



In Collaboration with USDA Forest Service, Pacific Southwest Research Station

Communicating With Wildland Interface Communities During Wildfire

By Jonathan G. Taylor and Shana C. Gillette, U.S. Geological Survey; Ronald W. Hodgson, Bureau of Land Management; and Judith L. Downing, U.S. Forest Service and Bureau of Land Management



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U.S. Department of the Interior
U.S. Geological Survey



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With Assistance from John T. Hogan, U.S. Geological Survey

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**U.S. Department of the Interior
U.S. Geological Survey**

U.S. Department of the Interior

Gale A. Norton, Secretary

U.S. Geological Survey

Charles G. Groat, Director

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Summary of Findings

An inter-agency research team studied communications during the small Bridge Fire in southern California, as well the before-, during-, and post-fire communications of an extreme fire event (Old and Grand Prix Fires) in the same area in the fall of 2003. This “quick-response” research showed that pre-fire communication planning was particularly effective for small fire events, and parts of such planning - especially the inter-agency coordination through the establishment and work of the Mountain Area Safety Taskforce [MAST] – proved invaluable for the large fire event.

Information seeking by the affected public relied on locally convenient sources during the small fire. Neighbors and friends were contacted; emergency frequency radio scanners were monitored; posted information was sought; and local call-in lines were utilized. Often, personal contacts were made where fire fighters could be contacted either directly or indirectly through family members. The information being sought was primarily about the precise location and severity, size, and direction of spread of the fire. This was keyed to the concern as to whether communities and personal homes were likely to be threatened. Effective community networks included the local fire department, the local water board, and established Fire Safe Councils [FSCs] which served as liaisons between the communities and the fire incident management team.

During the Old Fire and Grand Prix Fire complex, levels of threat were much higher, over a much longer period of time, and required prolonged evacuation displacement. With widespread evacuation of many communities, many of the local informal networks were disrupted: FSCs were scattered over a multi-state area; persons with personal knowledge of the fires were difficult to find—but in some instances were discovered. Attempts by fire officials to control the quality of fire information being disseminated were sometimes viewed by the at-risk public as delays in the flow of information. Local residents’ needs were for “real-time” information that was also place-specific; generalized information was of little value.

Assistance by news media (radio, TV, newspapers) in disseminating needed fire information was mixed. Regional TV and newspapers were perceived as very often being inaccurate (e.g. newscasters who did not know from where they were reporting, and communities wrongly listed as burned out), and focused on “entertaining” their major audiences in Los Angeles or San Diego rather than trying to report accurate information to mountain community residents. One local radio station was lauded for taking its community service obligation seriously and providing local residents with timely and verified information, and a couple of private websites were also cited as providing critical information.

There are times when the flow of information tends to get disrupted, especially when transitioning from one fire Incident Management Team [IMT] to another, or from active fire fighting to post fire recovery and protection.

The primary recommendation for fire management that comes from this triangulation on communication before, during, and after wildland interface fires is to “inform the network.” With changes in communication technology, the public has multiple channels to explore to discover the information they need, and they will not be put off by what they perceive as information delays. To increase the likelihood that the public will discover real, accurate, and timely information it is critical to disseminate information from the Incident Management Team as broadly as possible through multiple information channels. The at-risk public is seeking real time information; the key is to have accurate information readily available.

A second recommendation is to respond positively to groups trying to provide a local information function for both fire fighting and for media reporting. The research team heard multiple reports of inaccuracies in regional news media reporting. Fire crews could have benefited

from more local information on community defensibility and accessibility for fire fighting equipment. An FSC network in southern California is attempting to establish this kind of functional local-information network.

The pre-event preparation represented by the MAST was critical to effective handling of these fire events. More findings and recommendations are presented at the end of the report.

Background

Fire Communication

Increases in the severity and frequency of wildland fires during recent drought years in the Inter-Mountain West have coincided with growth in both housing developments and recreation in wildland areas (Rudzitis, 1999). The results of such a convergence in 2003 were large, composite wildfires that threatened communities, strained firefighting resources and caused evacuations from many cities and towns. The strength, size, and proximity to populated areas of these wildfires demanded unprecedented levels of communication among agencies, and between agencies and the general public. This quick response research study of two wildfire events in the San Bernardino Mountains evaluated the communication needs of the public in this wildfire context and explored current agency responses to those needs.

This study focused on fire communication before, during and immediately after a fire event because it represents a gap in the fire social science research literature. Researchers have studied public knowledge of wildfire (Cortner and others, 1990); and public perceptions of risk, responsibility, and blame (Taylor and Daniel, 1984; Gardner and others, 1987; Carroll and others, 2000). Very little research, however, has studied information-seeking behavior during and immediately after a wildfire event (see Kumagai and others, 2004).

Our initial research questions were the following:

- What information sources are used during a wildfire threat: both to gather information and to disseminate information?
- What message content is critical during what stages of a wildfire event?
- How does mass-media communication differ from of interpersonal communication networks?

Quick Response Research

Communication needs emerge rapidly and change quickly during a wildfire event; therefore research that takes place during the event is crucial. This type of research has been termed “quick response research” by researchers of other natural hazards or disasters (Michaels, 2003). Quick response research is conducted during and immediately following a disaster event. Preplanning and rapid implementation of this kind of research is important to ensure that events important to the study are captured but also to ensure that the research itself does not interfere with emergency response teams or public safety. The following components are essential to quick response research:

- Coordinate with regional Incident Management Teams [IMTs].

Coordination with regional IMTs encouraged a research exchange that better defined the objectives and the role of researchers in the field during the wildfire events studied. One research team member was assigned coordination of agency fire communications (as Joint Information

Center Director) during the wildfire events studied, which provided us with the opportunity to observe and better understand interagency communication efforts.

- Identify communities at risk for wildfire and assess their capacity to respond to wildfire threat.

The Mountain Area Safety Task Force (MAST), in this case a regional response team, helped identify at-risk communities and assess their capacity for response. This gave the research team access to background knowledge of these communities, before a fire event occurred. Such pre-identification is a common practice in hazard research.

- Arrive during or immediately after the fire event.

Quick response research is designed to facilitate first-hand observation of events and the gathering of feedback before subsequent events influence respondents' memory of the events.

- Conduct research in a manner that does not impede assistance efforts.

Consultation with IMTs and feedback from emergency agency officials during the wildfire event assisted in designing a research approach that did not interfere with assistance efforts.

- Provide timely results.

To provide timely results that could be used to inform future communication efforts, short observation reports were provided to sponsoring personnel immediately after each field research effort.

Data collection methods need to be flexible to respond to changing events in quick response research. The following collection methods, previously used in quick response research on other natural hazards (Michaels, 2003), were employed:

- Participant Observations
 - Public meetings, agency information operations
- Informal conversation and discussion
 - Group discussions, in-person interviews, telephone conversations
- Document Reviews
 - Flyers, brochures, postings, media via the web

Approach

The quick response research team consisted of two researchers from the US Geological Survey (USGS), one researcher/advisor with the Bureau of Land Management, and one fire information officer (IOFR) from the US Forest Service with a shared appointment with the Bureau of Land Management. The research study was conducted under the Policy Analysis and Science Assistance program of the USGS Fort Collins Science Center and was supported by the Pacific Southwest Experiment Station, USDA Forest Service (USFS).

Study Area Selection

During the fire year 2003, the study team planned to travel to wildland fires that showed significant potential threats to wildland interface communities in the Inter-Mountain West. Two such fires were identified: in Montana near Glacier National Park and in Oregon in the Sisters Wilderness vicinity, however, in both instances the fire threat to local communities ended before the team could get on-site. The team, therefore, opted to study a wildland interface area where the

known wildfire potential was very high, and where significant pre-fire communication and organizational planning was already taking place. Communities in the San Bernardino Mountains met those criteria.

- Fire Risk Factors

The San Bernardino National Forest (SBDONF) has experienced an extreme drought over the past five years that has made the trees more susceptible to mortality from air pollution and a complex of insects and disease (Dietrich, 2003). In response to the tree die-off, which one Fire Management Officer termed a “slow-moving disaster,” the USFS initiated several fuels reduction projects. Coordination of these projects and other fire mitigation efforts enlisted a diverse range of agencies and community groups and served as a catalyst for community discussion about wildfire and forest health.

The geographic location of the San Bernardino Mountain communities made them a challenge for emergency planning. While these communities are isolated from large urban centers, they have a substantial combined population (close to 60,000) with very few evacuation routes (only three paved roads lead off the mountain).

- Community Capacity Factors

An important development in the San Bernardino National Forest area was the organization of the Mountain Area Safety Taskforce (MAST), which included representatives from federal, state, and local government agencies as well as various community service organizations (e.g., Red Cross, Mountain Rim Fire Safe Council, etc.). The MAST helped many participants to understand how to deal with a wildfire, who would be in charge at various stages of a natural disaster, and how all entities involved would communicate.

In addition to the MAST, local community organizations called Fire Safe Councils (FSCs) were created for several mountain communities or community clusters. These organizations were linked to the MAST and developed networks within their constituent communities, providing prearranged interrelationships between communities and the responsible agencies.

The mix of residents (retirees, commuters, local workers) and vacation homeowners in the San Bernardino Mountain communities is typical of the wildland interface communities that have developed and expanded over the past ten years. This mix of community members, who have varying interests and communication needs prior to, during, and following a wildfire event, presents a challenge in the design of communication messages.

San Bernardino Mountains, Fall 2003 Fires – Timeline and Statistics Bridge Fire September 5-6, 2003

- Location: San Bernardino Mountains, beside Highway 330, just south of Smiley Park and Running Springs
- Acres burned: 1,352
- 1,500 residences threatened and occupants evacuated from 2 communities.
- No home or businesses destroyed.
- 1 injury, no deaths

The research team went to the San Bernardino area to study pre-fire communications, but arrived shortly after the Bridge Fire started.

Old Fire October 22 – November 4, 2003

- Location: Northern edge of San Bernardino into San Bernardino Mountains; from Running Springs on the east to I-215 on the west (see map, Figure 1).
- Acres burned: 91,281
- More than 45,000 residents evacuated; 12 communities had mandatory evacuation,
- 18 communities had voluntary evacuation.
- 993 homes and 10 commercial properties destroyed.
- 12 persons injured, 6 fire-related deaths.
- 12 deaths reported from post-fire flooding and debris flow.

The research team arrived during a later stage of the Old Fire, a few days before evacuated residents returned to the mountain communities.

Fire Communications Data Collection: Methods and Timeline

The research team traveled to the San Bernardino Mountains in southern California on September 7th 2003, to study the pre-fire communication process. Coincidentally, the Bridge Fire, a small wildfire in the San Bernardino Mountain foothills just below the communities of Smiley Park and Running Springs, occurred the same weekend. This gave the team the combined opportunity to study both pre-fire communication preparations as well as the effectiveness of the during-fire communication process related to the Bridge Fire. This data collection was an important referent pre-fire study for the extreme fire events that affected these and other San Bernardino Mountain communities in October and November 2003. The town of Smiley Park and portions of Running Springs were briefly evacuated during the Bridge Fire event.

Research team members interviewed residents and agency personnel and participated in a focus group discussion following a public meeting of the Running Springs FSC. A “snowballing” method was used to identify key personnel and residents to interview. Fire mitigation pamphlets, official fire reports, and other informational material were also collected.

On October 22, 2003, a fire began on a section of the Old Waterman Canyon Highway, just north of the city of San Bernardino. This fire, dubbed the “Old Fire” by abbreviation of the name of its origin site, was driven initially by Santa Ana winds partially down slope into the city. As this fire grew, and eventually merged with the Grand Prix fire to the northwest, it became a significant portion of the notorious firestorm that swept across hundreds of thousands of acres in southern California that fall. At one time, the Old and Grand Prix Fires together formed a 40-mile fire front. As the Santa Ana winds decreased, the Old Fire moved progressively upslope into the San Bernardino Mountains, including into the area where previous interviews had been conducted. Several mountain communities were burned, including Cedar Glen, Crestline, and Waterman Canyon (see maps on page 24 for fire progression). All communities on the mountain, from Big Bear to Crestline, were evacuated, except for essential personnel.

During the Old Fire/Grand Prix Fire combined events, affected community members were spread, as a result of the all-mountain evacuation, across a multi-state area and thus most were inaccessible to the research team. Further, because the first guiding principle of the research team was to “do no harm,” it stayed out of the way of firefighters and communities in the San Bernardino Mountains during the Old/Grand Prix Fires.

Instead, the team acted as participant observers to the information coordination process arranged by Judith Downing who organized the setup and operation of a Joint Information Center

(JIC) to handle communication with the public, media, legislative liaisons, etc. from a single location. Research team members attended internal briefings at the JIC among three participating Incident Management Teams, observed public briefings held at evacuation centers, attended a public meeting held one day after re-entry for Big Bear community residents, attended organizational meetings among IOFRs, and attended two MAST meetings. The team also conducted interviews with staff and volunteers at the JIC toward the end of the evacuation period and the start of re-entry. This timing allowed the team to capture experiences and perceptions of people involved in the public communication process while the experience was fresh in their minds.

In March 2004, the Fire Communications Research Team returned to the San Bernardino Mountains to moderate focus group discussions with groups from several different communities who had experience with the Old Fire or Grand Prix Fire. During this research visit, the team collected information on communication needs during fire evacuation and re-entry as well as communication needs during fire recovery. Eight focus groups (Table 1) were set up by community members including FSC members, community leaders, business community leaders, and Rim Family Services members. The team had met with many of these focus group members during the previous work on the San Bernardino National Forest.

Table 1. Timing, Numbers and Organizers of Focus Groups: Old Fire/Grand Prix Fire Follow-up

	Tuesday March 23rd	Wednesday March 24th	Thursday March 25th
Morning			25 Rim Family Services
Afternoon	15 Running Springs Business Community	3 Lytle Creek Fire Safe Council	12 Big Bear Fire Safe Council
Evening	10 Crestline Fire Safe Council	6 Running Springs Fire Safe Council	
	20 Rebuilding Mountain Hearts and Lives	10 Rancho Cucamongo Fire Safe Council	

Findings: Information Sources and Messages Useful During a Wildfire Threat

Pre-Fire Communication

Frequently, it appears to researchers working in public responses to natural hazards that no one wants to get prepared until after the disaster has struck them or their community. In the case of the San Bernardino Mountain area, significant pre-fire communication planning had already taken place prior to the fire events we report here. The existing communication agreements were attributed, at least in part, to the “slow moving disaster” of the mature tree mortality spreading across the forests in the San Bernardino Mountains.

Communications among agencies and between agencies and residents, in the mountain communities, were substantially more effective during the fires as a result of preparations made by MAST and the FSCs prior to the events. Agency personnel reported having worked out ahead of time the sequence of authorities and responses in the event of a wildland fire. Thus, interagency conflict was greatly reduced, and through the FSC communication networks, the public at risk felt more informed of how the event should proceed.

“Things we usually have to try to figure out during the fire event had already been negotiated.”
Running Springs Fire Dept: Sept. 10, 2003.

“Things like transitions of authority had already been ‘table-topped’, so we knew what to expect.” Sheriff’s Dept: Sept. 11, 2003

The FSCs were linked to the MAST and had networks in their constituent communities, providing pre-arranged interrelationships between communities and the responsible agencies. One of the FSCs’ functions was to pass pertinent fire information on to other community groups such as the Chambers of Commerce; this communication exchange was facilitated by having overlapping memberships among community leaders. People who had disaster responsibilities in the community reported the value of this pre-fire planning.

One particularly helpful document, produced by Running Springs FSC, was an evacuation guide titled “Get Ready, Get Set, Go.” This document laid out preplanning of what was important to take. It also established locations for those essentials when a fire threat occurred and outlined procedures for getting the essential items, animals, etc. removed in the event of evacuation when the resident is not at home.

Communication During a Small, Short-Duration Fire

The Bridge fire was both relatively small and of short duration, resulting in a small number of resident evacuations; most San Bernardino Mountain communities were not affected. Because the fire was relatively short-lived, people sought information from sources that were locally convenient during the course of their everyday routines. Initially, when the fire had potential to become a high-level of threat, people took actions that had been discussed by MAST, the FSCs, and community liaison officers prior to the fire event.

The community members interviewed, especially those from Smiley Park and Running Springs who were evacuated during the Bridge Fire, reported accessing multiple local sources of information about the Bridge Fire. They phoned the disaster call-in lines, went to Fire Information contact points, listened to their scanners for information, and called friends and neighbors –

especially those connected in some direct way to the fire response. Fire Information contact points had been previously established and were easily identified by the USFS vehicle or uniformed authority present. The Running Springs Fire Department played a major role in providing up-to-date fire information.

Some FSCs had established yellow-board signs to post emergency information. The FSC-developed evacuation brochure “Get Ready, Get Set, Go” was cited by Bridge Fire evacuees as especially helpful because it provided step-by-step guidance on how to prepare to evacuate. The FSC informed a network of organizations, including the Chambers of Commerce, trade associations (e.g., the Mountain Association of Realtors), etc. Specific businesses or services (e.g., Water Board members) activated their phone and email networks to keep their members and the general public informed of the fire progress and community responses.

An example of the level of collaboration between the MAST and the FSCs was the arrangement and announcement of public information meetings on Saturday, day two of the Bridge Fire. The Incident Commander, who took over management of the fire at 6:00 pm on Friday, decided by 8:00 pm that same evening that he wanted to arrange public meetings the following day. Within two hours of his decision, the time and place of two public briefings had been decided and were posted on the Mountain Rim FSC website.

The fire briefing, held at the Rim of the World High School which served as the Bridge Fire emergency evacuation center, and was characterized by participating officials as very successful – most involved agencies were represented and a large audience attended. However, that briefing was characterized as uninformative and redundant by some non-agency participants.

“Each person just said, ‘I work for the such-and-such, my job is to do so-and-so.’ But nobody gave detailed information about the fire condition or where it was going.” Red Cross volunteer: Sept. 12, 2003.

The morning fire information news releases from the IMT contained more technical ICS 209¹-type information than specific fire information that would directly address public information needs. Releases included information about the IMT assigned to the fire, when the IMT took over management of the fire, and how many firefighters and how much equipment was assigned to the fire. Information about the location, direction, and size of the fire was very general (e.g., “The fire is located 3.5 miles east of San Bernardino.”), and lacked local specifics that would be useful to community residents.

“[The Forest Service’s] internal communication went smoothly and efficiently. But the flow of information out of that was where things broke down.” Running Springs: Aug. 9, 2003

Further, the limited information release – usually two times daily by the IMT – was not frequent enough to respond to public needs as the fire event progressed. Volunteers working the call-in lines as well as community members reported the need for more updated, real-time information. Without such updates, people said that they used information from scanners, other community members, the Internet, and the media to try to fill the gaps.

“Channels 6 & 38 (disaster information channels) had the same information up for 15 hours and it was too generic.” Running Springs: Sept. 12, 2003

¹ ICS 209 forms are filled out by the IMT to keep track of pertinent information about the fire and how many and what kind of resources are assigned. The forms are typically produced two times each day. They are often used by IOFRs to prepare news releases, but that is not the principal purpose for which the forms are maintained.

“The Fire Information phone line (recording) is not updated during the day. FS updates at 6am and 6pm. Not enough for people who are affected.” Running Springs: Sept. 10, 2003

At times the communication criteria of the Incident Management Team appeared to conflict with the public’s information needs. Members of the fire information community reported trying to ensure the validity of the fire information message, to speak with “one voice,” and send out information that was rationally and cognitively structured in pre-determined time increments. Affected local residents, whom the team interviewed, reported that their search for information was urgent and emotionally driven because of what was at stake for them. They sought real-time information, but with far less concern on whether the information was officially sanctioned. This is not meant to imply that the public does not care about accuracy of information, but they do express an urgent need for “real time” information.

The social-psychological processes in fire communication are reflective of the processes that occur in other risk communication. Fitzpatrick and Dennis (1994) mention that the most effective forms of risk communication respond to the desire of those at risk to personalize warning messages and to receive those messages from multiple sources.

Communication During a Large, Long-Duration Fire

Focus group respondents reported using informational sources that reflected the urgency of the situation in which entire communities were preparing to evacuate. People who were at work off the mountain relied on neighbors, friends, and community authorities (schools, sheriff/fire departments) to provide information on conditions and evacuation plans. People who were on the mountain, listened to emergency frequency scanners, spoke with neighbors and friends, spoke with local officials, and responded to loud-speaker announcements and reverse 911 calls when the time for evacuation came.

Early in the fire progression, many mountain households lost electrical power. With no electricity, television broadcasts were not accessible, the internet was not accessible, and phones that used a plug-in power supply did not work. Only battery-operated radios and standard land-line telephones or cell phones remained operable (although cell phones could not be recharged). This was one of the significant differences between the small Bridge Fire and the large Old Fire.

“As soon as the lights went out I called the sheriff’s office. And the sheriff said ‘Well your lights are out. It’s a good idea to leave.’ That was the only indication we had.” Resident, Lake Arrowhead: Tuesday, March 23, 2004.

At the beginning of the fire event, the main information needs identified by the public were: “Where exactly is the fire;” “How bad (how big) is it;” and “Which direction is it moving?” These items are important for determining, “Is my home/community at risk?” and “Will we have to evacuate?” As such, these questions require real-time information to be answered satisfactorily. Any fire information that was generalized, either spatially or temporally, had little value to people who were trying to ascertain how much they would be directly affected by the wildland fire. Later, during the event when residents had been evacuated, the primary public concerns changed to “Has my community been affected?” “Has my home burned?” and “When can we go home (if we still have one)?” Again, these questions were real-time and place sensitive.

During Evacuation

Once people were evacuated, it became more difficult to receive information that was up-to-date and locally accurate. “Well, there's one thing worse than gossip in Big Bear, and that's gossip when you're out of Big Bear.” Resident, Big Bear FSC group: Thursday, March 25, 2004. Members of the Mountain Rim Fire Safe Council were evacuated and scattered; it was impossible for them to assist and contribute to fire information efforts in the same manner that they had done during the Bridge Fire. One FSC officer overcame this frustration by serving on the community phone bank at the JIC.

With evacuation, this separation from information networks became almost universal. Reports of the evacuation experience varied widely across the mountain:

“The Sheriff’s Department started early, so everybody was able to get off the Mountain.” Rim Family Services focus group: Thursday, March 25, 2004.

“It took four hours to get off the mountain Saturday night.” Big Bear focus group: Thursday, March 25, 2004.

“Everyone underestimated the duration of the evacuation,” many taking only what they needed for a few days. Rim Family Services: Thursday, March 25, 2004.

“There were no pre-packaged instructions or maps for evacuating.” Rebuilding Mountain Hearts and Lives: Tuesday, March 23, 2004.

Evacuation of the elderly off the mountain was challenging, in part due to communication failures. Public transit buses were assigned to ferry elderly people off the mountain to the evacuation centers. However, in at least one reported instance, a public transit bus was denied access to return to the mountain to evacuate more people. One community member described an elderly lady evacuee in her neighborhood, with no family or pre-arrangements, who simply stood in the middle of her street with her suitcase until someone stopped and gave her a ride.

Evacuation Centers

The public appreciated the response of the Red Cross in setting up evacuation centers, but varied in their perception of information access while at the centers. Some community members who moved to the centers felt they had received more timely information than people who were not at the centers, however, a few people at the centers said they rarely received up-to-date information and would go several days without getting any new information about the fire.

The IMTs coordinated briefings given at the evacuation centers on the current fire situation. However, one group decided not to give advance notice of their briefings because they were concerned that the centers as well as the Red Cross personnel might be over-run by evacuees from off-site and the news media. One staff person explained this decision as “not wanting to have to deal with hundreds of angry people” (Joint Information Center: November 2, 2003). It is important to point out that the decision not to provide advanced notification was apparently made by information officers at a low level in the organization and is contrary to both the JIC and IMT information policy. As the IMT lead information officer said, “If there are angry people it is our job to work with them.”

A briefing at the Apple Valley High School evacuation center did not appear to be seriously affected by the lateness of the briefing announcement – a large portion of the 130 persons sheltered there were on site and attended the briefing. The briefing in the airport hangar shelter in San

Bernardino, however, reached only a small portion of evacuees – perhaps 100 of the 2,000 housed at the hangar shelter and the 40,000 evacuees registered at that center. Virtually none of the evacuees who were camping outside the hangar attended the evacuation center briefing. Many evacuees inside the hangar shelter were Spanish-only speakers without translation services. Spanish-speaking evacuees appeared to have difficulty in general receiving up-to-date information. Only a few on-site interpreters were available at the evacuation centers, and these were brought from the Mexican Consulate and had difficulty interpreting locally specific information because they were not familiar with communities in the San Bernardino Mountains.

The research team spoke with a few mental health professionals who said that the evacuation centers were not prepared to handle the elderly or the disabled. A number of evacuees described the evacuation centers – especially the airport hangar in San Bernardino – as depressing. Some refused to enter the hangar, preferring to camp out in the evacuation center’s parking lot. Some objected to being “wrist-banded” upon entry. There was a sense of insecurity, especially among the elderly, about possessions in the giant open hangar. One lady reported being afraid to go to the bathroom for fear her cot, sheets, and pillow would be taken.

Communication at the Joint Information Center

The JIC was conceptually organized and recommended for implementation in July 2003, but was not actually put into operation until the Grand Prix and Old Fires were burning. Transitioning information functions from the Fire Operations Command Centers to the JIC caused some minor disruption and required personnel to adapt to a new working environment and authority structure, although most felt they adapted to these fairly readily.

Information was brought into the JIC from multiple sources: IMTs, IOFRs, Red Cross, Legislative Liaison, Federal Emergency Management Agency, Forest Supervisor’s office, etc. The information was organized, verified, and then distributed by the JIC to its community phone bank, media contact lines, evacuation centers, legislative staff, etc. Generally, the information sources supplying the JIC continued to distribute information through their own channels; the JIC was not always notified first or even at the same time when events or plans changed. As a result, people operating the phone lines sometimes had incomplete or out-of-date information.

“San Bernardino County Fire had a switchboard that you were supposed to be able to call. Unfortunately, it was busy but when you would get into the switchboard they weren’t giving-- they didn’t have manpower to update the information.” Resident, Lake Arrowhead: Tuesday, March 23, 2004.

Phone operators reported frustrated callers complaining about the lack of real-time information about the active fires. Many callers wanted to know if their homes had burned -- information that was not possible for the phone operators to report. People were unhappy when they could not get information about whether or not the fire had reached their own communities. The lack of up-to-date information from official sources was a consistent complaint heard throughout this fire communication study. Sometimes callers had more up-to-date information than the phone operators, leaving the operators unable to verify what the caller had heard. It was demoralizing when operators later discovered that the caller had been correct.

“Being at the JIC was almost more frustrating than doing nothing. The amount of information was limited—the official agency information is sterilized, sanitized to reduce liability.” Resident, Running Springs: Wednesday, March 24 2004

In addition, operators reported that they occasionally overheard informative conversations among other JIC personnel, but were not allowed to release the overheard information immediately. Since the operators' function was to keep the public as informed as possible, such delays, necessary for the JIC to verify information from different sources, appeared to undermine the confidence of both the operators and the callers. The objective to provide timely information has always competed with the objective to provide accurate information. This is a significant problem in community fire information where the public depends on current and accurate information to make decisions that affect their ability to cope with the wildfire threat.

Individuals with access (e.g., sheriff's department, police, or fire personnel) sometimes used their authority to enter the fire zone to check on their own, or family members' homes – some even doing so accompanied by media reporters. This access for personal purposes angered residents who did not have such inside avenues to check on their properties. "A few individuals who had lost their homes were given private trips up the mountain to see their property, but this certainly was not a service provided to all." Some callers to the community phone bank characterized this as a misuse of authority.

Community phone bank operators often had to deal with greatly traumatized callers. Often, these callers did not want to be "shunted off" to a counselor at a different phone number. Having mental health professionals available and accessible to the emergency phone banks would help operators who must convey information in a manner that can satisfy people who are having difficulty dealing with the traumatic emotions tied to a wildfire event.

Further systematic research on call communication during a fire could help direct improvements in call-taker/caller interaction. Tracy (1997) conducted a discourse analysis with data from 640 audio-taped telephone calls, field notes, observations of call-takers, semi-structured interviews, and a document review of procedure manuals. Findings from that research identified differences in call-taker and caller expectations regarding information provision, geographic location, and time elapsed before police arrived. These differences contributed to the use of conflicting frames of reference that led to misunderstandings and heightened tension. Similar research on call communication during a fire could help identify ways to improve call procedures during a wildfire event.

ESRI²

Fire maps were helpful to both JIC staff and the public. ESRI actually had personnel stationed within the JIC to interact with fire personnel and provide quick-time product production as needed. In discussions with residents a few months after the fire, community members reported interest in seeing fire maps that provided sufficient detail as to which specific neighborhoods had been hit or spared by the fire. Some ESRI maps seemed to be excellent, but were perceived to be geared primarily for the JIC and Fire Teams. In fact, the JIC Director required the phone operators to regularly provide the ESRI team with the kinds of information being requested by the public. The ESRI team attempted to provide maps that met those changing information needs as quickly as possible. Very few of the fire-affected public who were asked knew of these maps, and even fewer knew how to access them. At the airport hangar evacuation center, one local evacuee attempted to improve access to real-time information by setting up a web-linked projection on the wall of the fire-map site. Even when rapid response information is provided, special efforts are apparently necessary to plug into the networks community residents use. This will require discovery of the

² Environmental Systems Research Institute [ESRI], a prominent Geographic Information Systems (GIS) producer, has focused their expertise on developing fire progress maps and other tools of immediate importance to Fire IMTs. ESRI is headquartered in Redlands, CA and thus were able to deploy a GIS mapping team into the JIC.

technology based networks used by community residents and active efforts to link to sites that they use.

“You should be able to go someplace and find a map, hour by hour, of how the fire progressed.” Resident, Lake Arrowhead: Tuesday, March 23, 2004.

Communication Following a Large, Long-Duration Fire

Re-Entry

At the JIC, the cooperating agencies worked out a procedure for timing and announcing community re-entries that allowed an orderly return when each community area was declared safe. The San Bernardino County Sheriff’s Office, one of the cooperating agencies, held the final authority to allow residents back in to their communities. Part of this procedure included notifying officers in charge of highway access into the mountains.

Re-entry to mountain communities, following the lifting of the evacuation order, was perceived to be a problem by many people. Since re-entry had not been as clearly outlined by MAST as the evacuation, the various authorities appeared to be operating under different rules, resulting in confusion over how and when to allow residents to return home. Some residents reported receiving instructions such as, “Go to such and such location and get a permit sticker. Then go to the closure gate on the highway and the California Highway Patrol (CHP) will let you go through,” only to be turned away by the CHP at the roadblock.

“So we get to the CHP and the CHP is not going to let us up because they didn’t get the code.” Resident, Big Bear FSC group: Thursday, March 25, 2004.

The Big Bear re-entry announcement, however, was an exception to the ordered rule worked out among the agencies. The re-entry announcement was made by a county official and the timing outside the joint agency’s agreement. Therefore, the mechanism for notifying the road blocks or other management points may not have been activated. Essential city officials were asked first to return to Big Bear, for example, so the community infrastructure could be working when the general population returned. At the highway re-entry post, however, the CHP were not aware that this request had been made and were unfamiliar with the password that the essential personnel had been given.

“And they told us that we were the last people that they were letting through because there’s just no information and they don’t know what they’re doing.” Resident, Big Bear FSC group: Thursday, March 25, 2004.

BAER and Other Transitions

Burned Area Emergency Rehabilitation (BAER) teams are frequently dispatched to large fires towards the end of, or immediately following, the incident management team operation on the fire. When the BAER teams completes its work, the remaining rehabilitation and communication responsibilities return to the National Forest. The transition between these authorities can easily bring about a breakdown in the flow of communication with the local communities and the public. To avoid these interruptions in information flow, sometimes the National Forest may retain fire information authority. In the case of the Old Fire/Grand Prix Fire complex, the JIC was allotted the authority for the flow of information to the public. The IMTs and the BAER team overlapped, and here the communities reportedly felt an interruption in the flow of information. The BAER

informed all pertinent agencies of the remaining hazards on federally managed lands. A target date was set for completion of federal land rehabilitation and establishment of warning systems by December 15th (Federal assistance for rehabilitation on private lands is provided by the National Resource Conservation Service. The agency had teams working in the burned area too).

For the Old Fire/Grand Prix Fire complex, the JIC was structured to change and adjust to new needs by predicting how information needs would change over time, in particular, providing detailed information about safety concerns for re-entry and distributing materials on flooding, landslides, and fire restoration efforts.

Real-Time Information

In both the Bridge Fire and the Old/Grand Prix Fire complex, it was apparent that public interest in fire information changed focus over time but did not lessen in intensity. Through the call-in lines and at public meetings, residents expressed frustration with the fact that updates on the fire came quickly at the beginning of the fire event but slowed considerably once the fire was under more control. Even if the fire movement was slowed, fire information still needed to keep pace with public information demands that changed over time from fire behavior to re-entry efforts.

The IMTs and the JIC worked together to gather intelligence and report it back to the JIC at the end of the day. This worked well, although the time-lag from intelligence gathering to reporting to the public appeared to be too long from the residents' perspectives. Some information officers assigned to the community reported that they did not want to continue working with residents because they felt people did not want to talk to them.

“There was extreme lag time, like half a day or more, on the updates at one point.” Resident, Lake Arrowhead, Tuesday, March 23, 2004.

Mass Media Communication

Almost everyone interviewed mentioned that the news media did not provide useful information through regional media outlets. While the local Big Bear radio station, KBHR, was reported as a good source of local information by several community members, most interviews mentioned inadequate coverage by television or newspaper media based in San Diego and Los Angeles.

“Then when we get down the hill, and you're away from the radio and you're watching TV and seeing pictures... when they're (the media) west of Running Springs saying they're in Big Bear, you know, they're still 25 miles away and you realize that . . . you're not going to get good information this way.”

“We were watching and laughing and saying, ‘Boy, you know, it looks like you took a (camera) shot.’ And so, ‘We're in Running Springs now.’ They just turn the camera 45° and they've got another burning tree and saying, ‘We're over in Big Bear now.’ Well they couldn't have gotten there that fast. Besides, I know that tree!” Resident, Big Bear FSC group: Thursday, March 25, 2004.

Some interconnected media issues surfaced clearly in both the Bridge and Old/Grand Prix Fires. Because there was little local news media coverage, regional media provided most of the reports. The regional coverage was often inaccurate and not very useful to residents who needed up-to-date information on how their communities were being affected and what they needed to do.

At the beginning, most of the regional media did supply relevant agency contact information, thereby handing over the emergency information responsibility to the JIC and to fire and emergency management agencies. As a result, people expected agencies to provide up-to-date, real-time, accurate information that the regional media sources were not providing.

“And if I had to complain about anything in particular, it is the sensationalism within the television and radio and misinformation.” Business Owner, Big Bear FSC group: Thursday, March 25, 2004.

“I would watch the news and I’d start screaming at the TV and (inaudible) people that I’m supposed to be able to relate to.” Resident, Big Bear FSC group: Thursday, March 25, 2004.

Phone operators reported a large proportion of calls complaining that the regional news media gave incorrect information: “Highway 330 is now open,” “Residents can now return to Arrowhead,” etc. It was estimated that about 50 percent of media reporting was in error. Callers who reached the community phone bank expressed relief that they had found a source of verified, reliable information. Phone bank personnel were frustrated that media outlets were using multiple sources of information – indicating that this was a probable source of inaccuracy. Gathering news from multiple sources is viewed as important by the media because it draws from the most available, up-to-date information, albeit of varying levels of accuracy and authenticity.

“But it was a very interesting period of time. You said even when it's not news anymore. It's not news. But it's not entertainment for me. You know, that's when information goes away.”

“And we just watched the news and couldn't tell anything. The one thing we wanted was something like that . . . just a map that says ‘it's here’ – because there was nothing.” Resident, Big Bear FSC group: Thursday, March 25, 2004.

Residents reported that regional television and newspapers provided little information that was locally specific and useful. In conversations with residents and emergency personnel, people reported that television commentators often talked without knowledge of where they were or of the real fire situation. One person said that she quit using television news as an information source when she heard a television reporter announce: “Running Springs is being sacrificed in order to save Big Bear.” Others stopped watching because of what they perceived as sensational repetition.

Speaker 1: “You know the way we found our house was gone? Someone called us on the phone from the LA area which is where we got all our information. People who were watching the Internet down there and they’d call and they’d say, ‘We just saw this on television.’ But the first call we got that we found out the house was gone, somebody called us and said, ‘Run out and get the LA Times.’ It was October 30th. ‘Your house is on the front page.’”

Speaker: “I saw the house and the flame was coming out of the windows.”

Speaker 2: “When we saw Chuck Henry (newscaster) standing at Pine Ridge... we were fairly certain, but then he said, ‘By some miracle some houses survived,’ and it was like, ‘Is it still there?’”

Speaker 3: “I saw mine burning on Channel 5. I saw my house burn on TV. As a matter of fact, I saw my house burn over and over . . .”

Interviewer: “Just over and over?”

Speaker 3: “Over and over and over! Because they do that. They say: ‘Oh, this our best shot.’ You know, ‘use this one.’ And then people who were affected by that, they watch that thing just happen, you know, kind of on into the night – it’s just awful.”

Rebuilding Mountain Hearts and Lives – Community Residents, Lake Arrowhead: Tuesday, March 23, 2004.

A local media operator in the San Bernardino Mountains said that fire in the mountain communities only had “entertainment value” for Los Angeles television audiences. Past research has indicated that mass media can make a useful contribution during the initial stages of a crisis event. Broadcast media can act as the primary distributor of immediate news, conveying information to citizens about the emergency and local emergency management organizations (Wenger and Quarantelli, 1989; Burkhart, 1991). However, when the public service function is subjugated to focus on the primary market, television and newspaper media lose that function of informing a crisis situation.

From focus group discussions, researchers found that only the locally based broadcast media was considered useful and credible by residents during the prolonged evacuation and confusing re-entry period. Information-seeking behavior during these stages of a wildfire event may indicate a shift from the traditional concept of public media consumption to a more nuanced notion of mediation of information from different communication channels by the public itself (Mokros and Aakhus, 2002).

“There’s a new generation of news people. They were more interested in entertainment. They understand it’s ratings that makes the money and keeps their job and it has nothing to do with getting the information right.”

“But to describe one person’s disaster is another person’s entertainment. And I think it is really true in the Los Angeles market, because you got approximately 12 million people and maybe 200,000 people were affected here, so it’s not a very big percentage that they’re worried about getting information right for. They’re interested in getting entertainment right for the rest of the 11 and a half million people who were watching the TV to try to get ratings.” Resident, Big Bear FSC group, Thursday, March 25, 1-3:30pm.

In public meetings after the fire, residents applauded the local radio station KBHR for providing useful and up-to-date information to residents during the evacuation. These media operators felt an obligation to their communities, so they went out of their way to get information and to update it frequently. When KBHR had to shut down, with the evacuation of Big Bear, the operator kept putting his fire information on the KBHR website.

Locally operated websites dedicated specifically to the Old Fire often were cited as sources of valuable information for affected communities, both before and after evacuation. Most frequently cited were Rimoftheworld.com and fireupdate.com. Both of these websites worked to provide real-time and place-specific information to mountain residents. It should be noted that fireupdate.com was a site that SBDONF Association personnel referred to when they complained that trained people were kept off the mountain while unauthorized people were allowed to wander around freely. Lack of official permission denied both the National Forest Association and the local residents a function that both parties recognized as badly needed.

Ranger Al's story

“Ranger Al” lived on the mountain 48 years: 10 years working with the Forest Service, 30 years with the LA Fire Dept. He chose not to leave the mountain when evacuation was announced. Ranger Al started his Old Fire work by finding out, for a friend, whether his house had been spared. When other people found out what he had done, he was inundated by phone calls asking for help. He contacted his son, off the mountain, saying, “I can’t get the message out.” His son set up <fireupdate.com> and began posting the information his father collected. There were so many hits the first day that the son had to switch immediately to a much higher-capacity server. The site averaged about 1 million hits per day during the Old and Grand Prix Fires. Ranger Al traveled around neighborhoods gathering addresses of places that had burned and places that had been spared. No officials seemed to want the information he had gathered at the time, but the affected public did. When Ranger Al’s free access to areas on the mountain was challenged by the Highway Patrol, notice of that on his website resulted in a message from Sacramento, “Ranger Al can go anywhere he needs to go.”

First hand account in the Rim Family Services focus group meeting: Thursday, March 25, 2004.

Management Recommendations

Although there is a tendency by many organizations and government agencies to hope for control over the information that travels through the media and informal networks in a natural disaster situation such as a wildland fire, it is neither an achievable nor even a desirable goal. Instead, by establishing a goal of informing the network, the JIC and other fire information efforts can focus more on their responsibility as providers of up-to-date and accurate fire information. The more IOFRs supply multiple information channels with locally relevant information, the more likely the public will find accurate, verified information in their searches. The lack of adequate crisis information in the regional media further emphasizes the need for agencies to provide that information and to find methods for sending it more effectively through local media and informal communication networks.

If the need for real-time information is not fulfilled by the agencies, people are more likely to rely on alternate informal information networks, fed both by trusted sources and public rumors. If the JIC is able to provide more immediate information from its multiple sources and assure that fire information is received and disseminated in a regular, hourly manner, more people are likely to rely on JIC contact points as their main information source during a fire event. One way to provide more immediate information from the IOFRs is to more effectively embed information officers into Incident Management Teams whose sole responsibility would be to communicate detailed information about the fire to the JIC at a minimum of hourly intervals or when a significant change occurs. A number of people provided suggestions for improving broadcast communication during wildland fires. A dedicated broadcast specific to the fire event could be established similarly to the Weather Alert System. Fires should be coordinated with the Emergency Broadcast System – especially evacuation orders. The National Weather Emergency system was used to warn of flooding and mass- or debris-flow dangers post-fire; that system could be used during the fire.

It may work better to have publicly accessible fire maps updated by ESRI, but the descriptive comments updated by an information technology specialist working with the JIC.

The need to provide parallel Spanish-language information was highlighted during these fires because a large proportion of Spanish-speaking residents were affected. More Spanish-speaking information officers and volunteers would have facilitated communication between the JIC and Spanish-speaking media and community. Later, during follow-up focus group meetings, it was learned that Spanish translation was provided at several evacuation shelters. The translators, however, were not familiar with the San Bernardino Mountain communities and were often confused about what areas were being discussed. Achieving an interactive exchange of information that is reasonable and effective can be especially challenging when the communities involved have vastly different socioeconomic and cultural contexts (Vaughan, 1995).

Lessons Learned: Findings and Recommendations

Real Time Information

1. Residents of communities near wildfires feel an urgent need for timely site-specific fire information that will help them cope with the threat to their families, lives, safety, property, and interests.
 - a) Expand and reinforce those fire information functions that provide information to communities near the fire, especially those where residents perceive a direct threat from fire and smoke.
 - b) Recognize in fire management policy that – for wildland urban interface fires – providing those whose families, lives, safety, property, and interests are potentially endangered with timely but accurate information needed to cope effectively with the threat is the first and most important fire information role.

Official Communication

2. Residents found that official communications about the fires contained little that was useful to them and that information releases were too few and infrequent. Even the public meetings directed to residents sometimes appeared to address issues more important to fire managers than to residents.
 - a) Incident Commanders and IOFRs should develop ways to monitor the information needs of residents of communities at risk and rapidly respond to changing information needs.
 - b) The information on the ICS-209 form is of little use to residents of threatened communities. Information releases for communities should not rely on the 209. New methods of tracking and disseminating information should be developed within the IMTs, focused on the needs of communities at risk.
 - c) Information releases should be every 1–2 hours, or immediately following major changes in the fire situation.

Response to News Media

3. Residents expressed dissatisfaction with most of the traditional TV and newspaper media as information sources. Information disseminated through the mass media was believed to be frequently inaccurate, emphasized the sensational over the practical, and shifted to new topics

before the local need for information was past. An exception was a local radio station that dedicated programming to coverage of the fire with information collected locally and directed to local information needs. Other hazards communication research has found that residents are more likely to turn to social networks or officials in order to confirm information about a hazard (Burkhart, 1991) and to other information sources, such as the Internet, when media coverage is considered insufficient (Bucher, 2002).

- a) Although information officers need to meet the demands of the traditional commercial print and electronic media, they should not rely on those media to get essential information to residents of communities at risk during fires.
- b) However, local radio stations might be recruited to broadcast useful information to residents in their areas.
- c) Traditional commercial media could be asked to broadcast the locations (radio frequencies, internet addresses, etc.) where accurate and timely fire information could be found. If such sites could be established before the fire, then these locations could be broadcast immediately.

Informing the Networks

4. Wildland urban interface communities are served by relatively complex information networks that go well beyond traditional media. Those include websites of local businesses and organizations, interpersonal networks, and a variety of local mass media. Residents rely on these networks heavily during fires. They both seek information from the networks and add information to the networks. The need to relay warning messages through multiple channels in order to increase comprehension and encourage residents to take needed action has been well documented in the hazards communication literature (Turner and others, 1981). This study found that the use of multiple channels is especially important during evacuation and re-entry periods.
 - a) Incident managers and information officers should recognize that their official messages and media are in competition with many other channels, messages, and sources. If the official message is to succeed, it must be useful, credible, and timely.
 - b) Advanced communication technology such as cell phones -- some of which can take and transmit photos, websites, and GIS maps and databases -- need to be incorporated along with bulletin boards, community meetings, and mass media as communication channels.
 - c) Most importantly, information officers should seek to inform the networks to disseminate information. Arrangements should be made to map the informal communication channels used and find ways to provide them with accurate and timely information.

JIC-Timing and Media

5. The JIC was able to overcome some of the difficulties of getting timely and useful information to people in communities at risk. However, it could have worked better if it had been activated sooner. Some cooperating agencies were slow to shift their information functions to the JIC. Other cooperators did not always provide the center with critical information but continued to disseminate information through their own channels without coordination with the JIC. Information from several different IMTs was communicated through the same media without adequate coordination, sometimes causing confusion. Even the special efforts to rapidly

validate information could not always provide information close enough to real time for residents.

- a) The JIC can serve as the coordinated point source of official, validated information and necessary changes should be made to correct the difficulties encountered. Recommendations are included in the final report from the JIC. The JIC served a positive need, but could have been more effective if implemented sooner.
- b) Specially trained information officers and/or community liaison personnel should be deployed to the fire to gather real-time intelligence and immediately communicate it to the JIC for dissemination to the communities at risk. Time is of the essence.
- c) When thousands of people are threatened, a few dozen emergency information phone lines will not meet their demands for information. Phone banks should be maintained, but need to be reinforced with other accessible media. The JIC website met some of that need and could be even more effective had it been broadly advertised. Active dissemination through the existing informal networks and websites would help overcome bottlenecks that can occur in emergency information centers.

Evacuation Communication

6. Evacuation creates serious communication problems. They disrupt informal information networks. Access even to the traditional media is sometimes disrupted when power fails, causing radios, televisions, and some telephones to shut down. With evacuation, residents' information needs change and intensify just as communication becomes more difficult. Studies on warning communication for pre-impact evacuations in response to natural disasters have been fairly extensive. Researchers have reviewed the key structural and psychological and social factors that affect people's response to evacuation warnings (Aguirre, 1991; Fitzpatrick and Dennis, 1991; Baker, 1995; Atwood and Major, 1998; Dow and Cutter, 1998; Balluz, 2000; and Bateman and Edwards, 2002). Others have looked at warning and communication processes and evaluated their effectiveness under different organizational scenarios (Carter, 1980; Aguirre and Anderson, 1991; Burkhart, 1991). There is little research, however, on communication needs following the evacuation warning. More research is needed on information-seeking behavior during the evacuation, re-entry, and recovery period of a wildfire event.
 - a) Evacuation notification needs to be delivered with as much lead time for preparation as possible. The means of announcing evacuation must be as considerate as possible: the recipients are already traumatized. Reverse 911 call systems can be effective, but they must repeat information, and include a "call-back" number for residents to get additional information or instruction.
 - b) Early on, information officers should establish channels that can be accessed easily by people away from home and without access to their usual communication technologies.
 - c) During evacuation, information about structures and other key values needs to be regularly collected and communicated to residents. Homeowners need to be told, as soon as possible, whether or not their homes and structures have burned. Information at the community level should be broadly and quickly disseminated.
 - d) However, care needs to be taken in how individual property information is communicated. Homeowners must be told privately if their individual homes are

destroyed, and it may be important to have mental health workers present to assist families who have lost their homes. Procedures for these sensitive communications have been developed by the American Red Cross with the help of psychologists and can be easily adapted for use on fire disasters. Never should evacuated residents be kept in the dark about the condition of their property and community for any length of time. A cell phone call from an IOFR standing at a particular location describing and/or photographing the scene can be very helpful.

7. Evacuation centers and shelters proved to be effective locations to communicate fire information to residents who used them. However, relatively few evacuees use the shelters, most with the means to do so choose to rely on their own, or friends' and family resources.
 - a) The American Red Cross might consider establishing assistance and information sites throughout the area to which evacuees go for shelter or lodging. If evacuees know the location of those satellite assistance and information centers before the evacuation, they may seek them out to keep up-to-date on events and conditions in the evacuated community.
 - b) Information officers could provide such sites with specialized information and with telephone links to the JIC and field information officers who could respond to questions from residents.
 - c) Evacuation centers could also set up voluntary bulletin board sign-up locations so evacuated parties could leave forwarding/contact information. This has been used effectively on some wildland interface fires.

Re-entry/Reoccupation

8. Reoccupation following evacuations needs to be planned as carefully and completely as the evacuation itself. A communication plan needs to be part of the reoccupation plan.
 - a) Information officers need to prepare methods to alert all evacuees of the reoccupation and provide instructions on how and when to return.
 - b) Safety information may be needed if vegetation and structures or power lines, water systems, roads, and other infrastructure have been damaged.
 - c) Returning residents will face a wide range of urgent problems when they return, including acquiring food and fuel, assessing whether any heat stressing has affected their structures, disposing of spoiled food in freezers, encountering injured snakes or other wildlife, and caring for heat-stressed ornamental vegetation. An information program needs to be in place and active to help returning residents cope and return the community to normal as soon as possible.

MAST and FSCs

9. Communications among agencies and between agencies and residents, in the mountain communities was substantially more effective during these fires as a result of preparations made by MAST and the FSCs prior to the events. The existing communication patterns that had been established to deal with the widespread die off of trees as a result of drought, disease, and insects added significantly to the effectiveness.

- a) Communication plans should be prepared and rehearsed for wildland urban interface communities well before they are needed for a wildfire.
- b) Communication plans could be developed as part of community wildfire protection plans.
- c) Local informal communication networks were effective at keeping large numbers of people informed during the Bridge Fire and worked well to quickly mobilize people to attend community meetings. Communication plans should specifically address means of activating local networks and keeping them informed with timely and useful information.
- d) Local residents should take necessary safety training so they can participate in official information functions to provide local information and to serve as informational links to local informal networks.
- e) FSCs, especially in southern California, are organizing themselves to be qualified and trained to serve local presence functions during wildland interface fires. This momentum needs to be accepted and supported through agency collaboration.

Separating Functions: Informing the Media vs. Informing the Public

10. The problem of communicating with communities at risk during wildfires is a much different problem from that of providing timely and accurate information to the traditional news media. The two audiences demand different kinds of information and have different deadlines. Information to communities needs to be as close to real time as possible.
- a) Incident managers and information officers should clearly separate the two fire information functions of serving the media and serving communities at risk.
 - b) Specialized training needs to be developed and provided to information officers who will manage community information functions. Agency administrators must be informed and encouraged to support these changes.
 - c) Many of the community information functions used during the fires seemed to work well and information officers reported success with community information efforts on other fires. These experiences should be used to help develop effective information programs to deal with the unique communication needs of people in communities at risk of wildfire.
 - d) On the other hand, a great deal of research and communication theory is available on disaster communication. Much of that can be useful in developing community fire information processes. Some erroneous assumptions have been clarified in research on hurricane and other natural hazard research. For example, people do not panic when notified early that evacuation may be required. Also, most people when faced with serious natural hazards do not adopt “self-first” attitudes, but go out of their way to assist others in their neighborhoods and communities.

Information Flow During Transitions

11. When wildland fires change in status and scope, authority, function, and personnel change as well. For example, as a safety measure, all wildland firefighters, including members of an IMT can work only 14 days (under most circumstances) before they are required to rest. As they

reach the required rest period or as fire conditions permit, the IMT will transition to another team. Each fire fighting team brings with it a lead information officer and usually orders additional information officers. Once the fire is contained, fire management will be returned to the local agency. A Burned Area Emergency Rehabilitation team (BAER) may be assigned to the fire. BAER teams also may include a lead information officer. Often, team transitions correspond with abrupt changes in information flows, with the new team in charge starting from scratch to try to build community information systems. In spite of the formal transition between the team leaving and the one taking over, the community perceives a disruption to reliable information sources and channels.

- a) Authority to manage the incident is delegated to the IMT from the local agency line officers. Sometimes forest supervisors and other agency administrators reserve the information function under their direct supervision. In the interest of continuity of community information throughout the incident, line officers may wish to exercise this option more often, especially when there are multiple fires and several IMTs would be communicating with the same communities at the same time, or over time.
- b) When transitions are made, each fire team needs to examine the information flow to the public in the unique situation of transition. Previous communication operations must be examined in light of the incoming team's assessment of changing community information needs.

Priority of Fire Information Functions

12. Land management agencies need to critically examine the resource flow allocated in different stages of pre-, during-, and post-fire management. While resources available to suppress a fire may seem unlimited, by comparison, very few resources are made available for pre-fire mitigation and community preparedness, or for post-fire recovery and mitigation against future fire losses. This is true as much for information as for any other fire management dimension. Individual Bureau of Land Management Field Offices, and National Forests, National Parks, Fish and Wildlife Service, and Bureau of Indian Affairs management units typically have limited resources compared to those of an IMT during a major fire. Consequently, the level of community information effort seen during the fire may not be sustained after the team leaves. The public – in post-fire environments – shows evidence of believing that their local forest (or other land management agency) did not care or “dropped the ball” because they could not respond in scope or rapidity equal to that of the IMT.

- a) Land management agencies need to insure that resources are sustained beyond fire suppression both for fire information and for community involvement.

Figure 1. Old Fire Perimeter: October 28

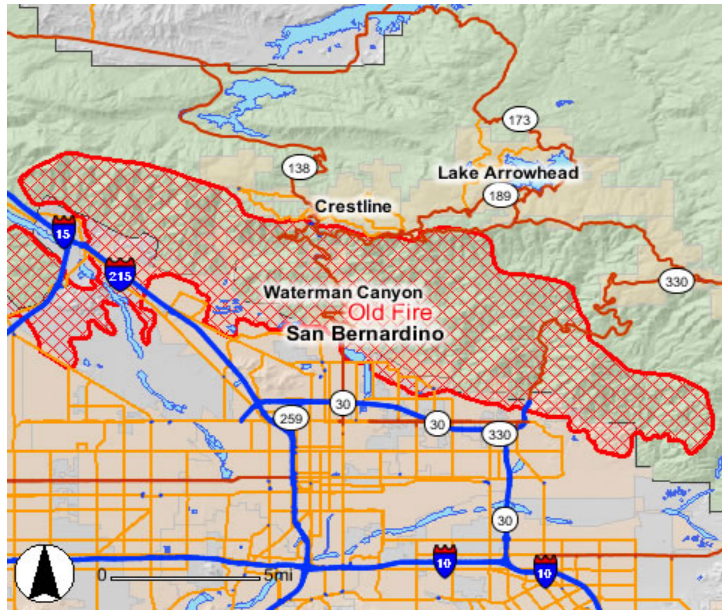
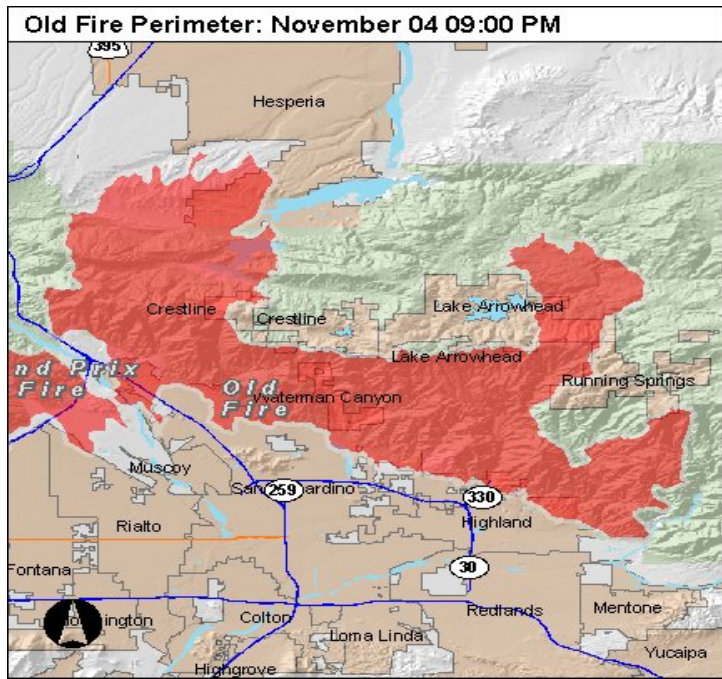


Figure 2. Old Fire Perimeter: November 4



Literature Cited

- Aguirre, B. 1991, Evacuation in Cancun during hurricane Gilbert: *International Journal of Mass Emergencies and Disasters*, v. 9, no.1, p. 31-45.
- Aguirre, B., and Anderson, W., 1991(a), Saratoga, Texas, tornado, May 22, 1987: An evaluation of the warning system: Washington, D.C., National Academy Press.
- Atwood, L.E., and Major, A., 1998, Exploring the 'Cry Wolf' hypothesis: *International Journal of Mass Emergencies and Disasters*, v. 16, p. 279-302.
- Baker, E., 1995, Public response to hurricane probability forecasts: *Professional Geographer*, v. 47, no. 2, p. 137-147.
- Balluz, L., 2000, Predictors for people's response to a tornado warning: Arkansas, 1 March 1997: *Disasters*, v. 24, no. 1, p. 71-77.
- Bateman, J.M., and Edwards, B., 2002, Gender and evacuation: A closer look at why women are more likely to evacuate for hurricanes: *Natural Hazards Review*, v. 3, p. 107-117.
- Bucher, H.J., 2002, Crisis communication and the Internet: Risk and trust in a global media: *First Monday*, p. 1-10.
- Burkhart, F.N., 1991, Media, emergency warnings, and citizen response: Boulder, CO, Westview Press.
- Carter, M.T., 1980, Community warning systems: The relationships among the broadcast media, emergency service agencies and the National Weather Service, in *Disasters and the Mass Media*, Committee on Disasters and the Mass Media: Washington D.C., National Academy of Sciences, p. 214-228.
- Carroll, M., Findley, A., Blatner, K., Mendez, S., Daniels, E., and Walker, G., 2000, Social assessment for the Wenatchee National Forest wildfires of 1994: Targeted analysis for the Leavenworth, Entiat, and Chelan Ranger District: Portland, OR, USDA Forest Service.
- Cortner, H.J., Gardner, P.D., and Taylor, J.G., 1990, Fire hazards at the urban-wildland interface: What the public expects: *Environmental Management*, v. 13, no. 1, p. 57-62.
- Dow, K., and Cutter, S., 1998, Crying wolf: Repeat responses to hurricane evacuation orders: *Coastal Management*, v. 26, no. 4, p. 237-252.
- Fitzpatrick, C.M., and Dennis, S., 1991, Motivating public evacuation: *International Journal of Mass Emergencies and Disasters*, v. 9, no. 2, p. 137-152.
- Fitzpatrick, C.M., and Dennis, S., 1994, Public Risk Communication, in *Disasters, Collective Behavior, and Social Organization*, Dynes and T. Russell R., Kathleen J. Newark, U Delaware Press: 71-84.
- Gardner, P.D., Cortner, H.J., and Widaman, K., 1987, The risk perceptions and policy response toward wildland fire hazards by urban homeowners: *Landscape and Urban Planning*, v. 14, no. 2, p. 163-172.
- Kumagai, Y., Daniels, S.E., Carroll, M.S., and Bliss, J.C., 2004, Social-psychological reactions to wildfire: Implications for agency-community interactions and communication strategies: *Western Journal of Applied Forestry*, v. 19, no. 3, p. 113-194.
- Michaels, S. 2003. Perishable Information, Enduring Insights? Understanding Quick Response Research. Beyond September 11th: An account of post-disaster research. Natural Hazards Research and Applications Information Center, Program on the Environment and Behavior. Boulder, University of Colorado.
- Mokros, H.B., and Aakhus, M., 2002, From information-seeking behavior to meaning engagement practice: Implications for communication theory and research: *Human Communication Research*, v. 28, no. 2, p. 298-312.

- Rudzitis, G., 1999, Amenities increasingly draw people to the rural west: *Rural Development Perspectives*, v. 14, no. 2, p. 9-13.
- Taylor, J.G., and Daniel, T.C., 1984, Prescribed fire: Public education and perception: *Journal of Forestry*, v. 82, no. 6, p. 361-365.
- Tracy, K., 1997, Interactional trouble in emergency service requests: A problem of frames: *Research on Language and Social Interaction*, v. 30, no. 4, p. 315-343.
- Turner, R.H., Nigg, J.M., Paz, D.H., and Young, B.S., 1981, Community response to earthquake threat in Southern California, Part 10, Summary and Recommendations: Institute for Social Science Research, University of California, Los Angeles.
- Vaughan, E., 1995, The significance of socioeconomic and ethnic diversity for the risk communication process: *Risk Analysis*, v. 15, p. 169-180.
- Wenger, D., and Quarantelli, E.L., 1989, Local mass media problems, and products in disasters: University of Delaware, Disaster Research Center.