

**Characteristics of Effective Communication Before and During a Wildland Fire Event:  
Evidence from the Hat Creek Complex Fire, 2009**

By

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## **EXECUTIVE SUMMARY - Characteristics of Effective Communication Before and During a Wildland Fire Event: Evidence from the Hat Creek Complex Fire, 2009**

### **Fire Management and Communication**

Communication is vital to public satisfaction, support, and collaborative action that can help address existing fire management challenges. To reduce the frequency and severity of large wildland fires, a more intense focus on preemptive fire management strategies (defensible space, prescribed burns, forest thinning, etc...) should be taken. Proactive and effective communication is an integral part of *before* and *during* fire activities. In previous studies, proactive communication *before* a fire was shown to increase knowledge and citizen support for fuels reductions which can aid alternative fire management strategies. Effective communication *during* a fire can affect public satisfaction with overall information provided during such events.

### **Effective Communication Survey of the Affected Public on the Hat Creek Fires**

This study focused on how communication from the United States Forest Service (USFS) and local governments affected public satisfaction with the information received both *before* and *during* a wildland fire incident. Based on existing literature, effective communication characteristics were defined as the result of 1) planning, 2) message delivery, 3) integrating into the local context, and 4) building trust in the process. The hypothesis was that these four characteristics of effective communication were associated with greater levels of overall communication satisfaction *before* and *during* a wildland fire incident. During fall 2009, a Wildland Communication Survey (WCS) was administered to 1,000 people living within a 10 mile perimeter of the fires in the Hat Creek Complex (including the Brown, Sugarloaf and Butte Fires), in Northern California. Questions were asked about satisfaction with communication, planning, message delivery, integrating into the local context and trust. Results revealed the four characteristics of communication were related to overall satisfaction with communication *before* and *during* the Hat Creek Complex Fire.

### **Analysis**

*Satisfaction with Communication.* To attain high levels of public satisfaction, communication between citizens and the agencies responsible for fire management should occur during all phases of the fire cycle. The majority of respondents from the Hat Creek indicated that they were satisfied with the overall information they received both *before* (60%) and *during* (68%) the fire. Forty percent *before* the fire and, 32% *during* the fire were not satisfied with the information they received. These results suggested that respondents were mostly satisfied with the information they received. They also indicated that more respondents were satisfied with the information they received from the USFS and local agencies *during* the fire compared to the information they received *before* the fire.

*Planning.* Results from the survey indicated that communication from the USFS was clearly related to satisfaction both before and during the fire. Communication from local government was related to satisfaction before the fire, but not during the fire. Three explanations are possible for this finding. First, this may suggest that the local government agencies did not bear as much responsibility disseminating information *during* the fire; therefore the public did not rely on them. Second, local government agencies made attempts, but did not successfully disseminate

information to the public *during* the fire. Third, the results could suggest that the Forest Service's planning efforts prior to the fire may have helped establish more effective lines of communication *during* the fire than the local government.

*Message Delivery.* Survey respondents used a variety of different information sources *before* and *during* the fire. These sources were broken down into unidirectional (TV, radio, etc...) and interactive modalities (conversations, meetings, etc...). Previous research has shown that interactive communication is a more effective way to develop support and acceptance for the selected fire management strategy. Descriptive analysis from the Hat Creek showed that respondents were using more unidirectional sources, compared to interactive sources, both *before* and *during* the fire. Respondents were however, more satisfied with overall communication when they used multiple information sources and interactive modalities that allowed them opportunities to ask questions and express concerns about the fire.

*Integrating into the Local Context.* Effectively integrating into the local context can decrease the amount of uncertainty that the public associates with fire management and build their capacity to participate in developing and implementing solutions in the future. Three components of integrating into the local context at the Hat Creek were associated with greater levels of satisfaction *before* and *during* the fire. First, respondents that felt local resources were used well *during* the fire. Second, respondents who felt local knowledge and local concerns were integrated into planning *before* the fire. Third, respondents that felt the agencies took action to provide satisfactory answers to issues raised by the public *before* the fire. The results suggest that fire management officials successfully integrated into the local context of this fire.

*Building Trust.* Building trust with the public is the culmination of effective planning, delivering information through multiple mediums, and incorporating a community's local context into wildland fire communication strategies. Previous research indicates that public acceptance of alternative fire management strategies is associated with agency skill, credibility, and adequacy of communication efforts. The Hat Creek survey results showed that there was greater trust in unidirectional information sources rather than interactive information sources *before* and *during* the fire. Respondents were more satisfied with communication *during* the fire if they received credible and accurate information about the fire. The results also indicated respondents who trusted the USFS were more likely to be satisfied with communication. Sixty-nine percent of respondents trusted the USFS, while only 43% trusted local government.

### **Lessons from the Hat Creek Fires**

As shown above, four characteristics of effective communication were related to overall satisfaction with information received both *before* and *during* the Hat Creek fire. More respondents were satisfied with communication efforts *during* the fire. Communication from the USFS was more likely to be associated with satisfaction than communication from local government. This may be because respondents trusted the USFS more than local government. Even though survey data indicated that respondents were satisfied with interactive information sources, respondents revealed that they had greater trust and were using more unidirectional information sources compared to interactive sources. Respondents were also more likely to be satisfied with communication when agencies incorporated local knowledge, local concerns, and local resources for fire both planning and response. The findings imply that the public was satisfied with communication *before* and *during* the fire. These lessons may help contribute to better communication practices and aid in more sound fire management in the future.

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## INTRODUCTION

The focus of this study was on how communication from the United States Forest Service and local governments affects public satisfaction with the information received both *before* and *during* a wildland fire incident. The hypothesis is that four characteristics of effective communication are associated with greater levels of overall satisfaction *before* and *during* a wildland fire incident. Effective communication characteristics are defined here as the result of effective planning, using unidirectional and interactive media to disseminate information, successfully incorporating the local context into management practices, and continually building trust in the process. Building trust and credibility is facilitated through the successful implementation of the first three characteristics. Survey questions from the Wildfire Communication Survey<sup>1</sup> administered after the Hat Creek Fire Complex in 2009 were used to test these relationships with descriptive and inferential statistical analysis. Results from the statistical analysis revealed the four characteristics of communication were mostly related to overall satisfaction *before* and *during* the Hat Creek Complex Fire.

## JUSTIFICATION

In the last decade, numerous factors have caused larger and more expensive forest fires to take place in the western United States. Higher temperatures associated with climate change have diminished mountain snowpacks more rapidly than before (Boxall and Cart 2008). This has led to drier vegetation, which further increases the danger that has been brought on by current drought trends. Invasive insects have killed thousands of acres of forest, and the spread of fast burning invasive grasses have altered the natural defenses of the ecosystem (Boxall and

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<sup>1</sup> Wildland Communication Survey is attached in Appendix A

Cart 2008). Increased heat, less moisture, and invasive disturbances have enabled fire season to begin sooner each year. These environmental causes partnered with increasing numbers of individuals moving into the wildland urban interface (WUI) have made these fires much more complex, dangerous, and expensive (Boxall and Cart 2008).

Effort to reduce the incidence of these large fires revolves around being able to implement alternative and proactive fire management strategies. Research has shown that these alternative strategies, such as fuel reduction, are more successfully implemented if agencies understand which factors affect public acceptance and satisfaction with responses to “questions, objections, and concerns of residents” on the WUI (Winter 2002:15). One of the most important factors that determines acceptance and satisfaction levels with various activities is communication. To attain high levels of public satisfaction, communication between citizens and the agencies responsible for fire management must occur during all phases of the fire cycle (Olsen and Shindler 2010). The purpose of this paper is to understand whether or not communication efforts from the United States Forest Service (USFS) and local government agencies were related to overall satisfaction with information received both *before* and *during* the Hat Creek Complex Fire.

## HISTORY / RELEVANT LITERATURE

The ever growing body of literature on forest fire communication practices can be disaggregated in many different ways, but can succinctly be organized into four main principles as explained by Toman and Shindler (2006). Their research concluded that effective communication is a product of 1) effective planning, 2) using both unidirectional (one-way) and interactive information sources, 3) incorporating a local context into fire management and

information dissemination, and 4) emphasizing meaningful interaction with participants in a way that builds trust. These four principles form a holistic approach to addressing the difficult problems that agencies and communities residing in the WUI are facing today.

### Planning

Developing an effective plan is an important first step in communicating a clear message of the fire management strategies that are being pursued. Effectively implementing those strategies on any level depends upon an agency's ability to inform and develop a supportive constituency. To build these important relationships, mutual respect, and trustworthy educational materials must be developed and distributed from the responsible agencies. The beginning phases of building trust and communication can often take place well before a fire occurs through fire education, interaction with the community, and empowering the public by including them in the decision making process (Olsen and Shindler 2010).

Before doing anything, the agency that is responsible must determine the exact message that it is attempting to communicate. There are a variety of different methods and programs to choose from that must be defined to clearly communicate a message to the public. Agency outreach and education programs can be focused on improving public understanding of alternative fire management strategies or can be geared towards actual behavior change. Communication methods used to improve awareness may include a workshop on prescribed burning, while communication methods used to encourage behavior change may more clearly explain the proper guidelines for implementing effective defensible space techniques (Toman and Shindler, 2006). Either way, proactive efforts to build relationships with such programs before fires occur have developed higher levels of acceptance and agency trust. In one case, Eric

Toman and Bruce Shindler note that “public support for fire and fuels management is greatly enhanced through effective public communication and outreach programs” (Toman and Shindler 2006: 111).

Previous studies of agency outreach activities incorporating fuel load reduction in the planning stages have found an association between citizen understanding and support for the practice. McCool and Stankey (1986) showed that an increase in citizen awareness of fire management was associated with agency communication and education conducted before a fire. The association however, did not establish a causal relationship, which weakened its claim. A second study conducted by Marynowski and Jacobson (1999) concluded that educational materials disseminated from agency outreach activities before a fire did in fact improve fire ecology awareness, but did not necessarily represent an increase in public support for reducing fuel loads. A third study conducted by Loomis (2001), however, provided empirical evidence of an increase in knowledge and citizen support for reducing fuel loads among those who were exposed to agency outreach education materials (Toman, Shindler, Brunson 2006). Whether the goal is to improve public awareness or to encourage behavior change, incorporating good agency outreach and educational materials into the planning process can improve public support and satisfaction for reducing fuel loads.

Planning activities should not only focus on the specific agency objectives that are being communicated, but should also place an emphasis on who is receiving the information. While agency outreach and educational materials can be effective forms of communication and increase public support, the “availability of information does not necessarily mean that it will reach its audience or be effective once it gets there” (McCaffrey 2004: 12). Understanding the barriers to information exchange, such as the initial public attitudes, previous management success or

blunders, and how the historical context of the community is related to the stakeholders involved, can influence the ability to deliver a clear message that is accepted and appreciated (Toman, Shindler, Brunson 2006).

Lastly, to disseminate a clear message to the public, the responsible agencies need to take proactive steps to plan and organize their objectives. The agency must be aware of the available resources for its outreach or educational programs. As resources and personnel are stretched thin, innovative ways to improve efficiency are needed to complete the transfer of information from agencies to the public and vice versa. Federal, state, and local agencies are continually updating old educational materials and using new media to distribute information to the public (radio, news, internet, meetings, etc). They also need to focus on how and who is delivering the information to the public. Because public support for fire and fuels management is accomplished through solid communication and outreach programs, properly managing personnel and financial resources is a key component to clearly communicate the fire management strategies that are being pursued (Toman and Shindler 2006).

In summary, enacting policies to increase awareness and build public support is an integral part of the planning process. To deliver a clear message to the public, the responsible agency must also have a clear goal or objective. The agencies must also know the challenges and historical background of communicating a message to the stakeholders involved in the process. Lastly, they must be able to utilize available resources to the best of their ability.

Understanding agency planning and communication efforts is important in disseminating a clear and consistent message to the public. I will investigate how well the public felt the Forest

Service and local government agencies helped them understand how the fire was managed *before* and *during* the incident.

### *Message Delivery*

The body of forest fire communication literature is very diverse. It can be difficult for the USFS and local government agencies to select and implement the most effective communication strategy. While studies have shown that increased understanding affects public satisfaction levels, there is often a disconnect between the sheer amount of educational materials and other available information. Sarah McCaffrey suggests that the “communication medium may be as important as the message” that is being delivered (McCaffrey 2004:13).

First, communication methods can largely be disaggregated into two main media categories: unidirectional and interactive. Unidirectional methods, such as television, radio, newspaper, etc., generally involve information being communicated from the agency to the public. Interactive methods enable the citizen or community as a whole to participate in the discussion, ask questions, and voice concerns. A large amount of research has shown that interactive methods of communication between agencies and citizens is a more effective way to develop support and acceptance within the community for a specific fire management strategy (Toman, Shindler, Brunson 2006). Communication through interaction not only helps the public understand the steps and policies that are being selected, but can also help the agencies or individuals responsible for making policy decisions understand what information the public needs in return. Strategies to reduce fuel loads are more likely to be successful if the managers can sufficiently interact and understand what factors influence public acceptance. Understanding

public concerns, questions, and objections is vital in being able to effectively communicate how the management strategy is going to address public needs (Winter, Vogt, and Fried 2002).

Toman and Schindler (2006) stated that both unidirectional and interactive approaches are both necessary in effectively relaying information to the public. A survey conducted by McCaffrey (2004) in Incline Village, Nevada, was administered to gather public opinion information about the usefulness of fire management information sources. The first question asked the respondents which mediums of communication made them more aware of information for defensible space, tree thinning, and prescribed burning fire management strategies. Respondents felt that newspapers/magazine articles, educational material, and television made them more aware of the three strategies. The three unidirectional mediums performed better than personal contact, actual experience, neighborhood meetings, and government representatives. A second question sought information with respect to how useful each source was in helping them understand fire danger and the fire management program. The fire department was the source that most respondents were aware of and deemed as “very useful.” Print news, brochures/newsletters, and television/radio were the next three most useful sources of information for the public. Respondents were less aware of the Nevada Department of Forestry, the USFS, and school programs, but felt that they were somewhat useful. More than a quarter of the respondents did not know that the USFS was working in the area during the time of the fire (McCaffrey 2004).

Toman and Shindler (2006) suggest that the primary advantage of mass unidirectional communication is its efficiency. Newspapers, TV, and now the internet efficiently enable information to be delivered to a large group of people with relative ease. Akin and Rice state however, that “the broadest reach can deliver only a superficial amount of information”

(2001:56). McCaffrey found this to be true as well. To break down her first findings, she included two “sense of responsibility” survey questions to determine the variability in respondents that prefer newspapers/magazines as compared to those that prefer television as their main source of information. She found that respondents using newspapers and magazines were more likely to take responsibility or ownership of local fire planning and management strategies. The survey results indicated that a greater percentage of respondents using print materials had performed defensible space measures around their homes, compared to those that were not using print materials. On the contrary, higher percentages of respondents citing television as a main source of information were less likely to feel responsible for local fire planning. They were 15-20% less likely to perform defensible space measures. Interestingly enough, “95% of respondents who cited television as ‘never used,’ or ‘not useful’ had implemented defensible space measures” (McCaffrey 2004:16-17). This evidence shows the difference between two methods of unidirectional communication. While both methods were listed as being “very useful,” more action was taken by the group using unidirectional sources of information. It appears however, that unidirectional communication is not always adequate by itself and should be partnered with interactive methods.

Research has shown that individuals rely on unidirectional methods of communication during the beginning stages of a wildfire event. These methods are likely to provide good information, but interactive methods are more likely to encourage actual behavior change (Toman, Shindler, Brunson 2006). When faced with difficult decisions, individuals are interested in finding out as much information about how serious an event is and how it specifically might affect them. The ability to attain that type of direct information about risky or uncertain fire management strategies has increased public support for more interactive

communication methods. Improved citizen-agency outreach programs, conversations with agency personnel, and guided field trips have proven to be effective interactive tools in transferring information to and from the public. Toman and Shindler (2006) note that individuals using interactive communication methods are more likely to feel connected because they are part of the experience instead of simply being bystanders. This increase in participation can also spark additional interest and develop better understanding of existing unidirectional information or other educational materials.

Unidirectional and interactive efforts to distribute information are both integral parts of wildland fire communication. Research has shown that the effectiveness of unidirectional or interactive communication depends on what type of audience or stakeholder is on the receiving end. Sarah McCaffrey maintains that “coupling educational materials with more personalized contact appears to be the most effective method for providing information on wildfire management and mitigation” (McCaffrey 2004:18).

This study will attempt to gain a better understanding for whether the public was using unidirectional sources or interactive sources. An additive index will be created to measure which of these two sources respondents were using. Two additional questions will be used to gain insight into the effectiveness of interactive information sources used **during** the Hat Creek fire.

### Local Context

Agencies must incorporate a variety of different factors to learn how to fully integrate into the local context of a fire incident. Building credibility and effectively integrating into the community is dependent on how the message is delivered, the content that is inside it, and the individuals that are interfacing with the public. These strategies must also be socially acceptable

and have the best interest of the community in mind. Information must be communicated in such a way that communities can understand the process being chosen (Olsen and Shindler 2010).

While agencies work to foster public support, it is impossible to control for all variability that exists within the context, condition, and provision of the fire. All three of these affect social acceptability (Olsen and Shindler 2010). These judgments vary within and between different communities, making it impossible to develop a “one size fits all” approach. Public support is contextual because it is based on what the local community is familiar with or able to embrace. Each community has different priorities and values, which are further complicated by how individual landowner’s feelings are disaggregated within. Whether it be protecting old growth forest, tribal lands, or public property, identifying with the contextual parameters is important in developing public support. Social acceptability also has conditional properties, which are dependent on how the community feels it has been represented and included in the decision making process. Socially accepted policies are conditional on whether or not an agency can genuinely engage the public, value those interactions, and emanate mutual social respect. Lastly, judgment and acceptance is made on a provisional basis because public opinion is in constant motion (Olsen and Shindler 2010). While listing social acceptance as provisional, it is important to note that context and condition can also be in fluid motion during a fire, constantly changing with fire activity and daily agency interaction.

This third characteristic of effective communication focuses on developing functional and genuine communication lines for local conditions and concerns. Incorporating a local context into fire management and information dissemination can decrease the amount of uncertainty that the public associates with fire management and build their capacity to participate in developing and implementing solutions in the future (Toman and Shindler 2006). A precise and planned

approach to incorporating the local context should be encompassed to achieve action through increased public participation.

Two recognized social psychology studies on persuasive communication have been used to harness communication to the public in the most effective ways. The Theory of Reasoned Action (TRA) strategy suggests that prior beliefs and attitudes affect behavior and acceptance (Ajzen and Fishbein 1980). As a result of this finding, it is fair to assume that to achieve behavior change and public acceptance of fire management strategies, agencies should focus their efforts on communication strategies towards the beliefs and subjective norms that naturally occur within respondents in the community. The Elaboration Likelihood Model (ELM) method indicates that persuasion occurs through processing the message content, where it is coming from, how credible the source is, and if it is technically sound (Petty and Cacioppo 1981). Instead of focusing on subjective norms, such as prior experiences or beliefs of agency intent, this method is more focused on how to deliver the content in a reputable way (Toman, Shindler, Brunson 2006).

The two approaches suggest a useful framework for how agencies can deliver information. To be effective in generating participation, the public must be able to receive and learn from communication efforts. Because people learn, distribute, and receive information in different ways, agencies must be prepared to custom fit their communication strategies in a variety of different ways. Long (1998) touches on this notion and further defines learning as a "cognitive process that is influenced by a variety of other elements: a) existing or prior knowledge; b) attitudes and beliefs; and c) the state of the learner, eg., whether the learner is rested, tired, well, sick, angry, anxious and so forth" (: 29). Knowles (1998) discussed six components that elaborated on the adult learning process: 1) learner's need to know; 2) learner's

self concept; 3) role of the learner's experience; 4) readiness to learn; 5) orientation to learning; and 6) motivation.

Understanding the public's background and how they learn will be useful in generating a plan to effectively communicate with them. My study will incorporate how well the public felt local knowledge and concern were integrated into fire planning, whether or not agencies took action to provide satisfactory answers to issues raised by the public/community, and whether or not respondents felt that local resources were used well during the fire.

### *Developing Trust*

The fourth characteristic of effective communication suggests long term public support for forest management strategies cannot be attained without building substantial levels of trust. Olsen and Shindler note that "citizen trust in forest agencies may be the most essential component to successful implementation of any forest management program" (Olsen and Shindler 2010:139). There are also many benefits associated with citizen / agency trust including a reduction in conflict, improvements to organization, lower costs, and better cooperative behavior (Olsen and Shindler 2010).

A survey focusing on fuel treatment in the WUI showed that "residents' attitudes toward and acceptance of fuel treatments are associated with their perceptions of management agencies' ability to control fire, professional skill, credibility, and adequacy of communication efforts" (Winter 2002:20). Trust is built in many different ways during the course of the fire. Developing relationships and incorporating public concerns into the decision making process is necessary during all stages of the fire. Research has shown that "citizens frequently make judgments based on their interactions with forest agencies and their level of trust with local

managers” and that “acceptance of fuel treatments hinges on citizens’ confidence that the agencies will effectively manage risks as well as conduct a planning process that includes them” (Shindler and Toman 2003:9). A study performed by Shindler and Reed (1996) showed that while the public supported proactive fire management strategies, they did not fully trust the Forest Service to effectively implement the treatment programs. Only about fifty percent felt that they would do an adequate job. When Toman and Shindler conducted follow up research in 2000, they found that fewer people trusted the Forest Service to implement treatment programs and even fewer people agreed that the Forest Service provides trustworthy information. McCaffrey, on the other hand, found that when individuals had personal contact with government personnel, they were more likely to trust and support more controversial fire management strategies (2004).

Developing citizen trust of fire management strategies and forest agency practices is dependent on all three of the previous characteristics of effective communication covered in this paper. Trust can be gained through effective planning, credible unidirectional and interactive communication methods, and by successfully integrating into the community’s local context. This study will incorporate how accurate and credible the information received was *during* the fire. Additional insight will be gained through an assessment of Forest Service trust *during* the fire.

## **STUDY POPULATION**

During the summer of 2009, a research team from NC State University investigated the Hat Creek Complex (including the Brown Fire, Sugarloaf Fire, and Butte Fire) in northern California. This group of fires threatened approximately 130 structures and 400 people. A total

of 11,269 acres were burned resulting in a cost of \$7.7 million to suppress. Evacuations took place over a four day period, in an area with significant communication barriers, due to main highway closures, burned over and downed power and phone lines, and poor cell phone coverage. The Wildland Communication Survey (WCS) was administered to 1,000 people living within a 10 mile perimeter of fires in the Hat Creek Complex. The survey was pilot tested in late Spring 2009 and administered on October 2, 2009, approximately eight weeks after the end of the fires. A three-wave, Dillman-type method was used to obtain the highest possible response rate. This technique includes a personalized letter and business reply return in the initial mailing, followed by a reminder postcard, and then followed by another return envelope for those that do not respond (Dillman 2000). The first wave was sent on 10/2/2009, followed by a post card on 10/16/2009, and followed by a third wave on 10/30/2009. One hundred and thirty-three responses were received for a response rate of 13%. Non-response error is the most likely the largest area for bias in the survey. While receiving more feedback would be ideal, the survey data is normally distributed and valid for the all statistical analysis performed in this study. When compared to the general population in Shasta County, the Hat Creek survey respondents are “more male, older, better educated, retired, have been residents longer, and are more rural” (Steelman 2010).

## METHODS

The main objective of this study was to understand how various factors associated with efficacy in communication relate to respondent satisfaction with communication on the Hat Creek Fire Complex. The dependent variable in this study is overall respondent satisfaction with information received both *before* and *during* the fire. The independent variables are represented

by four characteristics of effective communication. Specifically, these variables are planning, message delivery, local context, and trust.

The model used in this study states that satisfaction is a result of effective communication efforts during a wildland fire incident. Effective communication can be the result of planning, using of interactive and unidirectional information sources, integrating into the local context of a community, and building trust with the public.

## Dependent Variables

This study explores respondents' level of satisfaction with the information that they received both *before* and *during* the fire. Specifically, the dependent variables are taken from questions 8) and 1) in the WCS (See Table 1).

Table 1 – Dependent Variables

| <b>BEFORE</b> the fire                                                                                               |                       |                    |                |            |
|----------------------------------------------------------------------------------------------------------------------|-----------------------|--------------------|----------------|------------|
| 1 How satisfied were you <b>overall</b> with information on fire management received prior to the fire? (Question 8) |                       |                    |                |            |
| Very dissatisfied                                                                                                    | Somewhat dissatisfied | Somewhat satisfied | Very satisfied | Don't know |
| <b>DURING</b> the fire                                                                                               |                       |                    |                |            |
| 2 How satisfied were you <b>overall</b> with information you received during the fire? (Question 1)                  |                       |                    |                |            |
| Very dissatisfied                                                                                                    | Somewhat dissatisfied | Somewhat satisfied | Very satisfied | Don't know |

Chi-square analyses were performed with all four of the independent variables (planning, message delivery, local context, and trust). To simplify the cross-tabulation tables, the dependent variables were collapsed into two categories, “dissatisfied” and “satisfied.” “Don’t know” responses were not used.

The two dependent variables represent the “row” portion of each Chi-square cross tabulation table. Each independent variable was analyzed with its respective *before* or *during*

fire dependent variable. Spearman's  $\rho$ <sup>2</sup> rank correlation was applied to each of the 2 x 2 cross tabulation tables to measure the independent variable's degree of association with the dependent variable satisfaction.

## **Independent Variables**

As highlighted in the literature review, the main independent variables for this study were planning, message delivery, local context, and trust. To operationalize the independent variables, specific questions from the WCS were selected for the corresponding characteristics of communication.

### Planning

This independent variable was selected to gain insight into how planning initiatives and outreach activities performed by the Forest Service and local government opened lines of communication from their organizations over the course of the fire. It is important to understand the relationship between the respondents' level of satisfaction and whether or not communication from the Forest Service or local government (county, municipality) helped them understand fire management. To be consistent with the dependent variables, planning was also separated into **before** and **during** fire communication activities. Two separate Chi-square tests were performed for both **before** and **during** the fire activities for a total of four tests. The full statements from question 17) of the WCS are detailed below in Table 2.

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<sup>2</sup> Spearman's  $\rho$  rank correlation was used due to the survey's ordinal design. This non-parametric correlation represents the strength of the relationship (from -1 to +1) between two variables.

Table 2 – Planning Questions

| <b>BEFORE</b> the fire                                                                                                                                                       |          |       |                |            |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------|----------------|------------|--|
| 1 Communication from the <b>Forest Service</b> <i>before</i> the fire helped me understand what would likely happen when a fire occurred. (Question 17)                      |          |       |                |            |  |
| Strongly Disagree                                                                                                                                                            | Disagree | Agree | Strongly Agree | Don't know |  |
| 2 Communication from <b>local government</b> (county, municipality) <i>before</i> the fire helped me understand what would likely happen when a fire occurred. (Question 17) |          |       |                |            |  |
| Strongly Disagree                                                                                                                                                            | Disagree | Agree | Strongly Agree | Don't know |  |
| <b>DURING</b> the fire                                                                                                                                                       |          |       |                |            |  |
| 3 Communication from the <b>Forest Service</b> <i>during</i> the fire helped me understand how the fire was being managed. (Question 17)                                     |          |       |                |            |  |
| Strongly Disagree                                                                                                                                                            | Disagree | Agree | Strongly Agree | Don't know |  |
| 4 Communication from <b>local government</b> (county, municipality) <i>during</i> the fire helped me understand how the fire was being managed. (Question 17)                |          |       |                |            |  |
| Strongly Disagree                                                                                                                                                            | Disagree | Agree | Strongly Agree | Don't know |  |

To simplify the cross tabulation tables, these independent variables were aggregated into two categories, “disagree” and “agree.” “Don’t know” responses were not used. Spearman’s rank measure of association was applied to each Chi-square analysis to detect the strength of the relationship with overall satisfaction.

### *Message Delivery*

To properly understand the effect that using different types of information sources over the course of the fire had on public satisfaction, three separate phases of testing were conducted. Statements from questions 9) and 3) of the WCS asked the respondents what types of information sources they used *before* and *during* the fire respectively, e.g. if the respondents used television, newspaper, family/friends/neighbors, conversations with agency representatives, etc. Table 3 contains each information source that was analyzed. The responses to each of the *before* and *during* statements was “no” or “yes.” First, Chi-square analyses were performed with each individual information source to determine whether or not there was a relationship with overall satisfaction.

Table 3 – Message Delivery Questions, Part 1

| Unidirectional Sources of Communication |                                                         |                                                      |
|-----------------------------------------|---------------------------------------------------------|------------------------------------------------------|
|                                         | BEFORE the fire (Question 9)                            | DURING the fire (Question 3)                         |
| 1                                       | Television                                              | Local or Regional Newspapers                         |
| 2                                       | Newspaper                                               | Local or Regional Television                         |
| 3                                       | Radio                                                   | Maps                                                 |
| 4                                       | Information billboard/kiosk                             | Information billboard/kiosk                          |
| 5                                       | Web                                                     | Local or Regional Radio                              |
| 6                                       | Brochures                                               | Scanner                                              |
| Did you use this information source?    |                                                         | No Yes                                               |
| Interactive Sources of Communication    |                                                         |                                                      |
|                                         | BEFORE the fire (Question 9)                            | DURING the fire (Question 3)                         |
| 1                                       | Family/Friends/Neighbors                                | Family/Friends/Neighbors                             |
| 2                                       | Conversations with local Forest Service representative  | Local Forest Service representative                  |
| 3                                       | Visitor centers                                         | Incident Management Team representative              |
| 4                                       | Conversations with local government representative      | Local government representative (county, city, etc.) |
| 5                                       | Public meetings by someone other than US Forest Service | Call center                                          |
| 6                                       | Public meetings by the US Forest Service                | Meetings at Incident Command Post                    |
| Did you use this information source?    |                                                         | No Yes                                               |

Unidirectional (one-way) and interactive communication methods were used over the course of the fire. As shown in Table 3, the second phase of analysis consisted by classifying each individual medium of communication (radio, TV, meetings, etc) into one of two groups: unidirectional or interactive categories. Due to the nature of fire communication, there was a higher total number of information sources used *during* the fire. To make equal comparisons, the top six from each category were selected and ranked in order of mean usage. The means were then tallied and summarized with descriptive statistics.

The final phase of testing for message delivery involved Chi-square analysis of two statements from *during* fire communication taken from question 6) of the WCS, as indicated in Table 4. Understanding the relationship between respondents who were using multiple sources

of information does not explain if they were using unidirectional versus interactive. However it did provide insight into respondent satisfaction levels.

Table 4 – Message Delivery Questions, Part 2

| <b>DURING the fire</b>                                                                   |          |       |                |            |
|------------------------------------------------------------------------------------------|----------|-------|----------------|------------|
| 1 I used multiple sources of information to learn about the fire. (Question 6)           |          |       |                |            |
| Strongly Disagree                                                                        | Disagree | Agree | Strongly Agree | Don't know |
| 2 I had opportunities to ask questions and express concerns about the fire. (Question 6) |          |       |                |            |
| Strongly Disagree                                                                        | Disagree | Agree | Strongly Agree | Don't know |

To simplify the cross tabulation tables, these variables were aggregated into two categories, “disagree” and “agree.” “Don’t know” responses were not used. Spearman’s rank measure of association was applied to each Chi-square analysis to detect the strength of the relationship with overall satisfaction.

#### Local Context

Local context information was also hypothesized to be associated with respondent satisfaction. To determine how well the agencies integrated into the local context of the fire, three separate Chi-square tests were conducted. Two parts from question 11) and one part from question 6) from the WCS were used to help understand if there was a relationship between local context and satisfaction, as detailed below in Table 5.

Table 5 – Local Context Questions

| <b>BEFORE the fire</b>                                                                                       |          |       |                    |            |
|--------------------------------------------------------------------------------------------------------------|----------|-------|--------------------|------------|
| 1 Local knowledge and local concerns were integrated into fire planning. (Question 11)                       |          |       |                    |            |
| Were you satisfied?                                                                                          | No       | Yes   | Did not take place |            |
| 2 Agencies took action to provide satisfactory answers to issues raised by public / community. (Question 11) |          |       |                    |            |
| Were you satisfied?                                                                                          | No       | Yes   | Did not take place |            |
| <b>DURING the fire</b>                                                                                       |          |       |                    |            |
| 3 I thought local resources were used well during the fire. (Question 6)                                     |          |       |                    |            |
| Strongly Disagree                                                                                            | Disagree | Agree | Strongly Agree     | Don't know |

The *before* fire statements inquired into how satisfied the respondents were with the way that local knowledge and concerns were integrated into fire planning and how satisfied respondents were with the way agencies took action to provide satisfactory answers to issues raised by the public / community. The responses were; “no,” “yes,” and “did not take place.” To simplify the cross tabulations, “did not take place” responses were not used.

The *during* fire statement inquired whether or not the respondents agreed with how well local resources were used. To simplify the cross tabulation tables, these variables were aggregated into two categories, “disagree” and “agree.” “Don’t know” responses were not used. Spearman’s rank measure of association was applied to each Chi-square analysis to detect the strength of the relationship with overall satisfaction.

### Trust

Trust is a crucial element in fire communication. To adequately understand how trust related to information satisfaction during this particular fire, two paired t-tests and three separate Chi-square tests were conducted. Part I of questions 9) and 3) was used to determine what type of information sources respondents were using *during* and *before* the fire, as indicated in Table

3. Part III of questions 9) and 3) were used to determine the trustworthiness respondents had *during* and *before* the fire as indicated in Table 6. This part (III) inquired into how trustworthy the information sources they were using were.

Table 6 – Trustworthiness (from Message Delivery) Questions

| Unidirectional Sources of Communication |                                                         |                                                      |          |
|-----------------------------------------|---------------------------------------------------------|------------------------------------------------------|----------|
| BEFORE the fire (Question 9)            |                                                         | DURING the fire (Question 3)                         |          |
| 1                                       | Television                                              | Local or Regional Newspapers                         |          |
| 2                                       | Newspaper                                               | Local or Regional Television                         |          |
| 3                                       | Radio                                                   | Maps                                                 |          |
| 4                                       | Information billboard/kiosk                             | Information billboard/kiosk                          |          |
| 5                                       | Web                                                     | Local or Regional Radio                              |          |
| 6                                       | Brochures                                               | Scanner                                              |          |
| Trustworthiness?                        |                                                         | Not Very                                             | Somewhat |
|                                         |                                                         |                                                      | Very     |
| Interactive Sources of Communication    |                                                         |                                                      |          |
| BEFORE the fire (Question 9)            |                                                         | DURING the fire (Question 3)                         |          |
| 1                                       | Family/Friends/Neighbors                                | Family/Friends/Neighbors                             |          |
| 2                                       | Conversations with local Forest Service representative  | Local Forest Service representative                  |          |
| 3                                       | Visitor centers                                         | Incident Management Team representative              |          |
| 4                                       | Conversations with local government representative      | Local government representative (county, city, etc.) |          |
| 5                                       | Public meetings by someone other than US Forest Service | Call center                                          |          |
| 6                                       | Public meetings by the US Forest Service                | Meetings at Incident Command Post                    |          |
| Trustworthiness?                        |                                                         | Not Very                                             | Somewhat |
|                                         |                                                         |                                                      | Very     |

Again, an additive index was comprised from the top six unidirectional and interactive information sources, but since the responses were ordinal (“not very,” “somewhat,” and “very”), testing was not limited to descriptive statistics as in Table 3. Paired t-tests were used to make comparison between means. We were interested in understanding if respondents trusted unidirectional or interactive sources more. We were also interested in understanding if this trust changed over the course of fire or remained the same. The first t-test analyzed the mean increase, or change, in the use of unidirectional versus the use of interactive sources over the

course of the fire. The second t-test analyzed the difference in means between unidirectional and interactive sources *before* and *during* the fire.

The Chi-square tests were performed to see if there was a relationship between satisfaction and three separate statements from question 6) regarding factors that influence public trust in the information they received. These statements are listed in Table 7.

Table 7 – Trust Questions

| <b>DURING the fire</b>                                                                 |          |       |                |            |
|----------------------------------------------------------------------------------------|----------|-------|----------------|------------|
| 1 I received credible information about the fire. (Question 6)                         |          |       |                |            |
| Strongly Disagree                                                                      | Disagree | Agree | Strongly Agree | Don't know |
| 2 I received accurate information about the fire. (Question 6)                         |          |       |                |            |
| Strongly Disagree                                                                      | Disagree | Agree | Strongly Agree | Don't know |
| 3 After seeing how the fire was managed, I trust the Forest Service more. (Question 6) |          |       |                |            |
| Strongly Disagree                                                                      | Disagree | Agree | Strongly Agree | Don't know |

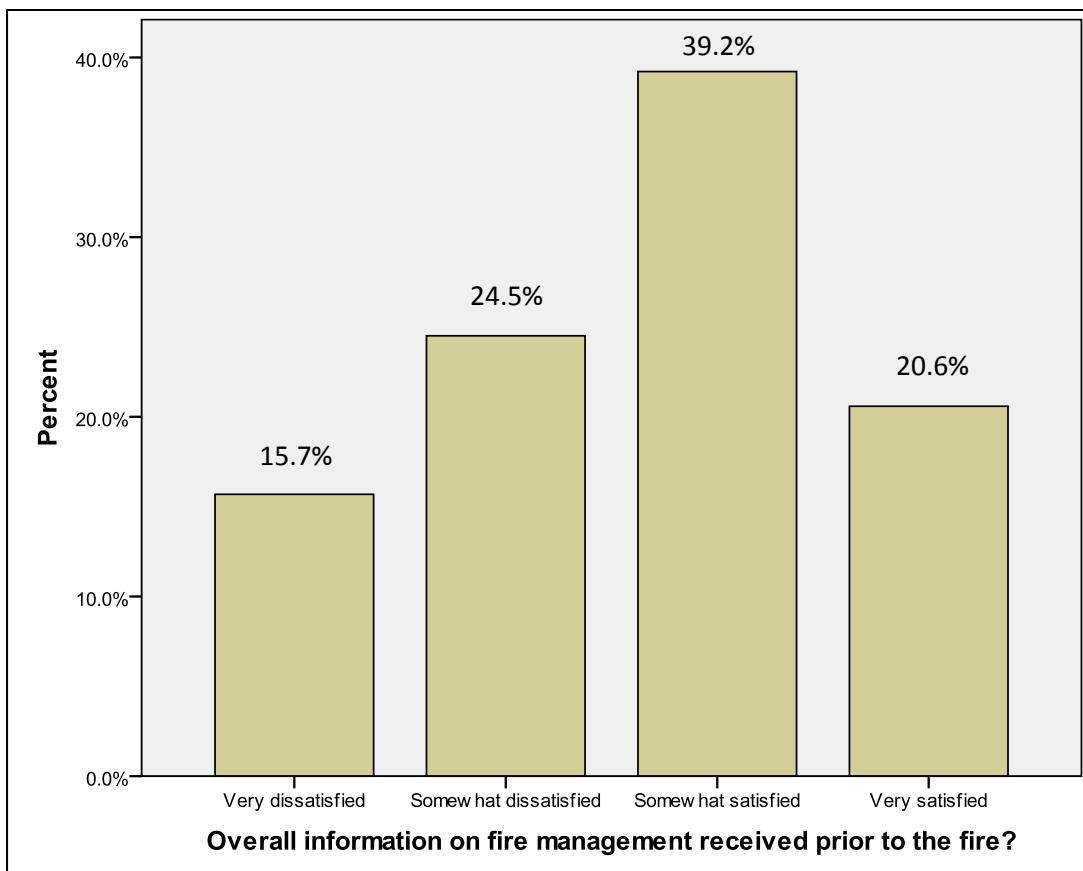
To simplify the cross tabulation tables, these variables were aggregated into two categories, “disagree” and “agree.” “Don’t know” responses were not used. Spearman’s rank measure of association was applied to each Chi-square analysis to detect the strength of the relationship with overall satisfaction.

## RESULTS

In addition to statistical analysis of the independent variables, descriptive analysis of the dependent variables was performed. The descriptives show the expanded answer choices from the survey. *Before* the fire, out of 102 respondents, 39% indicated that they were somewhat satisfied with the “overall information on fire management received prior to the fire” (Chart 1).

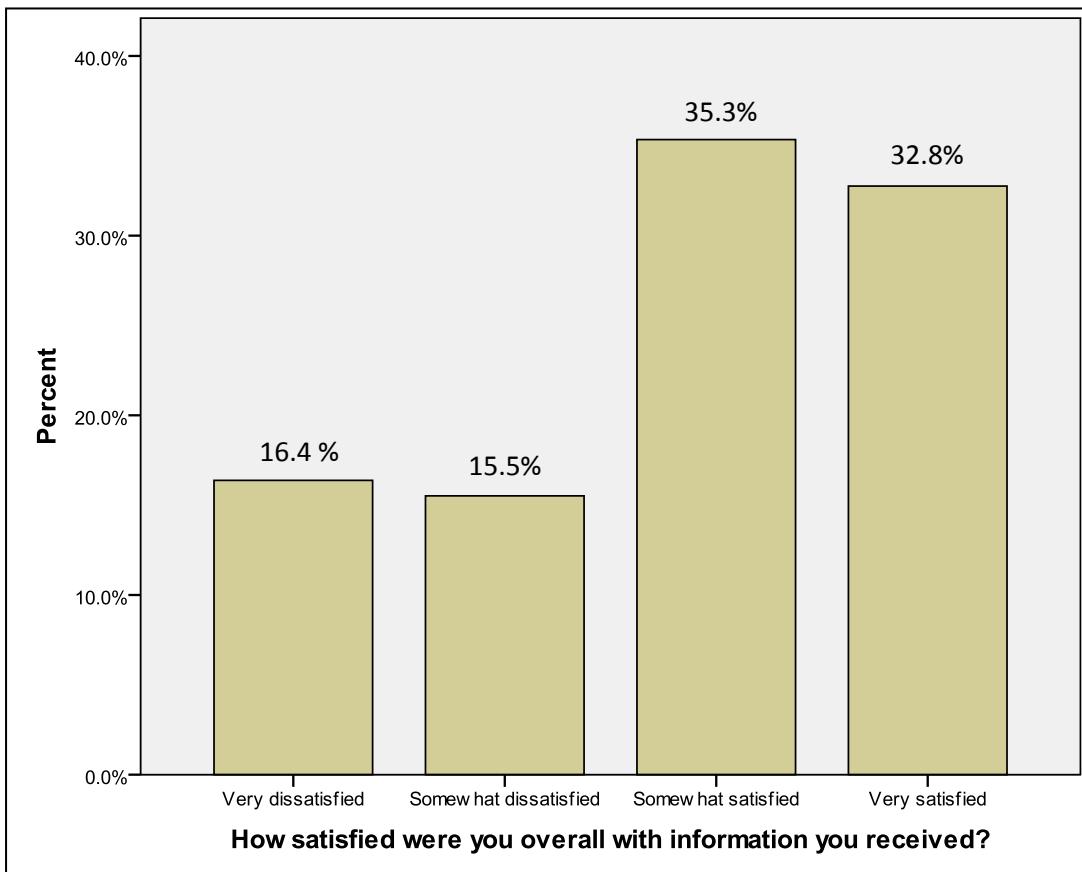
More respondents were somewhat dissatisfied than very satisfied, but even less indicated that they were very dissatisfied.

Chart 1 – **Before** Fire Satisfaction, Descriptive Statistics



***During*** the fire, out of 116 respondents, 35% indicated that they were somewhat satisfied with the “overall information on fire management received prior to the fire” (Chart 2). More respondents however indicated that they were very satisfied as compared to lower levels of dissatisfaction. It appears that respondents seemed to have a more favorable opinion of the information that they were receiving ***during*** the fire compared to the information they received ***before*** the fire.

Chart 2 – During Fire Satisfaction, Descriptive Statistics



### Planning

To show the effect that planning efforts had on the Hat Creek Complex fires, four separate Chi-square tests were conducted with the dependent variable, satisfaction with overall information received *before* and *during* the fire. The results showed that communication efforts from the Forest Service and local government agencies were related to overall satisfaction in three of the four cases (Table 8).

Table 8 – Planning Results

| Level of Satisfaction with Communication                                                                                                                               |              |          |          |            |         |                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------|----------|------------|---------|--------------------------|
|                                                                                                                                                                        |              |          |          | Chi-square | p-value | Spearman Rho correlation |
|                                                                                                                                                                        |              | Disagree | Agree    |            |         |                          |
| <b>BEFORE the fire</b><br>1<br>Communication from the <b>Forest Service</b> before the fire helped me understand what would likely happen when a fire occurred. N = 88 | Dissatisfied | 53% / 31 | 17% / 5  | 11.066     | .001    | .355                     |
|                                                                                                                                                                        | Satisfied    | 47% / 27 | 83% / 25 |            |         |                          |
| <b>2</b><br>Communication from <b>local government</b> before the fire helped me understand what would likely happen when a fire occurred. N = 83                      | Dissatisfied | 51% / 33 | 17% / 3  | 6.675      | .010    | .284                     |
|                                                                                                                                                                        | Satisfied    | 49% / 32 | 83% / 15 |            |         |                          |
| <b>DURING the fire</b>                                                                                                                                                 |              |          |          |            |         |                          |
| 3<br>Communication from the <b>Forest Service</b> during the fire helped me understand how the fire was being managed. N = 103                                         | Dissatisfied | 54% / 27 | 15% / 8  | 17.359     | .000    | .411                     |
|                                                                                                                                                                        | Satisfied    | 46% / 23 | 85% / 45 |            |         |                          |
| 4<br>Communication from <b>local government</b> during the fire helped me understand how the fire was being managed. N = 94                                            | Dissatisfied | 41% / 26 | 30% / 9  | .987       | .321    | .102                     |
|                                                                                                                                                                        | Satisfied    | 59% / 38 | 70% / 21 |            |         |                          |

**Before** the fire, 83% of the respondents were both *satisfied* with the information they received and *agreed* that communication from the Forest Service helped them understand what would likely happen if a fire were to occur. Analysis of communication received from local governments indicated a similar level of satisfaction. Cross tabulations showed that the percentages were significantly different and that a relationship exists between satisfaction and communication received prior to the fire for both Forest Service and local government. These relationships suggest that lines of communication were open to the public from both the Forest Service and local government prior to the fire. While the Spearman *rho* measure of association identified a stronger relationship with communication from the Forest Service (.355) as

compared to communication from local government agencies (.284), it appears that planning efforts (for both agencies) to proactively disseminate information prior to the fire were associated with satisfaction with information respondents received.

***During*** the fire, 85% of respondents were both ***satisfied*** with overall information received and ***agreed*** that communication from the Forest Service helped them understand how the fire was being managed. Communication efforts from the local government did not indicate a significant relationship with the respondent's overall satisfaction. The Spearman *rho* measure of association showed that during fire communication from the Forest Service was more strongly correlated (.411) with overall satisfaction than local government efforts (.102).

It is somewhat concerning that a significant relationship was not found between overall satisfaction and communication from local government agencies ***during*** the fire. As seen in Table 8, 59% of respondents did not feel information from local government helped them understand how the fire was being managed, however they were satisfied with the overall information they received ***during*** the fire. This may suggest two things. First, this may suggest that the local government agencies did not bear as much responsibility disseminating information ***during*** the fire; therefore the public did not rely on them. Secondly, this may suggest that local government agencies made attempts, but did not successfully disseminate information to the public.

The results also suggest that the Forest Service's planning efforts prior to the fire may have helped establish more effective lines of communication during the fire. Its communication efforts were more satisfactory than similar efforts made by the local government agencies. Out of all four categories, the Spearman *rho* measure of association identified the strongest

relationship with communication from the Forest Service (.411) as compared to before fire communication from the Forest Service or local government agencies. The stronger association both before and during the fires for the Forest Service may be indicative of the agencies embracing differing roles and responsibilities when it comes to sharing information about fire management.

### *Message Delivery*

Survey respondents used a variety of different information sources over the course of the fire. These sources were broken down into unidirectional and interactive modalities. To properly understand which medium affected overall satisfaction *before* and *during* the fire, the top six responses from each information source (unidirectional vs. interactive) were analyzed using Chi-square tests. The results showed only two significant relationships, both of which occurred prior to the fire (Table 9). Descriptive statistics were used to illustrate that the proportional increase in the use of unidirectional and interactive information sources over the course of the fire was fairly similar.

*Before* the fire, chi-square tests showed that respondents reading newspapers (unidirectional) and respondents attending public meetings by someone other than the US Forest Service (interactive) were significantly related to their overall satisfaction with information received prior to the fire.

Descriptive analyses showed that the mean increase in the use of unidirectional sources over the course of the fire was almost twice as much as the mean increase in the use of interactive sources over the course of the fire. The proportional changes however, were fairly similar. During the course of the fire, there was a 25% increase in the use of unidirectional

information sources. Increases in the use of interactive information sources increased slightly less at a rate of 23% during the course of the fire (Table 9).

It is also important to note that descriptive analysis showed 72% more respondents were using unidirectional information sources than interactive information sources *before* the fire. This figure increased to 75% *during* the fire.

Table 9 – Message Delivery Results, Part 1

| Unidirectional Sources of Communication |                                                         |       |      |                                                      |       |      |
|-----------------------------------------|---------------------------------------------------------|-------|------|------------------------------------------------------|-------|------|
| BEFORE the fire                         |                                                         |       |      | DURING the fire                                      |       |      |
|                                         | Mean                                                    | Sig?  |      | Mean                                                 | Sig?  |      |
| 1                                       | Television                                              | .79   | N    | Local or Regional Newspapers                         | .84   | N    |
| 2                                       | Newspaper                                               | .78   | Y    | Local or Regional Television                         | .83   | N    |
| 3                                       | Radio                                                   | .40   | N    | Maps                                                 | .69   | N    |
| 4                                       | Information billboard/kiosk                             | .38   | N    | Information billboard/kiosk                          | .53   | N    |
| 5                                       | Web                                                     | .33   | N    | Local or Regional Radio                              | .47   | N    |
| 6                                       | Brochures                                               | .23   | N    | Scanner                                              | .28   | N    |
|                                         |                                                         | Total | 2.91 | A                                                    | Total | 3.64 |
| <b>N</b>                                | no relationship                                         |       |      |                                                      |       |      |
| <b>Y</b>                                | p-value $\leq .1$                                       |       |      |                                                      |       |      |
| Mean increase in Unidirectional Sources |                                                         |       | B-A  | .73                                                  |       |      |
| % Increase                              |                                                         |       |      | 25%                                                  |       |      |
| Interactive Sources of Communication    |                                                         |       |      |                                                      |       |      |
| BEFORE the fire                         |                                                         |       |      | DURING the fire                                      |       |      |
|                                         | Mean                                                    | Sig?  |      | Mean                                                 | Sig?  |      |
| 1                                       | Family/Friends/Neighbors                                | .79   | N    | Family/Friends/Neighbors                             | .88   | N    |
| 2                                       | Conversations with local Forest Service representative  | .40   | N    | Local Forest Service representative                  | .42   | N    |
| 3                                       | Visitor centers                                         | .20   | N    | Incident Management Team representative              | .29   | N    |
| 4                                       | Conversations with local government representative      | .13   | N    | Local government representative (county, city, etc.) | .19   | N    |
| 5                                       | Public meetings by someone other than US Forest Service | .09   | Y*   | Call center                                          | .15   | N    |
| 6                                       | Public meetings by the US Forest Service                | .08   | N    | Meetings at Incident Command Post                    | .15   | N    |
|                                         |                                                         | Total | 1.70 | C                                                    | Total | 2.08 |
| <b>N</b>                                | no relationship                                         |       |      |                                                      |       |      |
| <b>Y*</b>                               | p-value $\leq .05$                                      |       |      |                                                      |       |      |
| Mean increase in Interactive Sources    |                                                         |       | D-C  | .39                                                  |       |      |
| % Increase                              |                                                         |       |      | 23%                                                  |       |      |

Chi-square analyses of survey data indicated that respondents using multiple sources of information and interactive sources of information had significant relationships with overall satisfaction of information received *during* the fire.

While responses to “I used multiple sources of information,” does not explain what type of information sources the respondents were using (unidirectional vs. interactive), it gives increased insight into whether or not using more than one source of information is associated with increased levels of satisfaction. The results from cross tabulation indicate a significant relationship with overall satisfaction. In other words, those who used multiple sources of information were more satisfied with overall information during the fire. Seventy-two percent of individuals using multiple sources of information noted that they were satisfied with the information they received during the fire. The Spearman rho measure of association showed that overall satisfaction and using multiple sources of information during the fire were positively associated with one another (Table 10).

A significant relationship with overall satisfaction also existed for respondents who felt they had opportunities to ask questions and express concerns about the fire. Eighty-six percent of individuals using this interactive method of communication were satisfied with the overall information that they received during the course of the fire. The Spearman rho measure of association showed a slightly higher level of correlation with satisfaction as compared to using multiple sources of information. While this does not explain the type of interactive method the respondents were using, it does suggest that using interactive forms of communication is associated with the respondent’s overall satisfaction with information received during the fire.

Table 10 – Message Delivery Results, Part II

| Level of Satisfaction with Message Delivery                                        |                                                                           |              |          |            |         |                          |
|------------------------------------------------------------------------------------|---------------------------------------------------------------------------|--------------|----------|------------|---------|--------------------------|
|                                                                                    |                                                                           |              |          | Chi-square | p-value | Spearman Rho correlation |
|                                                                                    |                                                                           | Disagree     | Agree    |            |         |                          |
| <b>DURING the fire</b>                                                             | 1 I used multiple sources of information to learn about the fire. N = 105 | Dissatisfied | 75% / 6  | 28% / 27   | 7.629   | .006 .270                |
|                                                                                    |                                                                           | Satisfied    | 25% / 2  | 72% / 70   |         |                          |
| 2 I had opportunities to ask questions and express concerns about the fire. N = 99 |                                                                           | Dissatisfied | 42% / 27 | 14% / 5    | 8.052   | .005 .285                |
|                                                                                    |                                                                           | Satisfied    | 58% / 37 | 86% / 30   |         |                          |

### Local Context

Three separate Chi-square tests indicated that efforts to incorporate the local context factors into fire management were significantly related to overall satisfaction both *before* and *during* the fire (Table 11).

*Before* the fire, 86% of respondents were both *satisfied* with overall information and *satisfied* with how local knowledge/concerns were integrated into fire planning. A slightly higher percentage of respondents (91%) indicated they were both *satisfied* with overall information and that they were *satisfied* with how the agencies took action to provide satisfactory answers to issues raised by the public and local community. Cross tabulations showed a significant relationship between satisfaction and how the public felt their concerns were integrated into fire planning. The Spearman rho measure of association for how agencies took action to provide satisfactory answers to issues raised by public / community taking indicated a stronger relationship with overall satisfaction (.586) than respondents that felt local knowledge and local concerns were integrated into fire planning (.354).

**During** the fire, 82% of respondents were *satisfied* with the overall information and *agreed* that local resources were well used over the course of the fire. Cross tabulations showed a significant relationship between satisfaction and how the public felt local resources were used during the fire. The Spearman rho measure of association indicated a moderate level of association (.391) with satisfaction and local resource use.

Overall, the level of satisfaction was positively correlated with the three factors (questions) that related to local context. While all three were significant, the Spearman rho measure of association indicated that agency response to public questions/concerns *before* the fire was the strongest correlation for local context. We are not sure how interactive the communication was, but the results suggest that proactively taking action to open lines of communication before a fire is associated with satisfaction.

Table 11 – Local Context Results

| Level of Satisfaction with Local Context                                                              |  |              |          |          |            |         |                          |
|-------------------------------------------------------------------------------------------------------|--|--------------|----------|----------|------------|---------|--------------------------|
|                                                                                                       |  |              | No       | Yes      | Chi-square | p-value | Spearman Rho correlation |
| <b>BEFORE the fire</b>                                                                                |  |              |          |          |            |         |                          |
| 1 Local knowledge and local concerns were integrated into fire planning. N = 60                       |  | Dissatisfied | 46% / 11 | 14% / 5  | 7.514      | .006    | .354                     |
|                                                                                                       |  | Satisfied    | 54% / 13 | 86% / 31 |            |         |                          |
| 2 Agencies took action to provide satisfactory answers to issues raised by public / community. N = 52 |  | Dissatisfied | 65% / 13 | 9% / 3   | 17.877     | .000    | .586                     |
|                                                                                                       |  | Satisfied    | 35% / 7  | 91% / 29 |            |         |                          |
| <b>DURING the fire</b>                                                                                |  |              |          |          |            |         |                          |
| 3 I thought local resources were used well during the fire. N = 104                                   |  | Disagree     |          | Agree    |            |         |                          |
|                                                                                                       |  | Dissatisfied | 56% / 20 | 18% / 12 | 15.879     | .000    | .391                     |
|                                                                                                       |  | Satisfied    | 44% / 16 | 82% / 56 |            |         |                          |

## Trust

Building trust with the public is the culmination of effective planning, delivering information through multiple mediums, and incorporating a community's local context into wildland fire communication strategies. Four paired t-tests were conducted to identify whether there were any significant differences in trust for how information was delivered to the public.

Descriptive statistics of the top six unidirectional and interactive information sources provided insight into trustworthiness. Upon first glance, it appeared that there was an increase in the mean level of trust over the course of the fire for people using unidirectional and interactive sources of information. Results from a paired t-test (Table 12) revealed that there was a significant mean increase (1.59) in the trustworthiness of unidirectional information sources over the course of the fire. While survey data also indicated a mean level increase (.55) of trust in interactive information sources over the course of the fire, the change was not significant.

Table 12 – Change in trust over the course of the fire

| Difference in Means, Paired t-test for <b>UNIDIRECTIONAL</b> and <b>INTERACTIVE</b> |           |           |           |           |            |                |
|-------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|------------|----------------|
| Trust Index                                                                         | N         | Minimum   | Maximum   | Mean      |            | Std. Deviation |
|                                                                                     | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic      |
| <b>UNIDIRECTIONAL</b> Before                                                        | 106       | 2.0000    | 18.0000   | 7.5094    | 0.30428    | 3.13276        |
| <b>UNIDIRECTIONAL</b> During                                                        | 106       | 1.0000    | 18.0000   | 9.1038    | 0.35591    | 3.66432        |
| <b>INTERACTIVE</b> Before                                                           | 98        | 1.0000    | 14.0000   | 5.8163    | 0.34028    | 3.36858        |
| <b>INTERACTIVE</b> During                                                           | 98        | 1.0000    | 18.0000   | 6.3673    | 0.39415    | 3.90186        |
| Change in trust for Unidirectional sources of communication                         |           |           |           | 1.59      | p ≤ .01    |                |
| Change in trust for Interactive sources of communication                            |           |           |           | 0.55      | Not Sig @  | P = .16        |

Results indicating a significant increase in trustworthiness of unidirectional information sources over the course of the fire. This encouraged us to take a closer look at how trustworthy unidirectional information sources were compared to interactive information sources *before* and *during* the fire.

Results from a paired t-test (Table 13) revealed that there was a significant mean difference (1.87) in the trustworthiness of unidirectional information sources versus interactive sources *before* the fire. As expected, respondents indicated significantly more trust in unidirectional information sources versus interactive sources *during* the fire (3.07).

Table 13 – Difference in Trust between each information source

| Difference in Means, Paired t-test for <b>BEFORE</b> and <b>DURING</b>              |           |           |           |           |              |                |
|-------------------------------------------------------------------------------------|-----------|-----------|-----------|-----------|--------------|----------------|
| Trust Index                                                                         | N         | Minimum   | Maximum   | Mean      |              | Std. Deviation |
|                                                                                     | Statistic | Statistic | Statistic | Statistic | Std. Error   | Statistic      |
| <b>BEFORE</b> Unidirectional                                                        | 97        | 2.0000    | 18.0000   | 7.7320    | 0.32125      | 3.16398        |
| <b>BEFORE</b> Interactive                                                           | 97        | 1.0000    | 14.0000   | 5.8660    | 0.35161      | 3.46299        |
| <b>DURING</b> Unidirectional                                                        | 115       | 1.0000    | 18.0000   | 9.0348    | 0.33232      | 3.56378        |
| <b>DURING</b> Interactive                                                           | 115       | 1.0000    | 18.0000   | 5.9652    | 0.35496      | 3.80657        |
| Difference in trust for Unidirectional / Interactive sources <b>BEFORE</b> the fire |           |           |           | 1.87      | $p \leq .01$ |                |
| Difference in trust for Unidirectional / Interactive sources <b>DURING</b> the fire |           |           |           | 3.07      | $p \leq .01$ |                |

Receiving credible, accurate, and trustworthy information is an essential element in delivering effective communication. Three separate Chi-square tests were conducted to identify significant relationships with overall satisfaction. The results showed that elements of trust were related to overall satisfaction in all three cases (Table 14).

**During** the fire, 81% of respondents were both **satisfied** with overall information and **agreed** that they received credible information about the fire. A higher percentage of respondents (84%) indicated they were both **satisfied** with overall information and **agreed** that they had received accurate information about the fire. Seventy-seven percent indicated that they trust the Forest Service more after seeing how the fire was managed. Cross tabulations showed a significant relationship between overall satisfaction and how much confidence the public had in the agency's ability to disseminate trustworthy information. The Spearman rho measure of association was most strongly associated with satisfaction if respondents felt they were receiving accurate information about the fire (.528).

Table 14 – Trust Results

| Level of Satisfaction with Trust                                                  |              |              |          |            |         |                          |
|-----------------------------------------------------------------------------------|--------------|--------------|----------|------------|---------|--------------------------|
|                                                                                   |              | Dissatisfied | Agree    | Chi-square | p-value | Spearman Rho correlation |
| <b>DURING the fire</b>                                                            |              |              |          |            |         |                          |
| 1 I received credible information about the fire. N = 110                         | Dissatisfied | 68% / 17     | 19% / 16 | 22.246     | .000    | .450                     |
|                                                                                   | Satisfied    | 32% / 8      | 81% / 69 |            |         |                          |
| 2 I received accurate information about the fire. N = 110                         | Dissatisfied | 71% / 20     | 16% / 13 | 30.699     | .000    | .528                     |
|                                                                                   | Satisfied    | 29% / 8      | 84% / 69 |            |         |                          |
| 3 After seeing how the fire was managed, I trust the Forest Service more. N = 102 | Dissatisfied | 52% / 17     | 23% / 16 | 8.185      | .004    | .283                     |
|                                                                                   | Satisfied    | 49% / 16     | 77% / 53 |            |         |                          |

## DISCUSSION

Forest fire communication is a multidimensional process. To be successful, four key characteristics of communication have been associated with communication effectiveness. Existing literature has shown that taking proactive steps to plan, disseminate information through different mediums, incorporate the local context, and build trust have helped agencies communicate information to the public during wildland fire incidents. The hypothesis advanced in this research was that characteristics of effective communication are associated with greater levels of overall satisfaction **before** and **during** a wildland fire incident. Analysis of survey data from the Hat Creek Complex reinforces the overall hypothesis that characteristics of effective communication are associated with greater levels of overall satisfaction **before** and **during** a wildfire incident. In short, I failed to refute the hypothesis. Statistically significant relationships were established between public satisfaction and most of the characteristics of effective communication **before** and **during** the fire.

### Planning

As Olsen and Shindler (2010) state, the beginning phases of communicating with the public occur well before a fire ever starts. Data from the Hat Creek support this claim. There were statistically significant relationships between respondent satisfaction with overall information received **before** the fire and communication efforts from both the Forest Service and local government agencies. Communication from the Forest Service however, was more strongly associated with satisfaction.

**During** the fire, however, the only significant relationship with overall satisfaction was with communication from the Forest Service. Out of the four tests, communication from the

Forest Service was most strongly correlated with overall satisfaction. Two possible explanations are plausible. First, it is possible that planning and outreach activities performed by the Forest Service not only helped people understand what would likely happen *before* a fire, but also facilitated the transfer of information *during* the fire. We are not aware of specific actions the Forest Service took prior to the fire. Future research must include questions about the specific steps that the Forest Service did or did not take.

Secondly, the lack of a statistically significant relationship between overall satisfaction and communication from the local government agencies does not necessarily mean that the local agencies did a poor job with their communication efforts. One possible explanation is that local government agencies played less of a role in disseminating information *during* the fire as opposed to *before* the fire. This could be due to the response and presence that the Federal Incident Management Teams (IMT) played at the Hat Creek. When called upon, IMT's are responsible for managing the fire, requesting/allocating additional resources, and disseminating copious amounts of information to the public. Their central presence quite possibly overshadowed efforts from local government agencies.

Another possible explanation could be more relevant to underlying issues in the community. The results indicated that respondents did not necessarily need information from local government *during* the fire to be satisfied with the overall information they received. There is a chance that they perceived information from the local government as less reliable than information from the Forest Service. There could possibly be another caveat to *during* fire communication. The Forest Service had a higher measure of association with satisfaction (.355) compared to local government agencies (.284). Since the public felt more satisfied with the

Forest Service ***before*** the fire, there is a chance that they went to them for information by default as opposed to using the local government agencies.

Future studies should attempt to gain a better understanding of the depth of responsibility that local government agencies have in disseminating information compared to the Forest Service. Also, to identify the exact role that local government played ***during*** the fire, an in depth approach should be taken to understand the collaborative agreements that are in place between the Forest Service and local government agencies.

Despite not knowing the specific role of local government in disseminating information ***during*** the fire, the Hat Creek survey results showed that communication efforts from the Forest Service and local government ***before*** the fire were related to satisfaction. The degree to which we can infer planning was associated with before fire satisfaction and during fire satisfaction is limited by the questions we asked in the survey. To this end, the Forest Service was associated with greater overall satisfaction both before and during the fire. We may tentatively infer that planning by the Forest Service is associated with greater satisfaction with overall information.

### *Message Delivery*

The Hat Creek survey results indicated that more respondents were using more unidirectional information sources as compared to interactive sources both before and during the fire. As would be expected during any wildfire incident, the usage of both unidirectional and interactive information sources increased over the course of the fire. Descriptive statistics however, indicated that respondents increased their use of unidirectional sources by almost twice as much as interactive sources. This may suggest that respondents did not have time to pursue interactive communication due varying activities that occur during a wildland fire. While the

results are not specifically related to satisfaction in this fire, the use of unidirectional and interactive information sources can be linked to satisfaction through awareness, action, and future management outcomes as shown below.

Echoing the previous work of Marshall McLuhan, Sarah McCaffrey stated that the “communication medium may be as important as the message” it contains (2004:13). In her 2004 study, she found that unidirectional information sources helped increase respondent awareness of fire management strategies more so than interactive information sources. While unidirectional information sources helped increase awareness for alternative fire management strategies, the results from her study also indicated that people using unidirectional information sources were less likely to take action to implement the alternative strategies prior to the fire. It is important to pay attention to her results, because increasing awareness and taking preventative action can affect how satisfied people are with fire management in the future.

The Hat Creek survey did not specifically inquire to the level of respondent awareness or preemptive action, but the results indicated that respondents were using more unidirectional information sources as opposed to interactive sources. Toman, Shindler, and Brunson’s study (2006) revealed that while respondents were more familiar with unidirectional information sources, they found interactive information sources more helpful. Their results indicated respondents using multiple sources of information and respondents who were able to ask questions/express concerns about the fire were more satisfied with the overall information they received during the fire. While both findings were statistically significant, the interactive statement was more strongly associated with overall satisfaction.

As Winter, Vogt, and Fried (2002) noted, interactive communication is important for the responsible agencies. When respondents are able to express concerns, the responsible agency is able to refocus their efforts on specifically what the public needs to know the most. Individuals who had the opportunity to ask questions/express concerns were more satisfied than those that did not. Future studies should ask the Forest Service and local government agencies if the interactive information obtained from the public aided their response and fire management strategies.

#### *Local context*

Survey responses from the Hat Creek Complex indicated that agencies took proactive steps to incorporate local context into the way the fire was managed. Olsen and Shindler (2010) state that while it is impossible to control for all of the variability that exists between the context, condition, and provision of a fire, significant relationships between local context and overall satisfaction were detected for the Hat Creek fire. On the Hat Creek, it appears fire planning efforts before the fire ensured that local knowledge and concerns were utilized. The results also indicate that the respondents were satisfied with the way agencies took action to provide satisfactory answers to issues raised by the public/community.

During the fire, respondents indicated they thought that local resources were used well during the fire. This statement also had a significant relationship with overall satisfaction. The results possibly suggest that the community felt the agencies were looking out for the community's best interest by utilizing their resources. Future research should inquire about the specific resources that were being used and whether or not there was a significant economic impact in the community as a result of the fire.

Similar to planning, future research should specifically ask what steps the agencies took to successfully incorporate the local context into the fire. Simply providing satisfactory answers to issues the public was concerned does not fully mean that an agency has fully integrated into the local context of a community.

### Trust

Long term public support for forest management strategies cannot be attained without building substantial levels of trust. Research by Olsen and Shindler (2010:139) noted that “citizen trust in forest agencies may be the most essential component to successful implementation of any forest management program.” Toman and Shindler (2006) further build on that by noting that communication that emphasizes genuine interaction builds trust as a result. Results from the Hat Creek survey indicated that interactive sources of information were associated with higher levels of overall satisfaction. To take that analysis a step further, we analyzed how respondent trust was related to unidirectional and interactive information sources before and during the fire.

Overall, Hat Creek respondents indicated that they trusted both unidirectional and interactive information sources more during the fire than they did before the fire. This is interesting because it indicates that trust was built over the course of the fire. Results from a paired t-test however, indicated that the mean increase in trust for unidirectional sources was almost three times more than the mean increase in interactive sources. The increase in unidirectional trust was significant, while the increase in interactive trust was not. The implication is that respondents’ trust in unidirectional modalities increased at a statistically significant level from pre-fire to during fire. Conventional wisdom in the literature suggests that

using interactive sources facilitates community support, encourages preemptive fire management, and increases trust, which could in turn lead to greater levels of satisfaction. Toman, Shindler, and Brunson (2006) however, also found that survey respondents felt they trusted unidirectional information sources more than interactive information sources. The Hat Creek results suggest that something possibly happened over the course of the fire that kept trust in interactive sources from increasing over the course of the fire. This is elaborated on below.

Previous research has shown that “citizens frequently make judgments based on their interactions with forest agencies and their level of trust with local managers” and that “acceptance of fuel treatments hinges on citizens’ confidence that the agencies will effectively manage risks as well as conduct a planning process that includes them” (Toman and Shindler 2003:9). Results from Chi-square analysis at the Hat Creek showed a relationship between satisfaction and respondent trust in the Forest Service subsequent to seeing how the fire was managed.

There was not a question, however, that asked respondents if they trust local government agencies. Future research should include a deeper look into respondent trust in the local agencies. There is a possibility that the minimal gains in interactive trust have something to do with how well the local government agencies disseminated information to the public both *before* and *during* the fire. Referring back to Table 9, there was an increase of use in interactive sources during the fire. Out of the six interactive information sources, the Forest Service was the only interactive information source that was associated at a statistically significant level with overall satisfaction. The minimal increase in interactive trust possibly suggests that one of the other information sources listed in Table 9 (other than the Forest Service), was not able to build trust over the course of the fire. To take a closer look at this, one more descriptive analysis was

run to check the means in during fire interactive information use. The initial assumption was correct. The mean trust level in the Forest Service representatives was 2.52, while the mean trust level in local government representatives was only 2.11 (on a scale of 1-3). The lower trust in local government is an area of concern for effectively communicating a message to the public. To better understand the difference in trust levels, future research should inquire to the specific action that each agency took and what respondents felt was most effective in building trust.

Taking a closer look at the planning results may shed some light into the situation. Communication from local government during the fire was the only Chi-square test that was not statistically related to satisfaction in the first round of testing. Fifty-nine percent of respondents did not feel local government helped them understand how the fire was being managed, nonetheless they were satisfied with the overall information they received. This could mean one of the following two statements. First, there is a chance that the public felt that local government did not play a large role in disseminating information during the fire. Secondly, the public may have felt that local government was not a reliable source of information during the fire. This may not have mattered in terms of satisfaction because respondents may have felt they were getting satisfactory information from other sources beyond local government, such as the Forest Service. From the additional descriptive analysis, it appears that the public did not have as much trust in local government as they did in the Forest Service.

Future research should take a closer look at the direct responsibility and credibility of local government in wildland fire incidents. To fully reduce conflict, improve organization, lower costs, and facilitate more cooperative behavior as Olsen and Shindler (2010) discuss, we recommend that the local government agencies take proactive steps to clearly communicate their specific role to the public well before a fire has begun. We also recommend that they initiate

collaboration with the cooperating agencies (local fire, law enforcement, emergency services, etc.) to establish higher levels of transparency and trust in the community. They should ensure that the public is aware of their role prior to the fire so there is not a misunderstanding of how their communication efforts (or lack thereof) are perceived in a time of crisis.

## CONCLUSION

As noted in the discussion, we found evidence to support a relationship between four characteristics of effective communication and respondent satisfaction over the course of the Hat Creek Complex Fire. One possible area of concern was the non-response rate. While only 13% of the surveys were returned, the distribution of the population was normal and appropriate for statistical analysis. It can be easy to lose track of the variety of tests from the four independent variables; planning, message delivery, local context, and trust. It is important to identify which specific portion of the testing had the strongest relationship with overall satisfaction *before* and *during* the fire. To properly distinguish the difference between the relationships, the correlation coefficient must be interpreted correctly. As a general rule, correlation coefficient less than .350 are considered to have “weak” relationships. “Moderate” relationships are found from .351 to .670 and correlations coefficients greater than .670 are considered as “high” (Mason and Lind 1983, Taylor 1990, Weber and Lamb 1970). There were no “high” relationships in this study. “Moderate” levels will be designated in Table 15 and Table 16 with an asterisk.

Table 15 – Before the fire

| Before the fire measure of association with Satisfaction |                                                                                                                                  |          |
|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|----------|
|                                                          |                                                                                                                                  | Spearman |
| <b>Planning</b>                                          |                                                                                                                                  |          |
| 1                                                        | Communication from the <b>Forest Service</b> before the fire helped me understand what would likely happen when a fire occurred. | .355*    |
| 2                                                        | Communication from <b>local government</b> before the fire helped me understand what would likely happen when a fire occurred.   | .284     |
| <b>Local Context</b>                                     |                                                                                                                                  |          |
| 3                                                        | Agencies took action to provide satisfactory answers to issues raised by public / community.                                     | .586*    |
| 4                                                        | Local knowledge and local concerns were integrated into fire planning.                                                           | .354*    |

**Before** the fire, questions about local context registered the first and third highest association with satisfaction. Out of the separate tests that were conducted with local context, the statement that stuck out the most was, “agencies took action to provide satisfactory answers to issues raised by public/community.” This first statement indicates that agency personnel were interacting with the public/community. Respondents indicated that they valued the way that their personal concerns were listened to and addressed in return. For local context, the third highest association with satisfaction was that “local knowledge and local concerns were integrated into fire planning.” This statement also incorporates a personal element in the way the public felt the fire was managed. Respondents sense value and appreciation when their knowledge and concerns are integrated into the plan.

The second highest association with satisfaction **before** the fire was with the statement “communication from the Forest Service before the fire helped me understand what would likely happen when a fire occurred.” While this statement was tested in the planning section, it is also incorporates a personal element that is similar to the first statement from local context. The respondents felt that the Forest Service had helped them. We cannot be sure whether this communication was passed from the Forest Service to the public via unidirectional or interactive

information sources, but we know that Forest Service communication was associated with higher levels of satisfaction.

***During*** the fire, two statements from trust and one statement from planning had the three highest associations with satisfaction. The strongest association was with the statement “I received accurate information about the fire.” Respondents’ feelings towards whether they were receiving accurate information had an impact on how satisfied they were. Similarly, respondents that felt they “received credible information about the fire,” were more highly associated with satisfaction. The third strongest measure of association was from the planning section. Just as we saw ***before*** the fire, respondents that indicated “communication from the Forest Service *during* the fire helped me understand how the fire was being managed” had a strong association with satisfaction. Together these three statements showed that respondents were concerned with genuine information and affirmed that the Forest Service helped them know how the fire was being managed ***during*** the fire.

Table 16 – ***During*** the fire

| During the fire measure of association with Satisfaction |                                                                                                                   |       |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-------|
| <b>Planning</b>                                          |                                                                                                                   |       |
| 1                                                        | Communication from the <b>Forest Service</b> during the fire helped me understand how the fire was being managed. | .411* |
| 2                                                        | Communication from <b>local government</b> during the fire helped me understand how the fire was being managed.   | .102  |
| <b>Message Delivery</b>                                  |                                                                                                                   |       |
| 3                                                        | I had opportunities to ask questions and express concerns about the fire.                                         | .285  |
| 4                                                        | I used multiple sources of information to learn about the fire.                                                   | .270  |
| <b>Local Context</b>                                     |                                                                                                                   |       |
| 5                                                        | I thought local resources were used well during the fire.                                                         | .391* |
| <b>Trust</b>                                             |                                                                                                                   |       |
| 6                                                        | I received accurate information about the fire.                                                                   | .528* |
| 7                                                        | I received credible information about the fire.                                                                   | .450* |
| 8                                                        | After seeing how the fire was managed, I trust the Forest Service more.                                           | .283  |

The weaker associations were more focused on communication efforts by local government agencies and the entire message delivery independent variable. An argument could be made that local context and trust were the strongest of the four independent variables.

While conducting research during the summer of 2010, our research team interviewed command and general staff from three Type I Incident Management Teams, employees from three National Forests, and representatives from local cooperating agencies in the affected areas. The exposure (through the interviews) showed the importance that proactive and effective communication play in delivering a planned, clear, and credible message to the public. While we witnessed sincere efforts to engage the public on the part of some agency representatives, we also saw room for improvement in how the agency representatives interfaced with the community in other cases. The most successful agency representatives showed a genuine interest and concern for others that helped them generate trust, awareness, and enthusiasm for putting partnerships to work in the forest and local communities. These characteristics are more representative of local context and trust that were the strongest independent variables at the Hat Creek.

As the literature illustrates, building trust is an important part of encouraging behavior change. Behavior change incorporates and encourages action and implementation of alternative fire management strategies. Alternative management strategies can lead to increased forest health and reductions to fire size, intensity, and cost. Improved forest conditions and reductions to the aforementioned can lead to increased satisfaction. Agency representatives as a whole are an integral part of this process. They must help develop authentic relationships, help facilitate the transfer of information from the USFS to the public, and help coordinate policy/action with the cooperating agencies in the area.

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## APPENDIX A

### WILDFIRE COMMUNICATION SURVEY

A joint project of:

North Carolina State University and  
the Joint Fire Science Program



## NC STATE UNIVERSITY

Good information and communication are important to sound fire management. We would like to hear your opinions about how fire management information was communicated to you before and during the Hat Creek Fire Complex (including the Brown Fire, Sugarloaf Fire and Butte Fire) in August 2009.

The following survey is divided into four sections:

- 1) Information and communication DURING the fires
- 2) Information and communication BEFORE the fires
- 3) Opinions about fire management
- 4) Demographic information

Your opinions mean a lot to us. Thank you in advance for your time!

## I. DURING FIRE

We are interested in knowing about information and communication practices that occurred DURING the Hat Creek Fire Complex (Brown, Sugarloaf and Butte Fires) in August 2009. We understand information comes from many agencies. We would like to know about your overall experience with all agencies and sources. Please reflect on your experience during the fire to answer the following questions.

1. Circle the number corresponding to the category that best describes your level of dissatisfaction/satisfaction with the information you received DURING the Hat Creek Fire Complex. If you are unclear about this aspect of information during the fire or it did not apply to you, mark "Don't Know".

| <u>Information Received</u>                                                                                                | Very dissatisfied | Somewhat dissatisfied | Somewhat satisfied | Very satisfied | Don't Know |
|----------------------------------------------------------------------------------------------------------------------------|-------------------|-----------------------|--------------------|----------------|------------|
| How satisfied were you <i>overall</i> with information you received?                                                       | 1                 | 2                     | 3                  | 4              | DK         |
| How satisfied were you with information you received about <i>evacuation</i> ?                                             | 1                 | 2                     | 3                  | 4              | DK         |
| How satisfied were you with information you received about <i>how the fire was fought</i> ?                                | 1                 | 2                     | 3                  | 4              | DK         |
| How satisfied were you with the information you received about <i>why certain fire management choices</i> were being made? | 1                 | 2                     | 3                  | 4              | DK         |

2. Can you tell us what kind of information you most wanted DURING the Hat Creek Fire Complex? Circle the number to indicate how much you did not want/wanted this information. Next, please indicate whether the information you received on the subject was adequate for your needs.

| <u>Information about:</u>                                                                    | Did Not Want | Wanted Somewhat | Wanted Very Much | Was this information <u>adequate</u> for your needs?<br>(Circle choice) |
|----------------------------------------------------------------------------------------------|--------------|-----------------|------------------|-------------------------------------------------------------------------|
| Ecological conditions of local forest                                                        | 1            | 2               | 3                | Did not receive/<br>Not Adequate/<br>Adequate                           |
| Fire management strategies                                                                   | 1            | 2               | 3                | Did not receive/<br>Not Adequate/<br>Adequate                           |
| Fire hazards/concerns                                                                        | 1            | 2               | 3                | Did not receive/<br>Not Adequate/<br>Adequate                           |
| Evacuation                                                                                   | 1            | 2               | 3                | Did not receive/<br>Not Adequate/<br>Adequate                           |
| Status of the fire (current threat, progress)                                                | 1            | 2               | 3                | Did not receive/<br>Not Adequate/<br>Adequate                           |
| Wildfire recovery                                                                            | 1            | 2               | 3                | Did not receive/<br>Not Adequate/<br>Adequate                           |
| Where the fire is (Maps of the fire)                                                         | 1            | 2               | 3                | Did not receive/<br>Not Adequate/<br>Adequate                           |
| Hazardous fuels reduction on the Lassen National Forest (thinning and/or prescribed burning) | 1            | 2               | 3                | Did not receive/<br>Not Adequate/<br>Adequate                           |
| Protecting home or property (defensible space/FIREWISE)                                      | 1            | 2               | 3                | Did not receive/<br>Not Adequate/<br>Adequate                           |
| Other _____<br>_____                                                                         | 1            | 2               | 3                | Did not receive/<br>Not Adequate/<br>Adequate                           |

3. People receive information about fire management from a variety of sources during a fire. How useful were the following sources for you DURING the Hat Creek Fire Complex? First indicate if you used this source. If you used this source then please also tell us how useful and how trustworthy the source was. By useful we mean how helpful the source was for you. By trustworthy we mean how credible the source was for you.

| Information Source                                      | Used this Source?<br>(Circle choice) | Usefulness to me |          |      | Trustworthiness for me |          |      |
|---------------------------------------------------------|--------------------------------------|------------------|----------|------|------------------------|----------|------|
|                                                         |                                      | Not Very         | Somewhat | Very | Not Very               | Somewhat | Very |
| Local or Regional Newspapers                            | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Local or Regional Radio                                 | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Local or Regional Television                            | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Family / Friends / Neighbors                            | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Blogs                                                   | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| InciWeb                                                 | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Web other than InciWeb                                  | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Twitter                                                 | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Public Meetings by US Forest Service                    | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Public Meetings by someone other than US Forest Service | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Information Billboard/Kiosk                             | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Facebook                                                | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |

| <u>Question 3<br/>Continued</u>                     | Used this<br>Source?<br>(Circle<br>Choice) | Usefulness to me |          |      | Trustworthiness for me |          |      |
|-----------------------------------------------------|--------------------------------------------|------------------|----------|------|------------------------|----------|------|
|                                                     |                                            | Not<br>Very      | Somewhat | Very | Not<br>Very            | Somewhat | Very |
| Press Conference                                    | No / Yes                                   | 1                | 2        | 3    | 1                      | 2        | 3    |
| Call Center                                         | No / Yes                                   | 1                | 2        | 3    | 1                      | 2        | 3    |
| Meetings at Incident Command Post                   | No / Yes                                   | 1                | 2        | 3    | 1                      | 2        | 3    |
| Local Forest Service Representative                 | No / Yes                                   | 1                | 2        | 3    | 1                      | 2        | 3    |
| Local Government Representative (county, city, etc) | No / Yes                                   | 1                | 2        | 3    | 1                      | 2        | 3    |
| Incident Management Team Representative             | No / Yes                                   | 1                | 2        | 3    | 1                      | 2        | 3    |
| Maps                                                | No / Yes                                   | 1                | 2        | 3    | 1                      | 2        | 3    |
| Scanner                                             | No / Yes                                   | 1                | 2        | 3    | 1                      | 2        | 3    |
| Other _____                                         | No / Yes                                   | 1                | 2        | 3    | 1                      | 2        | 3    |
| _____                                               |                                            |                  |          |      |                        |          |      |

4. Was there an information source you would have liked to have used? Please circle the source or sources listed in Question 2 that you would have liked to have had access to or used during the fire, but did not.

5. Different types of information are important to different groups of people DURING the fire. First, indicate whether or not you received this information during the Hat Creek Fire Complex. Then tell us whether the information was timely for you. By timely we mean you received the information when you wanted it during the fire. Finally, tell us how important this type of information was for you.

| <u>Type of Information</u>                             | Received Information<br>(Circle choice) | Timeliness of Information |          |      |
|--------------------------------------------------------|-----------------------------------------|---------------------------|----------|------|
|                                                        |                                         | Not Very                  | Somewhat | Very |
| Where is the fire going?                               | No / Yes                                | 1                         | 2        | 3    |
| Where is the fire likely to go?                        | No / Yes                                | 1                         | 2        | 3    |
| What should I be doing?                                | No / Yes                                | 1                         | 2        | 3    |
| What fire management choices are being made?           | No / Yes                                | 1                         | 2        | 3    |
| Why are the fire management choices being made?        | No / Yes                                | 1                         | 2        | 3    |
| Why are these fire management options the best ones?   | No / Yes                                | 1                         | 2        | 3    |
| How much does the fire cost?                           | No / Yes                                | 1                         | 2        | 3    |
| How is the ecology of the region affected by the fire? | No / Yes                                | 1                         | 2        | 3    |
| Who is responsible for the fire?                       | No / Yes                                | 1                         | 2        | 3    |
| Other _____                                            | No / Yes                                | 1                         | 2        | 3    |

| <u>Type of Information</u>                             | Importance of Information to You |          |      |
|--------------------------------------------------------|----------------------------------|----------|------|
|                                                        | Not Very                         | Somewhat | Very |
| Where is the fire going?                               | 1                                | 2        | 3    |
| Where is the fire likely to go?                        | 1                                | 2        | 3    |
| What should I be doing?                                | 1                                | 2        | 3    |
| What fire management choices are being made?           | 1                                | 2        | 3    |
| Why are the fire management choices being made?        | 1                                | 2        | 3    |
| Why are these fire management options the best ones?   | 1                                | 2        | 3    |
| How much does the fire cost?                           | 1                                | 2        | 3    |
| How is the ecology of the region affected by the fire? | 1                                | 2        | 3    |
| Who is responsible for the fire?                       | 1                                | 2        | 3    |

6. During a fire people want different things out of the information that is delivered to them. Circle the number to indicate your level of disagreement/agreement with the statements as they relate to the Hat Creek Fire Complex. Then indicate the importance of this aspect to you.

| <u>Information Desired</u>                                               | Strongly disagree | Disagree | Agree | Strongly Agree | Don't Know | Importance to me<br>(Circle choice) |
|--------------------------------------------------------------------------|-------------------|----------|-------|----------------|------------|-------------------------------------|
| I received credible information about the fire.                          | 1                 | 2        | 3     | 4              | DK         | Not Very / Somewhat / Very          |
| I received accurate information about the fire                           | 1                 | 2        | 3     | 4              | DK         | Not Very / Somewhat / Very          |
| I used multiple sources of information to learn about the fire           | 1                 | 2        | 3     | 4              | DK         | Not Very / Somewhat / Very          |
| I had opportunities to ask questions and express concerns about the fire | 1                 | 2        | 3     | 4              | DK         | Not Very / Somewhat / Very          |
| I learned more about fire management during the fire                     | 1                 | 2        | 3     | 4              | DK         | Not Very / Somewhat / Very          |
| I was told what I wanted to know about the fire.                         | 1                 | 2        | 3     | 4              | DK         | Not Very / Somewhat / Very          |
| I thought local resources were used well during the fire                 | 1                 | 2        | 3     | 4              | DK         | Not Very / Somewhat / Very          |
| After seeing how the fire was managed, I trust the Forest Service more.  | 1                 | 2        | 3     | 4              | DK         | Not Very / Somewhat / Very          |

7. Many factors can influence the trust you place in individuals, agencies and agency staff DURING a fire. What factors were most important to you in influencing trust in fire management during the Hat Creek Fire Complex? Indicate how important each factor was in shaping your trust on the fire. If you are unclear about the importance of this aspect of communication indicate "Don't Know". Then indicate whether you were satisfied or not with how this activity took place on the fire.

| <u>Factors that Influence Trust</u>                                                                | Not Very Important | Somewhat Important | Very Important | Don't Know | Were you satisfied with the way this activity took place during the fire?<br>(Circle choice) |
|----------------------------------------------------------------------------------------------------|--------------------|--------------------|----------------|------------|----------------------------------------------------------------------------------------------|
| Agencies were visibly seen to be working together                                                  | 1                  | 2                  | 3              | DK         | No / Yes / Did not take place                                                                |
| Local knowledge and local concerns were integrated into fire response                              | 1                  | 2                  | 3              | DK         | No / Yes / Did not take place                                                                |
| Agencies provided assurances about protection of public safety and minimization of property losses | 1                  | 2                  | 3              | DK         | No / Yes / Did not take place                                                                |
| Agencies provided timely and accurate information to the community                                 | 1                  | 2                  | 3              | DK         | No / Yes / Did not take place                                                                |
| Agencies took action to provide satisfactory answers to issues raised by public/community          | 1                  | 2                  | 3              | DK         | No / Yes / Did not take place                                                                |
| Agencies had good professional presence when talking to the public                                 | 1                  | 2                  | 3              | DK         | No / Yes / Did not take place                                                                |
| Agencies executed evacuation clearly and smoothly                                                  | 1                  | 2                  | 3              | DK         | No / Yes / Did not take place                                                                |
| Other _____                                                                                        | 1                  | 2                  | 3              | DK         | No / Yes / Did not take place                                                                |

## II. BEFORE FIRE

We would now like you to reflect on your experience BEFORE the Hat Creek Fire Complex (Brown, Sugarloaf and Butte Fires). Think back to the time prior to the Hat Creek Fires and the type of communication and information that you were interested in and received before the fire.

8. Circle the number corresponding to the category that best describes your level of dissatisfaction/satisfaction with the information you received BEFORE the Hat Creek Fire Complex. If you are unclear about this aspect of information during the fire, mark "Don't Know".

| <u>How satisfied were you with:</u>                                             | Very dissatisfied | Somewhat dissatisfied | Somewhat satisfied | Very satisfied | Don't Know |
|---------------------------------------------------------------------------------|-------------------|-----------------------|--------------------|----------------|------------|
| <i>Overall information on fire management received prior to the fire?</i>       | 1                 | 2                     | 3                  | 4              | DK         |
| <i>Information about how to protect your house/property prior to the fire?</i>  | 1                 | 2                     | 3                  | 4              | DK         |
| <i>Information about issues related to forest conditions prior to the fire?</i> | 1                 | 2                     | 3                  | 4              | DK         |
| <i>Information about the upcoming fire season prior to the fire?</i>            | 1                 | 2                     | 3                  | 4              | DK         |

9. People receive information about fire management from a variety of sources before a fire. How useful were the following sources for learning about fire management issues BEFORE the Hat Creek Fire Complex? First indicate if you used this source. If you used this source then please also tell us how useful and how trustworthy the source was. By useful we mean how helpful the source was for you. By trustworthy we mean how credible the source was for you.

| <u>Information Source</u>                                                 | Used this Source?<br>(Circle choice) | Usefulness to me |          |      | Trustworthiness for me |          |      |
|---------------------------------------------------------------------------|--------------------------------------|------------------|----------|------|------------------------|----------|------|
|                                                                           |                                      | Not Very         | Somewhat | Very | Not Very               | Somewhat | Very |
| Newspapers                                                                | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Radio                                                                     | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Television                                                                | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Family / Friends / Neighbors                                              | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Web                                                                       | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Conversations with Local Forest Service Representative                    | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Conversations with Local Government Representative (county, municipality) | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Twitter                                                                   | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Public Meetings by the US Forest Service                                  | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Public Meetings by someone other than the US Forest Service               | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Information Billboard/Kiosk                                               | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Facebook                                                                  | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Brochures                                                                 | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Guided field trips                                                        | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Visitor centers                                                           | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |
| Other _____                                                               | No / Yes                             | 1                | 2        | 3    | 1                      | 2        | 3    |

10. Can you tell us what kind of fire information content you most wanted BEFORE the Hat Creek Fire Complex? Circle the number to indicate how much you did not want/wanted this information. Next, please indicate whether the information you received on the subject was adequate for your needs.

| <u>Information About:</u>                                                 | Did<br>Not<br>Want | Wanted<br>Somewhat | Wanted<br>Very<br>Much | Was this<br>information<br><u>adequate</u> for your<br>needs?<br>(Circle choice) |
|---------------------------------------------------------------------------|--------------------|--------------------|------------------------|----------------------------------------------------------------------------------|
| Ecological conditions of local forest                                     | 1                  | 2                  | 3                      | Did not receive/<br>Not Adequate/<br>Adequate                                    |
| Likely fire management strategies                                         | 1                  | 2                  | 3                      | Did not receive/<br>Not Adequate/<br>Adequate                                    |
| Fire hazards/concerns                                                     | 1                  | 2                  | 3                      | Did not receive/<br>Not Adequate/<br>Adequate                                    |
| Evacuation planning                                                       | 1                  | 2                  | 3                      | Did not receive/<br>Not Adequate/<br>Adequate                                    |
| Hazardous fuels reduction (mechanical thinning and/or prescribed burning) | 1                  | 2                  | 3                      | Did not receive/<br>Not Adequate/<br>Adequate                                    |
| Defensible space/FIREWISE                                                 | 1                  | 2                  | 3                      | Did not receive/<br>Not Adequate/<br>Adequate                                    |
| Other _____                                                               | 1                  | 2                  | 3                      | Did not receive/<br>Not Adequate/<br>Adequate                                    |

11. Many factors can influence the trust you place in individuals, agencies and agency staff BEFORE a fire. What factors were important to you in influencing trust in fire management before the Hat Creek Fire Complex? Indicate how important each factor was in shaping your trust. If you are unclear about this aspect of communication indicate "Don't Know". Then indicate whether you were satisfied or not with how this activity took place before the Hat Creek Fire Complex.

| <u>Factors that Influence Trust</u>                                                       | Not Very Important | Somewhat Important | Very Important | Don't Know | Were you satisfied with the way this activity took place before the fire?<br>(Circle choice) |
|-------------------------------------------------------------------------------------------|--------------------|--------------------|----------------|------------|----------------------------------------------------------------------------------------------|
| Agencies were visibly seen to be working together                                         | 1                  | 2                  | 3              | DK         | No / Yes / Did not take place                                                                |
| Local knowledge and local concerns were integrated into fire planning                     | 1                  | 2                  | 3              | DK         | No / Yes / Did not take place                                                                |
| Agencies took action to provide satisfactory answers to issues raised by public/community | 1                  | 2                  | 3              | DK         | No / Yes / Did not take place                                                                |
| Other _____                                                                               | 1                  | 2                  | 3              | DK         | No / Yes / Did not take place                                                                |

### III. FIRE MANAGEMENT

Federal management agencies can use a number of different strategies to manage fire. Below we describe three fire management strategies. We are interested in your opinions about which of the management strategies you believed was used on the Hat Creek Fire Complex, what management strategy you expected to be used, and what strategy you thought should have been used.

- |                                                                                                                                                                                                                                                                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1) Direct suppression: The most active fire management. Fire managers do everything they can to put the fire out. Involves stopping fire spread through direct perimeter control by line construction and use of fuel breaks and other barriers to limit fire spread.                                                                                    |
| 2) Modified / limited suppression: Fire managers aim to put the fire out, but fire behavior, the safety of firefighters, values at risk (houses, people, endangered species, etc.), and/or concerns about potential firefighting costs influence the aggressiveness of the action taken. This strategy would be less aggressive than direct suppression. |
| 3) Area management / monitoring: The least active fire management. Fire managers monitor the area where the fire is occurring and allow the fire to burn freely within the planning area. Action is taken if values at risk (houses, people, endangered species, etc.) are in danger. Otherwise the fire is monitored.                                   |

12. Please circle the response below that best reflects your understanding of the fire management strategy used on the Hat Creek Fire Complex. If you are unclear about these different fire management strategies, indicate "Don't Know". CIRCLE ONLY ONE RESPONSE FOR EACH QUESTION.

|                                                                      | 1) Direct suppression | 2) Modified/ limited suppression | 3) Area management/ monitoring | Don't Know |
|----------------------------------------------------------------------|-----------------------|----------------------------------|--------------------------------|------------|
| What strategy was used to manage the fire?                           | 1                     | 2                                | 3                              | DK         |
| What strategy did you expect to be used to manage the fire?          | 1                     | 2                                | 3                              | DK         |
| What strategy do you think should have been used to manage the fire? | 1                     | 2                                | 3                              | DK         |

13. To what extent do you feel you understood the strategy that was taken in managing the Hat Creek Fire Complex?

- Not at all understood
- Poorly understood
- Somewhat understood
- Fully understood
- Don't know

14. To what extent do you feel this strategy was appropriate for managing the Hat Creek Fire Complex?

- Very inappropriate
- Somewhat inappropriate
- Somewhat appropriate
- Very appropriate
- Don't know

15. How satisfied were you with the implementation of this fire management strategy on the Hat Creek Fire Complex?

- Very dissatisfied
- Somewhat dissatisfied
- Somewhat satisfied
- Very satisfied
- Don't know

16. If you were unsatisfied with how the Hat Creek Fire Complex was managed, could you please explain in a short answer?

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17. To what extent do you disagree/agree with the following statements:

|                                                                                                                                                       | Strongly<br>disagree | Disagree | Agree | Strongly<br>agree | Don't<br>Know |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------|-------|-------------------|---------------|
| Communication from the Forest Service <i>during</i> the fire helped me understand how the fire was being managed.                                     | 1                    | 2        | 3     | 4                 | DK            |
| Communication from local government (county, municipality) <i>during</i> the fire helped me understand how the fire was being managed.                | 1                    | 2        | 3     | 4                 | DK            |
| Communication from the Forest Service <i>before</i> the fire helped me understand what would likely happen when a fire occurred.                      | 1                    | 2        | 3     | 4                 | DK            |
| Communication from local government (county, municipality) <i>before</i> the fire helped me understand what would likely happen when a fire occurred. | 1                    | 2        | 3     | 4                 | DK            |

18. Fire managers base their decisions on how to manage a fire on many factors. We would like to know how important different factors are to you in accepting a fire management decision. Please indicate how important each factor was when you made judgments about fire management actions and decisions during the Hat Creek Fire Complex. Then we'd like to know whether you received this information during the Hat Creek Fire Complex.

| <u>Management Based on Concern For:</u> | Not Very important | Somewhat Important | Very important | Don't Know | Received Information (Circle choice) |
|-----------------------------------------|--------------------|--------------------|----------------|------------|--------------------------------------|
| Ecological needs                        | 1                  | 2                  | 3              | DK         | No / Yes                             |
| Firefighting costs                      | 1                  | 2                  | 3              | DK         | No / Yes                             |
| Community and resident life and safety  | 1                  | 2                  | 3              | DK         | No / Yes                             |
| Firefighter safety                      | 1                  | 2                  | 3              | DK         | No / Yes                             |
| Protecting private property             | 1                  | 2                  | 3              | DK         | No / Yes                             |
| Protecting cultural resources           | 1                  | 2                  | 3              | DK         | No / Yes                             |
| Protecting endangered species           | 1                  | 2                  | 3              | DK         | No / Yes                             |
| Other _____                             | 1                  | 2                  | 3              | DK         | No / Yes                             |

19. How well informed were you about the condition of the Lassen National Forest?

|                            | Uniformed | Moderately uninformed | Moderately informed | Informed | Don't Know |
|----------------------------|-----------|-----------------------|---------------------|----------|------------|
| Before the Hat Creek Fires | 1         | 2                     | 3                   | 4        | DK         |
| After the Hat Creek Fires  | 1         | 2                     | 3                   | 4        | DK         |

20. How would you characterize the following conditions on the Lassen National Forest prior to the Hat Creek Fire Complex?

| <u>Forest Condition</u>           | None | Minimal | Moderate | Severe | Don't Know |
|-----------------------------------|------|---------|----------|--------|------------|
| Beetle Kill                       | 1    | 2       | 3        | 4      | DK         |
| Blow down                         | 1    | 2       | 3        | 4      | DK         |
| Drought                           | 1    | 2       | 3        | 4      | DK         |
| Too many trees/too dense          | 1    | 2       | 3        | 4      | DK         |
| Steep terrain                     | 1    | 2       | 3        | 4      | DK         |
| Erodible soils                    | 1    | 2       | 3        | 4      | DK         |
| Age of forest/time for it to burn | 1    | 2       | 3        | 4      | DK         |
| Other _____                       | 1    | 2       | 3        | 4      | DK         |

21. Do you believe this condition or these conditions affected how the Hat Creek Fire Complex was managed?

| <u>Forest Condition</u>           | No | Yes | Don't Know |
|-----------------------------------|----|-----|------------|
| Beetle Kill                       | 1  | 2   | DK         |
| Blow down                         | 1  | 2   | DK         |
| Drought                           | 1  | 2   | DK         |
| Too many trees/too dense          | 1  | 2   | DK         |
| Steep terrain                     | 1  | 2   | DK         |
| Erodible soils                    | 1  | 2   | DK         |
| Age of forest/time for it to burn | 1  | 2   | DK         |
| Other _____                       | 1  | 2   | DK         |

22. How would you rate the overall condition of the Lassen National Forest?

|                            | Very Unhealthy | Unhealthy | Healthy | Very Healthy | Don't Know |
|----------------------------|----------------|-----------|---------|--------------|------------|
| Before the Hat Creek Fires | 1              | 2         | 3       | 4            | DK         |
| After the Hat Creek Fires  | 1              | 2         | 3       | 4            | DK         |

23. Who has primary responsibility for getting information about the Hat Creek Fire Complex to you?

- I am responsible for informing myself
- Mostly me and a little bit agencies
- Equal portion me and agencies
- Mostly agencies and a little bit me
- Agencies are responsible for informing me
- Don't Know

24. How actively did you search for information about the Hat Creek Fire Complex?

- I did a lot to search for information
- I did a little bit to search for information
- I did not do very much to search for information
- I did not search for information

25. What is one thing the Forest Service could do to improve communication during a wildfire?

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26. What is one thing the Forest Service could do to improve communication before a wildfire?

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Who would people in your community go to for information about the Hat Creek Fire Complex?

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## IV. DEMOGRAPHICS

Questions in this section more fully help us understand people's views and opinions. All responses are strictly confidential.

28. How long have you lived in Shasta County? \_\_\_\_\_ years

29. What is your gender? (Circle one) Male / Female

30. What is your age? \_\_\_\_\_

31. Are you retired? (Circle one) No / Yes / Part time

32. What is the highest level of formal education you have completed?  
(Check one)

- |                                                   |                                               |
|---------------------------------------------------|-----------------------------------------------|
| <input type="checkbox"/> Some high school         | <input type="checkbox"/> Bachelor's Degree    |
| <input type="checkbox"/> High school graduate/GED | <input type="checkbox"/> Some Graduate School |
| <input type="checkbox"/> Some College             | <input type="checkbox"/> Graduate Degree      |

33. Which of the following best describes the residence where you are currently living?

- Farm or ranch, more than 1,000 acres
- Farm or ranch, 10 acres - 1,000 acres
- Rural residence, fewer than 10 acres
- Suburban residence
- Urban residence

34. Did you receive an evacuation warning during the Hat Creek Fire Complex? (Circle one) No / Yes

35. Did you evacuate during the Hat Creek Fire Complex?  
(Circle one) No / Yes

36. Was your property damaged during the Hat Creek Fire Complex?  
(Circle one) No / Yes

37. Did you have friends or relatives who had to evacuate or lost their property? (Circle one) No / Yes

**Thank you for participating in this survey.**

Your responses will help us improve fire management information and communication before and during wildfire incidents.

Please return the survey to us in the self-addressed stamped envelope provided.

We greatly appreciate your time and feedback!