and/or place the burden of protection directly on them.

The authors conclude that fire prevention programs in high-risk areas need to be expanded to include a discussion of the danger wildland fires pose to rural landscapes converted to urban developments. In addition, education programs designed to address initial awareness should be expanded to address the perceptions that the danger has gone away once a fire has occurred in the area. Given homeowner preferences, the easiest solution appears to be to focus fire management on technical solutions. Yet, human behavior plays an important role in the severity of the problem. The authors

conclude that the challenge for the wildland manager is to increase acceptance for public policy options that change behavior.

Hamer, Norman. 2001. Can We Increase the Public Perception of Danger in the Urban-Wildland Fire Interface? In: *Public Entity Risk Institute. Reducing the Risk of Wildland-Urban Interface Fires* Fairfax, Va.: Public Entity Risk Institute.

The author recounts his experiences in the 2000 Cerro Grand Fire that occurred in Los Alamos, New Mexico. Like others, his family's home and possessions were destroyed in the fire. After the fire, he participated in a meeting with the United States Geological Survey aimed at understanding what it would take not only to make people aware of fire dangers but also to do something about it. He is unsure if they arrived at any knowledge that would be useful for future action, he but does believe we need to strive at educating people in wildfire risk areas and at motivating them to act.

The author tells several stories of people who have taken the first step in reducing fire risk and then being discouraged from doing so by neighbors, agencies and homeowner associations. For example, the author tells of a friend who has a vacation house on Forest Service Land. He wanted to replace the roof of his house with a fireproof membrane roof. However, the Forest Service insisted he replace the old roof with the same wood to keep his house consistent with the appearance of other houses in the area. He thinks that the most important thing we can do is educate people (residents, homeowner associations, agency personnel, etc.) about the fire risk and what can be done to reduce the risk of damage to property.

Loomis, J.B., Bair, L.S., and A. Gonzalez-Caban. 2001. Prescribed fire and public support: Knowledge gained, attitudes changed in Florida. *Journal of Forestry* 99(11): 18-22.

The authors examined how central Florida residents changed their knowledge and attitudes about prescribed fire after they were given educational information that included definitions of common fire management terms, descriptions and comparisons of wild and prescribed fire, and illustrations of the behavior and consequences of wildfire and prescribed fire. The questions in this survey are similar to questions asked of other homeowners in other parts of the country. The choice of questions was deliberate so that survey results from this study could be compared to survey results from other studies in other parts of the country. The Florida survey was conducted using a phone-mail-phone process.

The initial question asked about participants' knowledge about prescribed fire and what it means. Respondents indicated a lack of initial recognition of the term "prescribed fire" despite fire management education efforts and the media's discussion of fire issues. This lack of recognition may have occurred because the participants were caught off guard. Even though they lacked initial recognition of the term, respondents had similar if not greater knowledge of wild and prescribed fires than respondents of past studies. Florida respondents, however, were not as tolerant of the idea of letting wildfires burn as respondents in other parts of the country. Media coverage following Homeowners in nine counties in central Florida were chosen and asked to complete a survey that, among other things, asked the fire events may have contributed to Florida respondents' knowledge and support of prescribed burning, along with their intolerance for letting wildfires burn. The authors conclude that the educational information introduced to the Florida participants provided them with greater knowledge than they previously possessed about fires and made them more tolerant of prescribed fire than they were before educational information was provided to them.

Winter, G. and J.S. Fried. 2000. Homeowner Perspectives on Fire Hazard, Responsibility, and Management Strategies at the Wildland-Urban Interface. *Society and Natural Resources* 13: 33-49.

The authors state that little is known not only about how homeowners in fire-prone areas perceive wildland fire, but also what wildland fire policies they prefer and why. In this study the authors attempt to identify the perceptions of homeowners in the wildland-urban interface about the attributes of fire hazards along with their perceptions of alternative wildfire risk reduction strategies. The study was conducted using focus-group members who were randomly selected from a sample of homeowners who had previously taken part in a survey related to reducing fire risk. Thirty-nine homeowners from Crawford County, Michigan (location of a 1990 fire) participated. Questions presented for focus group discussion were designed to: 1) identify perceived attributes of fire hazards, 2) obtain a deeper understanding of homeowner perceptions about the division of responsibility for risk reduction, and 3) characterize homeowner preferences for various fire management strategies along with their perceptions of the attributes of these strategies that results in some strategies being favored over others.

The perception that wildfire is an awesome, uncontrollable force against which suppression activities are futile, was common in all focus-group discussions. Witnesses to the 1990 fire saw dramatic fire behavior including the destruction of homes surrounded by 300-foot defensible space buffers. Seeing

this destruction left witnesses feeling that wildfire destruction is random and doubting that barrier's are an effective way to protect property.

Focus-group participants also viewed homeowners as responsible for fireproofing their property and for being careful when using fire. They believed government is responsible for maintaining a firefighting force, regulating and monitoring backyard burning, and elevating people's awareness of fire danger. Some participants declared that fire protection is everyone's responsibility because wildfires burn indiscriminately and cross ownership boundaries.

Burning regulations and their enforcement emerged as the preferred fire management strategy even though there were twice as many negative as positive comments made by participants about this strategy. The authors believe this strategy preference is clearly affected by participants' perception that forest fires are uncontrollable. Education of residents and visitors about fire was also accepted as an effective fire management strategy.

Homeowner and Community Wildfire Prevention Behavior

Keywords and phrases: impact of recommendations and education on behavior, impact of perceptions and attitudes on preventive action, barriers to and factors affecting wildfire prevention, and willingness to take action



1. Thin tree and brush cover.
2. Dispose of slash and debris left from thinning.
3. Remove dead limbs, leaves and other litter.
4. Stack firewood away from home.
5. Maintain irrigated greenbelt.
6. Mow dry grasses and weeds.
7. Prune branches to 10 feet above the ground.
8. Trim branches.
9. Clean roof and gutters.
10. Reduce density of surrounding forest.

Homeowner preparations. <http://www.ext.colostate.edu/pubs/natres/06304.html>

Galle, Julie. 2002. *Homeowners keep wildfires at bay with timely preps*. The Weather Channel: National Parks News.

The author interviewed Mary Hannah Dalton, a firefighter who works in the Coronado National Forest, Arizona and helps homeowners in her area protect their homes from flames. Dalton created the Homeowner Fire Risk Reduction Survey after moving to Arizona. The survey is used to help homeowners and business owners understand how vulnerable their buildings are to wildfires. Dalton completes the survey, composed of a checklist, discusses the apparent risks with the participant, and then makes recommendations to home and business owners about ways in which they can reduce fire risks.

The checklist includes: a) identifying materials located near the home or business that could be flammable and b) determining if firefighters can access the home or business using the road provided. Dalton follows up on the survey checklist results by making telephone calls to the home and business owners and sharing with them her recommendations for making their property less susceptible to wildfire damage. She has found that 100 percent of people using her service have reported taking action on at least one of her recommendations. The author reminds homeowners that action is not necessary on all parts of their property, but it is crucial near their home or business.

Gordon, Norma S.; Maida, Carl A.; Farberow, Norman L., and Fidell, Linda. 1994. *Residential Loss and Displacement among Survivors of the 1993 Altadena Fire*. Boulder, Colo.: University of Colorado, Institute of Behavioral Science, Natural Hazards Research and Applications Information Center; Quick Response Research Report No. 73. 17 pp. US, CA.

The authors report on a study they conducted in the community of Altadena in southern California. In 1993, fires destroyed 5,700 acres and 121 homes in this community and in the surrounding area. Interviews were conducted with 24 individuals residing in the Altadena area who lost their home in the fire or whose home was threatened, but not destroyed, by the fire. Three issues were explored: 1) the effect of loss, damage and threatened loss on the psychological state of fire victims; 2) the effect of fire preparedness on victim response; and, 3) the impact of the media on coping behaviors of fire victims.

When asked about depressive symptoms, respondents rated (on the Beck Depression Scale) the symptoms of “feeling blue” and “feeling tense or keyed up” the highest. With respect to the impact of experiencing the fire, the highest ranked mean scores (on a Likert scale) were: “any reminder brings back feelings about it”, “other things keep making me think about it”, “pictures of it pop into my mind”, and “I think about it when I don’t mean to”. The residents of these communities were aware that they were living in a high-risk fire area. With respect to preparedness, 29% of respondents reported being well-

prepared, 25% stated that their neighbors were somewhat prepared, and 33% stated that public officials and government agencies were well-prepared. When asked to describe their own precautionary measures, 67 percent reported they had installed fire-resistant or non-combustible roofing materials, 67 used stucco or brick exterior or installed fire-retarding undersiding, 58 percent kept 30 feet around the home clear of highly flammable vegetations, twelve percent eliminated roof eaves, twelve percent used dual-panel windows and sliding doors or shutters, eight percent enclosed the undersides of balconies and decks slopes with fire-retardant materials, and eight percent installed indoor sprinklers. Two-third of respondents felt they had done as much as possible to prevent the damage or loss experienced.

When asked about sources from which they gained information, respondents mentioned neighbors (54%), first-hand experience (42%), friends (21%), relatives (17%), television (17%), radio (12%), and newspapers (8%). Respondents were asked a question about how media reported the event. Sixty-seven percent felt the media was sympathetic to victims, 12 percent thought the media was critical, and 21 percent had no opinion.

The author reported additional findings pertaining to selected items from the questionnaire. With respect to attribution of blame, 12 respondents blamed natural causes while 11 blamed a homeless transient who had been identified as the possible cause. Six respondents blamed the fire department, four blamed low water pressure and two blamed their neighbors for failure to clean up brush surrounding their home. When asked about firefighter effectiveness, 41 percent felt dissatisfied with the firefighters' efforts to combat the fire, while the rest felt they did a commendable job under very difficult situations. When asked about the likelihood of another major fire striking their community in the next few months, ninety-six percent felt it was very unlikely. Most respondents indicated they had obtained assistance from the following disaster services: The Red Cross, non-governmental services (such as), Disaster Assistance Center, state and federal government services, municipal services, counseling and housing assistance. No significant differences were found when results were compared by exposure to event and by extent of loss of residence.

Hodgson, R. 1994. Strategies for and barriers to public adoption of fire safe behavior. In D. Weise and R. Martin (Eds.). *The Biswell symposium: Fire issues and solutions in urban interface and wildland ecosystems*, 15-17 February (pp.93-99). USDA Forest Service Pacific Southwest Research Station (GTR-PSW-158).

In this article, the author describes the barriers that block widespread public adoption of wildfire defenses as revealed by the survey of residents in wildland-urban intermix neighborhoods. Survey results

reveal a surprising result, one in five people considered protection of the landscape more important than protection of structures. Those who work with urban-wildland intermix residents have been told that if the landscape is lost, people will no longer want to live in the area. The author suggests we need to work with whole neighborhoods and settlements instead of targeting only individual property owners to develop and implement a coordinated set of wildfire defense preparations.

Public perception of defensible space was also assessed. Study results indicate that urban-wildland intermix (also known as the I-zone) residents know about defensible space and believe it is effective. They also believe defensible space is costly, complex, and potentially incompatible with landscape values. It appears that defensible space characteristics create barriers to its widespread adoption. Relative advantage (the degree to which a new technology is perceived as better than alternatives) was evaluated in the survey. Four out of five people surveyed believed that defensible space would help save their property in the event of a wildfire. For the majority, defensible space is perceived to be effective for its intended purposes. Yet, one in five does not think it will save their property. The author does not know whether that is because they do not think it will save their homes or because they think of their property as their home, other structures, and the landscape included in and surrounding their property. Approximately half of respondents believed defensible space would cost them more money in the long run than the alternative methods of fire protection. Less than one in twenty respondents thought defensible space would cost less. The authors note this way of thinking is an important barrier to widespread adoption. Almost two-thirds of respondents thought the work required to maintain defensible space would be about the same as that required by their current landscape. Nearly 30 percent thought it would be harder and less than one in ten said it would be easier. More than half of respondents thought it would be difficult to find the time to make the landscape more fire safe, while a quarter thought it would be easy. Although defensible space is believed by four out of five people to help protect their property from wildfire, many remain skeptical.

Complexity (the degree to which people find the new technology difficult to understand and use) was examined and the results found that people in the neighborhood where the authors had worked learn the basic principles of fire behavior easily and can apply them to their landscaping decisions. However, results also indicated that property owners were not sure about the kinds of plants to grow in a fire safe landscape. The author suggests that increasing the adoption of defensible space will require better and more available information on recommended plant materials and landscape designs that will provide wildfire defense and will survive a wildfire.

Compatibility (the degree to which the new technology is perceived to fit with existing values and ways of doing things) also was examined. Approximately 40 percent of those surveyed believe that natural landscapes are more beautiful than planted landscapes. An almost equal number of respondents

believe planted landscapes are more beautiful than natural ones. According to about a third of respondents, few changes should be made in the natural landscape to fireproof property. About half of the respondents are willing to make changes in the natural landscape to protect their property from wildfire damage.

The author concludes that promotion strategies that increase perceived relative advantage and reduce perceived complexity will accelerate the adoption of defensible space among residents of the wildland-urban intermix.

Jakes, P.M., L. Kruger, M. Monroe, K. Nelson and V. Sturtevant. 2002. A model for Improving Community Preparedness for Wildfire.
<http://www.ncrs.fs.fed.us/4803/highlights/Intro%20to%20website.pdf>

The authors discuss a model that was developed for a study of communities who are taking steps to increase their preparedness for wildfire. Within these studies, they are seeking answers to two questions, (1) what steps has the community taken to increase wildfire preparedness and (2) what social resources/conditions have been necessary to support these steps? The model will ultimately help the authors to understand wildfire preparedness. The model is based on the idea that communities and individual have resources that can influence and are used to implement their decisions relating to activities that impact wildfire preparedness. These decisions can come together as a set of actions aimed at increasing wildfire preparedness. Ultimately, these actions will result in fewer fires, minimal losses, and quick and effective recovery or restoration following a fire.

Three pilot studies (Northern Minnesota; Bend, Oregon; and Waldo, Florida) were conducted to test the model. Based on the pilot study findings, the authors are focusing on five community resources or characteristics that they feel are critical to wildfire preparedness: (1) social capital, (2) human capital, (3) cultural capital, (4) agency involvement, and (5) landscape. The model has been expanded to include the resources and characteristics listed above. The revised model will then be tested in at least fifteen communities nationwide. In each of the communities, interviews were be used to collect information on what steps the community is taking to increase wildfire preparedness and what resources have been necessary in these steps. The product of the research will be recommendations for actions a community can take to increase wildfire preparedness.

Jakes, P. and K. Nelson. 2002. Gunflint Trail Community: Steps to Improve Community Preparedness for Wildfire. Community Preparedness Case Study Series. Case Study #1. <http://www.ncrs.fs.fed.us/4803/highlights/GTCSfactsheet.pdf>

This case study was conducted as a pilot study to test a newly revised model (see Jakes, et al. 2002) The Gunflint Trail of northern Minnesota attracts people to live, work, and recreate in the area. Fire has always been a critical part of the area. In 1999, a major windstorm blew down trees on more than 600 square miles of forestland near the Gunflint Trail, increasing fuel loads significantly. Several keys to wildfire preparedness were found when interviewing people on the Gunflint Trail. The first key is knowing your place. Many of the residents on the Gunflint Trail are very knowledgeable about their landscape. The residents know the area's fire history and understand the role of fire in the ecosystem. They recognize that their position within public land means that they need to build relationships with wildfire management. This knowledge and understanding enable the residents to understand, undertake, and support activities to increase wildfire preparedness. The second key identified, is the use of existing networks and relationships for wildfire preparedness. Within the Gunflint Trail region, groups have worked together over the years on a variety of projects. Therefore, there is no need to invent new networks or relationships to work on community preparedness for wildfire issues. Because of the existing relationships, it was relatively easy to educate people about wildfire and bring them together to work on increasing wildfire preparedness. The third key is to build on local knowledge and skills. Residents in the area have, or have access to, knowledge and skills that increase wildfire preparedness. This "can do" attitude is common among Gunflint residents and can be used to work on community preparedness for wildfire. The fourth key focuses on the agencies developing key partnerships within the community. Public agencies in the Gunflint Trail have learned the importance of building relationships and maintaining an open door policy. Public agencies are a visible presence at community activities and functions, ultimately helping to create relationships between the agencies and residents. As a result, trust has grown between agency representatives and the community. The fifth and final key is to recognize wildfire preparedness as a process, not a product. People in the Gunflint Trail are recognize wildfire preparedness as an ongoing process of taking responsibility for the choices they have made regarding where they live and work. People interviewed from the Gunflint Trail suggested the following activities to help residents maintain or improve wildfire preparedness:

- Practice implementing evacuation and other plans in case of wildfire
- Educate new land and business owners about wildfire
- Be aware of human burnout (people working in wildfire preparedness have become burnt out over several years)

- Bring in new programs that build on accomplishments (Gunflint Trail residents are adapting principles from the Firewise program).

In addition to the above suggestions, the authors offer six lessons for other communities from the Gunflint Trail:

1. Develop homeowner wildfire preparedness packets or adapt existing educational materials so they are community specific.
2. Take steps to make your volunteer department professional (training, benefits, recognition).
3. Encourage local residents to take the lead in wildfire preparedness activities.
4. Use existing business and landowner associations in your wildfire preparedness program.
5. Make existing public programs work for you.
6. Ask for help from all community members.

Jakes, P. and V. Sturtevant. 2002. The Bend Community & FireFree Steps to Improve Community Preparedness for Wildfire. Community Preparedness Case Study Series. Case Study #2. http://www.ncrs.fs.fed.us/4803/highlights/bend_case_study.pdf

Located in Central Oregon's high desert, the city of Bend steadily attracts new residents and businesses. The city is surrounded by forests and is faced with the expansion of homes and residential subdivisions into forested areas. In 1990 and 1996, fires burned thousands of acres of land in the area and brought the reality of wildfire to the city. The SAFECO insurance company covered large losses from the 1990 and 1996 fires and recognized that something needed to be done to reduce future losses. The fire marshal of Bend suggested a public education campaign. After hiring a marketing company, the FireFree program was created. The federal agencies, managing a large portion of the land in the area, recognize the importance of coordinating wildfire risk reduction efforts on both private and public land.

The core belief of FireFree is that individuals can make a difference by reducing their risks from wildfire (i.e. creating defensible space, reducing vegetation and clearing brush around homes). FireFree delivers the message through the media, a public speakers bureau, and educational materials provided by businesses or distributed to homes. FireFree is still evolving. The program is currently sustained through the county program funded by FEMA, Project Impact. FireFree and Project Impact will continue to expand participation in annual clean-up days and help neighborhoods raise funds for fire safety projects. They will also be working on determining how many people are participating and why people chose not to participate. Ten wildfire preparedness lessons are offered for other communities from FireFree:

1. Make your message accessible and prevention strategies simple.

2. Use homeowner associations and other networks to reach individuals.
 3. Highlight civic responsibilities through special events.
 4. Rely on existing partnership to create and sustain effort.
 5. Turn to county and federal agencies for help and resources.
 6. Call on local professionals and businesses to help spread the word.
 7. Capitalize on one success to attract support for another.
 8. Recognize that a diversity of neighborhoods requires a range of possible actions.
 9. Be patient but persistent.
 10. Keep the leadership diverse, the message fresh and the outreach broad.
-

Monroe, M.C. 2002. Fire in the wildland-urban interface. In: Macie, Edward A.; Hermansen, L. Annie, eds. *Human influences on forest ecosystems: the southern wildland-urban interface assessment*. Gen. Tech. Rep. SRS-55. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 159 p.

The author discusses fire in the wildland-urban interface in terms of historical data, ecological structure and function, natural resource management, demographics, economics, land use planning and policy, and human dimensions. For the purpose of this bibliography, only the human dimension materials are annotated here. The author supports Cortner and others' (1990) conclusion that public reactions to wildfire have evolved over the past twenty years from a "fire is bad" perspective to a deeper understanding of the important role fire plays in many ecosystems. Homeowners often increase their risk of wildfire damage by choosing particular elements in home and landscaping construction. These elements include, wooden decks, wooden shingles, and narrow, winding driveways. Although all of these elements increase the risk of wildland fire damage, many agencies recommend these elements in the home landscape, leading to homeowner confusion.

The risks of living in the interface are rarely obvious to homeowners. According to Monroe, the best way to communicate these risks is through communications that are sensitive to homeowner concerns. The author agrees with Gardner and others' (1987) argument that recent wildfire survivors tend to discount future wildfire risk because they are convinced that fire won't strike twice in the same place. Ignorance of the wildland fire risk leads many homeowners to undervalue their wildland fire risk. Residents who believe fire is a random event may be less likely to support protective measures or actions to reduce risk.

The author notes that previous research indicates that educational programs are successful in increasing homeowner awareness and knowledge about wildland fire risks. The author agrees with

Cook's (1997) argument that more educated residents are often willing to take some actions to protect their home and property from fire. In a recent survey (Monroe, et. al., 1999), 42 percent of those who had been given information about wildland fire risks had taken precautionary actions on their property. The author ends the article with several recommendations:

- Increase communication with the public
- Educate citizens and managers working in the interface by providing additional training, interagency training, cooperative programs, and new publications
- Gain a better understanding of fuel management in southern United States
- Determine defensible space guidelines
- Determine most effective strategy to engage the public in fire mitigation activities

Smith, E., and M. Rebori. 2001. Factors affecting property owner decisions about defensible space. *Assisting Forest Owner, Farmer and Stakeholder Decision-Making. International Union of Forestry Research Organizations. Proceedings of the Extension Working Party (S6.06-03) Symposium.*

The authors discuss the effort to encourage property owners to implement defensible space and the frustratingly slow adaptation of these implementations. Several factors deter property owners from taking actions necessary to create defensible space. The identification of these factors is key to achieving widespread implementation of defensible space practices. The authors reviewed four surveys of property owners living in high fire hazard areas of California and Nevada. Smith and Rebori conclude that fifteen factors influence property owner decisions to adopt defensible space practices. They have categorized these factors by property owner motive, property owner means, and property owner opportunity.

Property Owner Motives (not in ranked order):

1. Unaware (“I didn’t know there was a wildfire threat to my neighborhood”) – Property owners did not necessarily know they lived in a fire hazard area. This unawareness was most often associated with new residents. An earlier study by Loehrer (1985) did not consider this motive important in explaining why property owners fail to create defensible space.
2. Denial (“It won’t happen to me” or “I don’t believe it”) – Even if aware of wildfire threat, some residents deny the risk is real.

3. Fatalism (“it’s all fate. When your number is up, it’s up”) – Some residents did not implement defensible space because they had a fatalistic view of events. Hodgson (1995) found that less than one in ten of respondents held fatalistic views.
4. Futility (“It won’t make a difference”) – Some property owners fail to create defensible space because they feel it will not be effective in reducing property damage.
5. Irresponsibility (“It’s not my job”) – Some property owners do not consider the creation of defensible space to be their responsibility.
6. No incentives (“If it was really important, my insurance company would give me a break on my premium”) – A few property owners believe that costs associated with creating defensible space should be offset by lower insurance rates.
7. Insurance (“So what, my insurance company will build me a new house”) – Some property owners feel no need to create defensible space because their homes are adequately insured.
8. Unnatural (“It’s wrong to cut trees”) – Some property owners are opposed to the removal of vegetation around their homes.
9. Aesthetics and function (“It won’t look good”) – Some property owners have the perception that the creation of defensible space around their homes will result in an unattractive landscape.
10. Discomfort (“I don’t want to because of snakes, lyme disease, poison oak, etc.”) – Some residents were reluctant to create defensible space due to perceived hazards to their health.

Property Owner Means (not in ranked order):

1. Cost (“I don’t have the time or money to do it”) – Some property owners believe the costs of implementing defensible space outweigh the benefits of reduced wildfire threat.
2. Unknowledgeable (“I don’t know what to do”) – Some property owners claim a lack of knowledge on how to create defensible space.
3. Disposal (“I don’t have an easy way to get rid of that stuff”) – Some property owners do not have a means of disposing of the slash generated by creating defensible space.

Property Owner Opportunity (not in ranked order):

1. Illegal (“It’s against the law”) – Federal laws, local ordinances, and homeowner association restrictions inhibit and/or prevent creating defensible space in some areas.
2. Lack of ownership (“The problem is my neighbor’s property”) – In some situations, vegetation on an adjacent parcel of land can pose a threat to a property owner’s house. Without the cooperation of this other property owner, effective defensible space cannot be created.

The authors conclude that if the goal is to have property owners employ defensible space practices, the factors that prevent them from taking action must be understood . Once the factors are understood, extension resources can be used to strategically address property owners' failure to create defensible space.

County, State, and Federal Actions toward Wildfire Prevention

Keywords and phrases: Relationship between fire protection planning and fire loss, Educational efforts



Firewise photo gallery. http://www.firewise.org/www/down_win.htm

Rice, C.L., and J.B. Davis. 1991. *Land-use planning may reduce fire damage in the urban-wildland intermix*. Gen. Tech. Rep. PSW-127. Berkeley, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 13 p.

Rice and Davis' study objectives were to look at existing land use plans to: a) determine if a cause-and-effect relationship exists between fire loss in the wildland-urban fire intermix and the level of fire protection planning by local government, b) note existing methods for identifying fire hazards and mitigating measures to minimize damage from wildfire, and c) suggest ways fire protection administrators can work through the planning process to enhance fire safety. They report on three case studies in terms of history, type and level of fire protection regulations, and proposed legislation pertaining to fire safety considerations in land-use planning.

From the case studies, two general observations support the idea that good fire-safe planning will protect homes: (1) not a single house was lost where comprehensive fire protection planning existed and

(2) where houses were lost to fire a complete lack of comprehensive wildfire protection planning existed. The damage in all three counties appears to be related to one of the following problems: (1) inadequate consideration of protection factors (i.e. language addressing fire loss mitigation in general plans is weak) , (2) disadvantages of small fire departments in dealing with developers and other units of local government (i.e. small fire departments have difficulty getting rigid regulations passed by elected officials), (3) variety in residential developments and in their susceptibility to control through planning (i.e. it is easier to control the developments because of the required stages of review), and (4) conflicting interests among homeowners, developers and local governments (i.e. homeowners build in the intermix based on promises, that are not often upheld, made by local government and developers).

Several planning tools were identified in the case studies. These existing tools are environmental review, codes and regulations, and the judicial process. Fire managers and planners can use these tools in providing for protection from wildland fires.

The authors recommend specific actions that planners, fire managers, and developers can take to minimize fire damage in the urban-wildland intermix.

1. Fire managers must try to convince local government planner to accept fire protection factors.
2. Local government planners must increase the role of fire protection entities in planning.
3. Local government planners must strengthen siting and building regulations.
4. The fire management community should educate and change attitudes of planners and the public.
5. The State Legislature must work toward an equitable sharing of costs and protection responsibility by developers, local governments, and fire protection agencies and departments.

Valen, R. 1997. Public outreach program = wildland fire prevention. *Fire Management Notes* 57(3):7-8.

The author discusses a public outreach program that was mobilized in the Southwestern United States. The outreach program, Fire Prevention Team, was established by the interagency Southwest Fire Management Board in 1996 to address fire prevention in the region. The program was successful due to the ease of getting the public's attention and the interaction of many public and private partners.

The author states that an important factor in the success of an outreach program is having a willing and listening public. The team quickly had the attention of the public, likely because of previous fires in the area and the upcoming July 4th celebrations. The media focused on the fire, giving updates and reports of fire danger and weather conditions.

In addition to having a willing and listening public, the success of an outreach program also relies on accepting and willing partners to carry the message. The team sought private sector partners to assist in their operations. Several partners carried web page information about fire and current conditions. Many products were produced including press releases, newspaper and radio public service announcements, public service handouts, and letters and messages. The private sector proved to be very supportive as well. United Parcel Service handed out a fire prevention-wildland property protection door hanger in Arizona and New Mexico and several utility providers added fire prevention statements to their billing statements.

The author suggests the production of a well-orchestrated prevention message screened as film-trailers to reach very large, "captive" audiences. The Southwest Fire Prevention Team and its impact on human-caused wildland fire prevention was a success. Data supports a dramatic drop in human-caused wildfires as well as acres burned during their tenure in the Southwest.
