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Humans, Fires, and Forests —

Social science applied to fire management

workshop summary

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Foreword

Humans, Fire, and Forest: Workshop Purpose and Need

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The 2000 and 2002 fire seasons resulted in increased political scrutiny of the nation's wildland fire threats, and given the fact that millions of acres of lands are still at high risk for future catastrophic fire events, the issues highlighted by the recent fire seasons are not likely to go away any time soon. Recognizing the magnitude of the problem, the National Fire Plan outlined a cooperative long-term program of research and development to support efforts to reduce human and ecological losses from wildfire. For example, in Fiscal Year 2001, USDA Forest Service scientists received \$26 million for 63 research projects, including many projects that would apply the theories and methodologies of the social sciences to critical wildfire issues; an additional 15 projects were funded in Fiscal Year 2002. Forest Service scientists, in turn, brought in cooperators from universities and non-governmental organizations across the country to collaborate on projects focusing on issues related to firefighting, rehabilitation and restoration, hazardous fuel reduction, and community assistance. The large infusion of fire research dollars has provided the resources and incentives for social scientists to address questions of humans interactions with fire—pre, during and post fire events. Other activities in support of fire social science include the National Wildfire Coordinating Group's establishment of a social science research task group, and sponsorship of *Burning Questions*, a social science research agenda on fire (Machlis et al. 2002).

The increased interest of social science researchers in exploring the human dimensions of fire was clearly evident at the June 2002 International Symposium on Society and Resource Management (ISSRM) held in Bloomington, Indiana. Only a few years earlier there would have been only a few isolated researchers working on fire-related issues. However, when Pam Jakes of the Forest Service North Central Station organized a breakfast meeting for fire researchers, the room was filled.

Don Field of the University of Wisconsin and Hanna Cortner of Northern Arizona University embraced the heightened research interest in fire, but also noted that along with the unprecedented opportunities being afforded social scientists, there was also the danger that these opportunities could be squandered if the resulting social science did not have direct and immediate application for fire managers and policy makers. Ecological fire researchers have had a much longer period of time to accumulate a body of knowledge, and to weave a potent story about the adverse ecological impacts of past fire suppression policies and the need for an active program of fuels reduction and ecological

restoration. But what are the stories social scientists could cogently tell? What if, Don and Hanna discussed, after all the new fire research dollars and the infusion of new researcher enthusiasm, the end results were a bunch of highly reductionist studies—significant perhaps by themselves or contributing to the growth of social science theory—but with minimal cumulative impact and utility for managers and policy makers? Would there be a significant second chance?

Don and Hanna agreed that there was a critical need to convene social scientists working on fire-related questions and to continue the networking and sharing Pam's breakfast had initiated. Social scientists needed an opportunity to share research results, address explicitly the "so what" question in terms of their research, identify further collaborative opportunities, focus on maximizing social science results on management and policy making, and just have more time to talk to one another. Don and Hanna approached Pam about organizing such a workshop within the next six months. Pam readily agreed, and our joint workshop planning effort was underway.

Tradeoffs had to be made in designing the workshop since human/environment issues in fire are not bounded simply, and there are multiple entry points for social science research in the countless facets of fire issues. Cognizant of the somewhat arbitrary decisions being made, we decided to organize workshop discussions and information sharing among five areas: 1) individuals; 2) communities; 3) fire across the gradient; 4) culture/ethnicity, and 5) policy, political, and institutional. We recognized that the price of focused informal discussions was a more inclusive topic agenda. In addition, rather than inviting individual researchers to give a series of papers, we also decided to only invite five short papers focused on the theme topics, two short responses from a managerial and a policy perspective, and a wrap-up "on-the-spot" synthesis presentation. The rest of the workshop time would be devoted to small group breakouts and full group discussions. The subtitle of the workshop, "Social Science Applied to Fire Management" was chosen deliberately to focus discussions on synthesis and the utility of fire-related social science for applied policy and problem solving.

This summary of the January 26-28, 2003 workshop held in Tucson, Arizona, presents the record of the meeting. It includes the full text of the invited theme papers, the managerial and policy talks, annotated outlines of the breakout sessions and the closing, wrap-up presentation. It also includes a reflective "after-the-workshop" summary and synthesis paper. This record, however, is only one product of the meeting. In addition to the networking that occurred, researchers attending the workshop also committed to several on-going activities designed both to foster communications among scholars as well as to maximize the utility of social science research applied to fire management. Examples of such activities include: preparation of a social science expertise directory, development of a research framework to demonstrate how various work nodes are relating to one another and where there are still significant gaps, and planning for sessions at the July 2003 Natural Hazards workshop in Boulder, Colorado, and the 2004 ISSRM conference in Keystone, Colorado.

Building a community of scholars working in fire will help individuals and communities of place build the social capital needed to anticipate or recover from fire events as well as foster institutional arrangements that build and sustain civic societies. The political feasibility of policies is dependent upon broader public conceptions of the fire problem, and public willingness to commit taxpayer dollars to fire prevention, fire suppression, and rehabilitation when there is any number of competing high priority policy problems. Basic fire fighter safety is also dependent upon knowledge of risk and the factors—from policies to individual motivations—that affect decisions. Just as policies must be sensitive to different ecological circumstances, they must also be sensitive to these factors as well as differences in culture, ethnicity and community. A coherent body of scientific social science knowledge has much to contribute to those who must weave a variety of informational sources and value systems into the decisions that will affect the relationships between fire, humans and forests.

References

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Theme Paper 1: Individuals

Social Science of Wildfire Risk Management: Individual Level of Analysis

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Wildfire is not naturally a hazard. Fires have burned for centuries and are an essential component of many ecosystems. Fires have become a “natural hazard” because modern humans and the things they value often get in the way. *Wildfire risk* is defined by the likelihood of damage to, or loss of, things human inhabitants, visitors or “owners” care about. Wildfires have historically caused loss of human life, damaged developed property, and disturbed or destroyed features of natural environments and ecological processes that people value. Rapid expansion of human development into previously wild lands—the wildland-urban interface—has raised wildfire risk to unprecedented levels.

Human societies in fire-prone environments have little choice but to manage wildfire risk. Ironically, modern humans’ enthusiastic application of highly developed fire prevention and fire suppression capabilities over the last century has exacerbated the wildfire problem. By reducing fire ignitions and by controlling the size of fires, extremely large volumes of combustible vegetative fuels have accumulated in many areas. Naturally fire-adapted ecosystems that would normally have burned frequently at low intensity are now more likely to burn with very high intensities, making fires much more difficult to control and more likely to cause greater damage.

The level of wildfire risk is determined by the value and vulnerability of the values-at-risk, in association with an array of interrelated environmental *hazard* factors. Some hazard factors are relatively stable and chronic, such as the fire propensity of the ecological setting, climate and weather patterns and topography. Other factors are more variable and critical, such as wind speed and direction, and the types, loads, distributions and moisture content of vegetative fuels. Together these hazard factors determine the likelihood and the “behavior” of a serious wildfire, including fire intensity, rate of spread and extent of burn. Modern wildfire risk management is a complex technical process that integrates pre-, during-, and after-fire actions, including development regulations and zoning, public awareness and education programs, mitigation efforts, warning systems, emergency action plans, protection/suppression resources and deployment, incident command and management, insurance, post-disaster relief, and rehabilitation. The scale of risk management activities ranges from local at-risk sites (e.g., fire retardant construction materials for individual homes) to adjacent areas (e.g., fuel breaks in “buffer areas” around communities or recreation sites) to regional scale projects (e.g., landscape-scale fuel reduction programs).

Wildfire and social science

Much of the technology of wildfire risk management rests on relevant biological and physical (“fire”) sciences, but social sciences can and have contributed substantially. Indeed, wildfire risk is a human-social problem. The values-at-risk are defined by people. Risk management options must be accepted by people locally and, especially where public lands are involved, nationally. Many components of risk management programs require action by local communities and by individual property owners. This paper presents some social science perspectives on wildfire hazard and wildfire risk management, focusing especially on efforts to implement fuels management programs under the National Fire Plan. The social sciences relevant to fire risk management range from the broadest cultural levels (e.g., history of human-fire relationships over the landscape) to social/political systems (e.g., land-development policies and the network of laws and regulations that enable and constrain risk management actions) to communities (e.g., adoption of fire-safe/fire-wise programs) to the behavior of individuals (e.g., decisions by residents to implement risk reduction actions on their own properties). All levels of analysis are necessary and important and ideally the social science of wildfire risk management would be fully and formally integrated, with each level of analysis drawing from and contributing to findings and principles at the other levels to provide the most effective possible support to the urgent task of reducing wildfire hazard and the associated human losses. This paper will focus on wildfire risk relevant perceptions, values and actions by individuals based on research, theory and methods from the discipline of psychology.

Psychological perspectives

Historically wildfire risk management efforts have emphasized fire prevention, with the goal of reducing the incidence of fire ignitions. When fire prevention fails, the risk management strategy traditionally has shifted to aggressive quasi-military campaigns to control the fire and reduce the extent and severity of damage. Fire risk management policies have more recently begun to show increased sensitivity to the natural, perhaps inevitable role of fire in forests and other fire-prone ecosystems. Increasingly, the professionally preferred management strategy is to preemptively control the intensity and magnitude of wildfires by altering the volume and distribution of the vegetation that fuels the fire. This shift in risk management emphasis is well founded in bio-ecological and physical fire science, but it also has important psychological implications that can affect public acceptance, support and cooperation.

Prevention—Wildfire prevention focuses on the probability component of the risk equation, seeking to reduce the likelihood of fire ignitions. Most closely associated with the “Smokey Bear” campaign, wildfire prevention policies have been highly successful (by some accounts, too successful). Images of beautiful green forests engulfed in flames, terrified wildlife running for their lives and visions of the charred aftermath of high intensity wildfires readily motivated high levels of public support for and compliance with fire

prevention policies. No self-respecting member of society would purposefully, or even carelessly start a forest fire. From a psychological perspective, attaining strong public support for fire prevention should be easy. First, the stated goal of fire prevention is to keep things the way they are—to maintain the status quo, without fire. Second, Smokey's admonitions (e.g., don't toss lighted matches into the woods) are, on the face of it, very reasonable and compliance requires little effort and little or no compromise of life style or desired environmental conditions.

Suppression—All out attacks on raging wildfires, characterized as threatening human lives and property, destroying beautiful natural forests and killing helpless wildlife, easily garner high levels of public support. The very plausible goal of fire suppression is to protect what we have by getting rid of the fire that threatens it. Support is further reinforced by dramatic media coverage of heroic fire fighters waging war against fires in the air and on the ground. Another psychologically appealing feature is that no action is required until a fire is undeniably burning, i.e., there is little (apparent) uncertainty about when and where to implement the policy. While fire suppression operations are notoriously expensive and frequently dangerous (firefighters are the most likely human fatalities in a wildfire), the need for fighting fires is rarely questioned. What is demanded of the average citizen is to cheer on heroic firefighters from the safe sidelines and, in the fine print, to (indirectly) pay the substantial financial costs—costs which can in part be justified by claims of the number of houses or the acres of forest that would have burned had the fire not been controlled.

Fuel reduction—The strategy of mitigating wildfire risk by preemptively reducing fuels, by comparison to prevention or suppression, presents a more complex and problematic psychological profile. Fuel treatments must be implemented well in advance of any wildfire, requiring people to accept immediate changes in their environment to protect against an uncertain threat in the future. Treatment options are neither as logically compelling nor as clearly justified as prevention and suppression actions. Removing flammable vegetation can readily be translated as “cutting the forest to keep it from burning,” seemingly defeating the purpose. Further, a public assumption not readily expelled is that cutting in the forest for whatever purposes will produce a less aesthetic, less “natural” landscape. Moreover, “mechanical treatments” are rather too similar in means and ends to commercial timber management activities that have historically had considerable negative connotations. Indeed, some have voiced the concern that fuels treatment programs have ulterior (economic) motives, a suspicion that drives “diameter cap” controversies and is reinforced by the fact that “timber sale” mechanisms are often relied on for financing and implementing treatments. The alternative of reducing fuels by controlled burning (“burning the forest to keep it from burning”) also conjures up less than appealing landscape images, and fire is still not completely accepted as a potentially benevolent natural process. Further, the highly publicized instances where the “control” part of the burning was not fully achieved have added to the uncertainty, and made some wonder whether the cure is more dangerous than the disease.

In addition to being implemented in advance, to be effective fuel reduction treatments must be repeated and maintained at least until the fire occurs. Thus, any adverse

effects on aesthetic or naturalness values will be immediate, and must be endured essentially forever. The perceived, and largely preferred status quo must be abandoned in favor of a continuous pattern of change as fuels are removed, re-accumulate and then get removed again, *ad infinitum*. In contrast, any gains in safety or reduced losses (which are only probabilistic, not guaranteed) cannot be realized at all until and unless a wildfire actually occurs. Tradeoff equations with such pay-now, get-benefits-later-maybe parameters do not have a history of being favored by large numbers of people.

Defining success—The effects of wildfire are typically reported to the public in terms of the number of ignitions and the area burned and, where relevant, the number of structures damaged or destroyed. There are a number of reasons to question the importance placed on structures (e.g., protecting structures may demand suppression resources that might better have been used to control the fire, and structures are generally covered by private insurance). Post-fire surveys suggest that even directly affected residents express often more concern about environmental damage than the loss of structures (“What good is a cabin in the woods without the woods?”). The reporting of area burned can be deceiving, as not all of the reported area is burned to the same degree—a mosaic of “hotter” and “cooler” spots is typical of large fires.

Paradoxically, a truly successful fuel reduction risk management strategy is unlikely to reduce fire starts (indeed, ignitions might increase in some areas to more closely approximate natural fire intervals), and might well result in larger burned areas (with lower, more natural intensities there would be less need for all out efforts to control and restrict fires). Rather than promising to avoid or get rid of fire, the fuel reduction strategy is predicated on accepting fire as a natural and recurring part of living in the wildland-urban interface. While there may be very compelling safety (and ecological and perhaps even economic) arguments for pursuing this risk management strategy, it is not likely to bring psychological comfort to wildland-urban residents and visitors, or to important national constituencies. Changing public perceptions of fire in the woods is an ongoing process, in which the way wildfire effects are communicated to the public can be very influential. If fire communications are not carefully crafted, there is a danger that a successful fuel reduction strategy could be perceived by the public as a failure.

Selling the fuel reduction strategy

Accomplishing national fuel-reduction goals will require intense involvement and significant cost sharing from affected local communities, as well as sustained national support from taxpayers with a full and expanding agenda of other pressing problems. There are numerous psychological reasons (discussed above) to expect that securing and sustaining the required public support could be extremely difficult. Current enthusiasm for “protecting homes” in communities that were actually or symbolically “scorched” by the recent fires will likely fade with time and wetter conditions. Nearly unanimous support for abstract public safety and environmental protection goals will increasingly be challenged by the very specific reality of cutting and removing and/or burning large volumes

of “natural” vegetation from cherished and often very visible places. Whether the means of removal is mechanical, prescribed burning or some combination, there will be real and sometimes substantial environmental, economic and social costs. Given current conditions at the highest priority sites, treatments sufficient to provide significant hazard reduction will not be subtle and, at least in the short term, the effects are likely to be perceived by the public as quite negative. Sustained public support for the fuel reduction program will hinge on whether the immediate and recurring environmental, economic and social costs of treatments are perceived to be favorably balanced by expected fire-safety benefits.

It may be safe to assume a continuing, generally high level of public support for the generic goal of reducing wildfire hazard, both to protect fire fighter’s lives and private property and to protect public natural environments and resources. Public support for “mechanical treatments” to reduce hazardous fuels has been found in several recent surveys. However, fuel treatments are not generic; they must be carried out in particular ways at particular times and particular places. The nature of treatments and their effects depends importantly on the specific vegetation/fuel type and condition and on details of the treatment prescription and the means of implementation. Moreover, each treatment has a particular temporal trajectory, with differing patterns of effects over the treatment to post-treatment to re-treatment cycle. It is important that public involvement programs adequately and effectively communicate the full set of value tradeoffs that proposed fuels treatments entail. Just as wildland managers need reliable assessments of existing fuel conditions and valid projections of the biological and fire behavior effects of treatments, they also need to effectively communicate these conditions and expected outcomes to affected publics and to obtain accurate and valid assessments of public response. Vague, incomplete or glossed over representations of treatment effects and exaggerated expectations of safety benefits could jeopardize the sustained public support needed for success of the national program.

Communicating with publics—First, environmental/wildfire managers should get their story straight. That is, they must have reasonable confidence in their assessments of current hazard conditions and of the environmental impacts and safety improvements that can be expected from fuel treatment alternatives being considered. Under the best of circumstances, the fuel reduction risk management strategy is complex, and poses a number of significant psychological challenges. Public resistance can be expected to any change in the status quo, especially when current conditions are perceived, accurately or not, as “natural.” There is considerable and unavoidable uncertainty in the outcomes of any fuel management treatment, over time and from site to site, and no reasonably contemplated treatments can promise absolute protection from wildfire. Even if managers are secure in their facts and are able to present compelling evidence of the long-term benefits of fuel treatments, it cannot be assumed that all people will find the expected benefits sufficient to cover the perceived short-term costs. Reasonable people could conclude that uncertain safety benefits in the event of a wildfire sometime in the future are outweighed by the opportunity to continue in the present to enjoy what they perceive as important aesthetic and naturalness values in their chosen environmental setting.

Aggressive information and community awareness campaigns have assured that most potentially affected publics recognize that wildfire is a threat. Most wildland-urban interface residents know that wildfire is dangerous, and most are fully aware that removing flammable vegetation around their homes and properties would reduce their risk. But action, whether clearing vegetation on individual properties or more generally supporting community and national risk management programs, requires more than knowledge. Evidence of the dissociation between knowledge and action is readily found—diet and exercise being prime examples. Action requires motivation, a deeper, more basic psychological processes that can be independent of knowledge.

Motivating action—Making one's life and property safe from wildfire would, on the surface, seem more than adequate motivation for support of and compliance with wildfire risk management programs. But, in addition to the uncertainty issues noted above, safety is a complex motive founded on one of the most basic and psychologically problematic emotions, fear. Certainly people fear raging wildfires, and no doubt the sight of such a fire would reliably produce swift and energetic action. But the actions that people are expected to take in support of fuel treatment programs must be executed well in advance of and well separated from any actual fire. Residents of wildland-urban interface areas do not normally view the vegetation surrounding their homes as "fuel." The wildland-urban interface landscape is demonstratively attractive to many people, largely because of the aesthetic and naturalness values it affords. The vegetation is a key part of the attraction, and it is much more likely to arouse pleasure than fear, making "clearing away the fuel" a less urgent and less likely response.

Even if people could be conditioned to feel fear in advance of the fire, there is good reason to suspect that fear may not be the best motive for achieving sustained public support and compliance with fuel reduction risk management programs. Actions motivated by fear are notoriously erratic and unstable, both in the psychological laboratory and in the "real world." Drawing attention to fearful events raises negative feelings that are prone to spill over to other aspects of the setting, including well-intentioned fire safety officers and their programs. For fuel treatments to be successful they must be regularly maintained and repeated, often for a very long time without any actual fire occurring. That is, fuel treatments must be motivated and sustained by the desire to avoid future harm and damage. Behaviors dependent on such "negative reinforcement" are very prone to break down ("extinguish") over time as the threatened negative event fails to occur. Thus, avoidance of a feared event is not likely to provide an effective psychological basis for a sustained wildfire risk management program.

Supporting motives—Certainly it would be irresponsible for environmental managers not to acknowledge the very real threat of wildfire in the wildland-urban interface. But fuel reduction programs need not be based solely on fear of catastrophic fire. In many fire-prone ecosystems reducing excessive accumulations of vegetative fuels can bring some immediate and continuing benefits in addition to promises of increased safety in the future. For example, reducing fire hazard by clearing brush, thinning thickets of small trees and opening up canopies in ponderosa pine forests can in many instances also improve aesthetic quality and help to restore healthy natural ecological conditions. These

ancillary benefits of fuel reduction can be appreciated immediately and continuously, independent of whether large wildfires ever occur. These positive motives, where appropriate, would provide a more stable and more reliable psychological basis for sustaining public support and active compliance with fuel reduction programs.

Conclusions

Wildfire is a real threat in rapidly growing wildland-urban interface areas. Managing wildfire risk is an important responsibility of wildland managers and private property owners in threatened areas. Securing public support of and compliance with traditional prevention and suppression risk management strategies has been relatively easy, in part because their rationales are psychologically compelling and the actions required of the public are, on the face of it sensible and relatively undemanding. In contrast, the fuel reduction mitigation strategy currently advocated by managers is less compelling and more demanding. Instead of protecting the status quo, fuel treatments require immediate and continuing changes to environmental conditions that most perceive as aesthetically attractive and natural. Fire is neither avoided nor attacked, but must be accepted as a natural, recurring and perhaps necessary event in wildland areas. Improved fire safety is achieved by preemptively clearing vegetation that might fuel a catastrophe, so that homes and valued environmental settings and resources are less likely to be damaged or destroyed. But safety, as a motive for action is based on fear, a particularly unreliable and erratic psychological basis for any sustained action. A more effective, more stable psychological foundation for fuel reduction risk management strategies can be achieved by adding the positive motives of ecological restoration and protection and aesthetic values which can often be made compatible with public safety goals.

Theme Paper 2: Communities

Fire in Our Midst:

A Look at Social Science Research Issues at the Community Level

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Introduction

This paper provides an ever-so-brief discussion of social science research issues related to communities and wildfire. As such, it looks at scales of organization that are intermediate between individuals (attitudes and acceptability of fire and fuels treatments, etc.) and national/federal (policy issues, administrative structures, funding, policy incentives, etc.). We divide the discussion into three sections. The first examines the impacts of fire on communities. The second examines the ways in which communities can mitigate, mediate, and transform the impacts that fires have on people. The third offers assorted research questions and issues that seem particularly relevant at the community scale.

Fire impacts on communities

The traditional social impact assessment model tends to look at the impact of events *on* communities. Applied to the question of wildland fire, this approach would lead us to view fire events as primary causal agents or “independent variables,” and the individuals and communities that experience such events as that which is being acted upon. Thus various attributes of individuals or dimensions of community become the “dependent variables” in such analyses. To be sure, there is validity to this perspective. For example, fires are dangerous to peoples’ physical well-being and they certainly have the potential to do great damage to the physical infrastructure of communities and to the landscape that provides the physical setting for individual and community life. Fires can destroy the equity in someone’s home, threaten municipal water supplies, overwhelm local structural fire-fighting capacity and wreak havoc with local governmental budgets. It is no doubt appropriate that a considerable portion of our firefighting efforts should be geared to minimizing these impacts.

Our key point is that such impacts are not simply a matter of one-way cause and effect. Communities are complex social systems, and they are linked to the natural lands that surround them in multiple, and sometimes competing, ways. A significant fire will therefore have multiple impacts on a community, and those impacts could vary significantly across geography, across groups, and over time.

The complexity of these interactions can perhaps best be illustrated by an example. Based on a preliminary look at data from six case studies of wildfire impacts in western American communities conducted over the past year and other work we and others have conducted (Rodriguez-Mendez 1995, Carroll et. al. 1999, Kumagai 2001), two seemingly paradoxical observations tend to stand out: fire serves as a *galvanizing* event and as a *disintegrating* event. Nearly every interviewee talked about people “pulling together” in the wake of fire. This “pulling together” manifested itself in a variety of ways from sharing food and living space, donations of money and other resources, and shared labor. Yet we also uncovered a variety of types of conflict and tensions that fires seemed to have triggered or exacerbated. These ranged from personal and cultural conflicts to inter- and intra-community conflict as well as local/federal conflict. In some cases this was the continuation or exacerbation of pre-existing conflict; in others it was the generation of new conflict. What is particularly interesting is that the “pulling together” and the various types of conflict that were occurring resulted from a similar, or in some cases the same, fire event. The lesson here is that the community creates the stage upon which the social impacts are played out.

Following this logic, we would posit two axioms:

- 1) Communities serve as important mediating institutions between the individual resident or family and the fire event;
- 2) Characteristics and histories of the communities themselves have a great deal to do with how fire impacts play out at both the community and individual level.

Community impacts of fire

A focus on communities as mediating institutions reverses the traditional cause-and-effect assumption that began this paper. While a conventional social impact assessment model would examine the fire’s impact on the community, a no less important question is “What are the community’s impacts on the fire’s effects?” Certainly the most obvious measure of this is the degree to which the community has organized and prepared for a wildfire event. Those communities with effective governance structures may have better fire departments, better evacuation plans, and more extensive programs of homeowner education and risk mitigation (i.e., Firewise-style programs). From a social science perspective, area of fruitful research would improve our understanding of how communities function (and perhaps dysfunction) in the face of significant challenges. Along this line, there are several issues/observations we want to emphasize.

The impact and interpretation of a wildfire is socially constructed. A fire is what it is, but what it means is created through a complex social process. This process of social construction is hugely influenced by the social context and discourse. “Tragedy,” “disaster,” “natural,” “unnatural,” “dodged a bullet on that one,” and “the Feds’ fault,” are all sentiments that one might read in the local paper or hear in the local coffee shop after a

large fire. The interpretation that people make of an event is directly impacted by the people with whom they interact (what social psychologists refer to as their “reference group”). In many cases, the need to hold a view that is informed by, and compatible with, one’s reference group is so strong that people will only develop the most tentative of interpretations before they have the chance to align themselves with their reference group.

While socially constructed meanings can be a direct response to the particular features of an event, they also condition our response to the event in powerful ways. We respond not merely to the event, but to our interpretation of it. Perhaps the most famous example of this in the human disaster literature—not fire related at all—is the Buffalo Creek Dam disaster (Erikson 1976), the aftermath of which puzzled many observers in terms of the community’s seeming inability to recover and reorganize. The post-event social analysis suggested that the widely-shared belief on the part of community residents that the event was the product of willful human negligence on the part of a mining company, rather than a random act of nature, was a main reason for slow and incomplete recovery. The implication was that if community residents had interpreted the cause of the disaster to something other than human negligence, the impact of the event could likely have been different.

In the case of wildfire impacts, it is our observation that the meanings attached to fire events and the consequences of those meanings are like the Buffalo Creek case: inextricably tied up with issues of the nexus of responsibility. The root causes of large wildfires, and the damage caused by them, are complex. They are rarely entirely human or entirely nature caused (although the media seems to focus obsessively on the source of ignition). People tend to look for simplified explanations for their origins (lightning, human starts, too much logging, not enough logging, short term drought, long-term climate change, failure to fire-safe individual properties, failure to respond quickly enough in initial attack, etc.). Such explanations of origin are part and parcel of the meaning of the fire event, and are linked to the way people respond emotionally and instrumentally to the event. They are also linked to beliefs about who should take responsibility for mitigating current damage and for preventing damage in the future.

The political construction of fire

Related to the social construction of the meaning of a fire event is something we will call the political construction of fire: the strategic “spinning” of a fire event to line up with and/or further a larger political agenda. This distinction is very similar to that drawn by Gamson and Modigliani (1989) in their study of the nuclear power issue in the United States. They suggest that every major policy issue has a culture within which particular positions are constructed and encapsulated in interpretive packages which are then presented to the public. They distinguish this sphere from that of individuals making cognitive sense of an issue or event. They state: “Both levels of analysis involve the social construction of meaning” (p. 2).

We observe both of these levels operating around fires at the community level (and certainly at other levels as well). While we acknowledge there is a fine line between strategic and merely social group-based meaning construction, we see noteworthy differences. In some cases a political construction put forward by an opinion leader can be seen by followers or fellow travelers as the “truth” and thus a new shared meaning is “born.” On the other hand, a strategically constructed “package” must have broad resonance with the values, world view, and prior experiences for it to become adopted. This phenomenon can be observed on both sides of wise use/environmental divide. At this moment in political history, it often takes the form of attempting to have one’s definition of what constitutes a “healthy forest” or “healthy ecosystem”—and the management (or non-management) prescriptions which logically emerge from it—win the political day. Understanding the role that communities play in social and political construction is crucial in understanding the recursive dialectic between community and individual fire experiences.

Technocratic vs. local knowledge/perspectives

Another dynamic we have observed is the tension between federal fire-fighting approaches and those favored by local fire companies. This seems to us to be partly a matter of power and authority: the feds have it and the locals resent it, especially when it seems excessively militaristic and unresponsive to local influence. More interestingly however, it appears partly to be a matter of the legitimacy of different kinds of knowledge and experience. While locals generally acknowledge the feds’ “big picture” expertise (i.e., fire models, weather forecasting through satellite imagery, etc.), they sometimes chaff at the feds’ frequent dismissal of local experiential knowledge, particularly as it relates to details of local geography and how fires have behaved in specific local drainages before. We have also observed differences in 1) perceptions of risks, 2) willingness to take risks in order to save particular houses or developments and 3) priorities for personnel and equipment deployment. Taken together, these differences lay the groundwork for great differences of opinion between local and non-local firefighters. In some cases these differences extend even to the perspectives of elite (Type 1) federal fire-fighting teams versus locally-based federal personnel. One interviewee told an interviewer of a conversation between a Type 1 team member and a ranger district fire fighter in which the former told the latter he was taking the fire too personally and the latter replied that the former was not taking it personally enough.

Such differences can have a profound effect on the overall frame that community residents adopt regarding the fire. Utilizing theory from social psychology known as causal attribution, Yoshi Kumagai (2001) has documented cases in which the frame of blaming the federal firefighters for damage to a home or property was not justified by “the facts” but rather seems to have been motivated by a psychological tendency to seek human agents to hold responsible. Other cases of blaming that we have observed however, are not so clear and seem to have more to do with strategic decisions made by

federal fire managers, how such decisions were communicated and the disconnects between such decision makers and local actors.

A Community Capacity Perspective

There is a feedback loop between the capacities in a community, the outcomes they experience, and the development of capacity. Perhaps as efficient an illustration of this is from Pretty (Figure 1; Pretty 2000). He conceptualizes communities as consisting of five different kinds of capital: human, natural, financial, physical, and social. Serving to organize, transform, and mediate the collective capacity that these capitals provide is a series of community institutions and processes: policies, partnerships, institutions, etc. As a result of these transformative processes, specific events occur: incomes rise, quality of life is

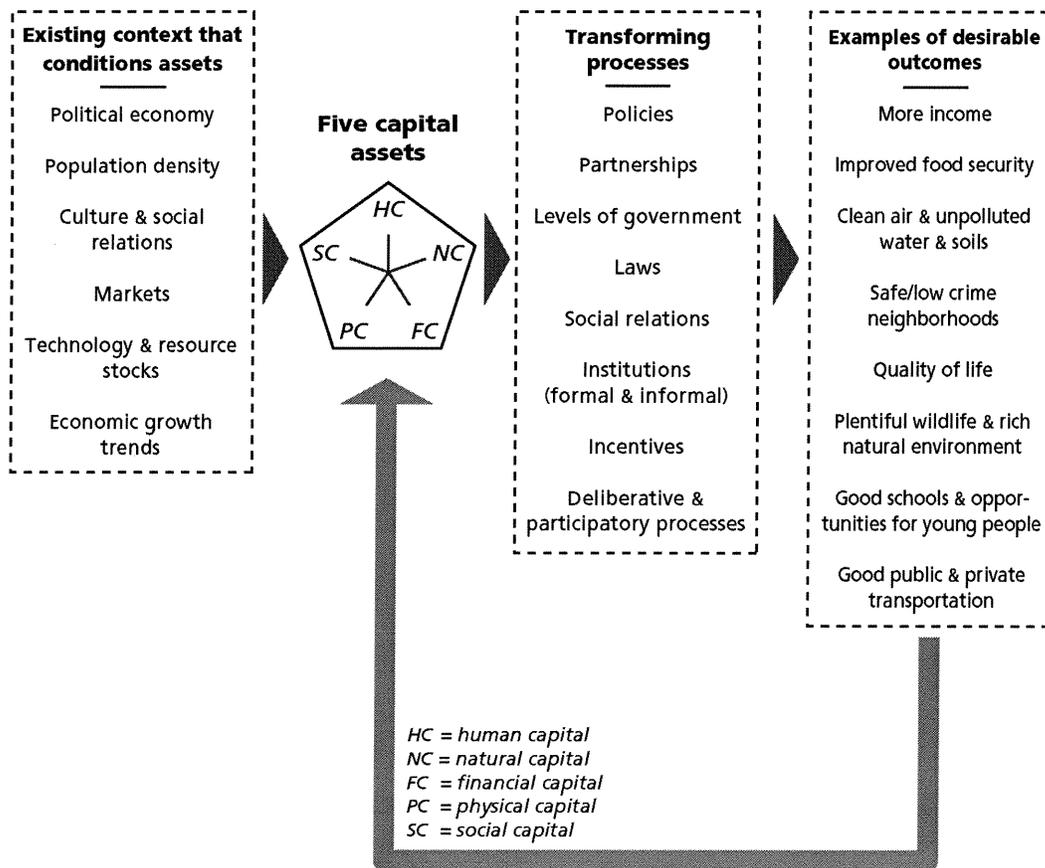


Figure 1 – The transformation of five capital assets (human, natural, financial, physical, and social) to desirable outcomes (after Pretty 2000).

enhanced, schools teach effectively, etc. But as a result of these events, the community's capital stock can in turn be increased; therein lays the feedback. A community's capacity affects and is affected by intentional outcomes and exogenously-generated events.

Because of the self-reinforcing and perpetuating nature of feedback loops, this framework allows us to recognize that communities could be on a number of different trajectories: increasing capital, stable, declining capital, etc. Each of these trajectories is the context within which the fire impacts must be understood. In terms of Pretty's conceptualization, we can think of a wildfire event as an exogenous shock to the community system. It certainly has the potential to change the local capital accumulation, by either destroying physical capital (buildings, fences, etc.) but can also alter the natural environment in ways that many residents might dislike. But Pretty's model also forces us to acknowledge the extent to which the impact of the fire, both in the short and long term, would be mediated by a series of community attributes.

Community/wildfire research issues

It is self-evident that more money should be devoted to community-scale fire research and that presumably we should get some portion of it. Virtually no research on community-scale issues related to wildfire has been funded by land management agencies, so claiming that more should be spent is superficial and trivial. Where any such money should be allocated is the far more interesting question and one to which we turn our attention.

First, we have posited two axioms:

- 1) Communities serve as important mediating institutions between the individual resident or family and the fire event;
- 2) Characteristics and histories of the communities themselves have a great deal to do with how fire impacts play out at both the community and individual level.

The following research issues should be considered in light of these statements, which admittedly are far more assertions than findings.

First, if the Pretty framework of community capital, mediating institutions, and outcomes is applicable to wildfire, research based upon it would demand a longitudinal orientation. Longitudinal studies of community capacity and outcomes are lacking, and therefore we have virtually no context in which to understand the impacts of a fire. A significant fire is not a *tabula rasa* event; rather, it is yet the latest event in long historical tableau that shapes the community's physical environment, self-identity, and shared culture. To fully understand the interaction between the fire and the community demands research that adequately places the fire in the historical context, and the various social institutions that evolved in that community.

Second, “firesafing” programs demand meaningful evaluation, and also offer a context for exploring the importance of community capacity in effective self-organization and compliance. Education programs intended to inform residential interface property owners about wildfire risks and their mitigation options are major wildfire-related activities that occur at the community level. Because these programs have been a focal point for considerable investment and effort, social science has a role to play in terms of maximizing their effectiveness. In particular, making an effort to minimize the risk of fire to one’s own property falls into a category of problems known as social dilemmas: while it makes sense for everyone to engage in the behavior, there is often insufficient incentive for any particular individual to ambitiously do so (recycling and other forms of voluntary self-restraint are also social dilemmas). There is a voluminous literature on social dilemmas, both in very theoretical/experimental settings and in field settings as well. This research broadly concludes that non-compliance is largely inevitable, and that highly socialized sanctions are probably more effective than strictly regulatory mechanisms in promoting appropriate (i.e., firesafing) behavior. We are also concerned that firesafing in individual homes is coming to be seen by many as a panacea for the wildland interface fire problem. While it would seem foolish to us to minimize the importance of these activities by individual landowners, there are other scales—notably the neighborhood, community and forest stand level—that also need to be considered.

Even though the various firesafing programs should receive concerted evaluation, they are certainly only part of the equation. How does the changing demographic structure of rural communities interact with their traditional reliance on volunteer fire departments? Rural communities are increasingly bedroom communities, and the working-age people may be an hour or more away at their jobs, making them unable to serve as volunteer firefighters. How does the relatively high degree of residential mobility in the West affect patterns of informal community mobilization? Are new-comer/old-time tensions a factor? Are some communities that experience fire able to organize economic partnerships that can either capture economic value (salvage) or minimize losses?

If our arguments about the importance of the construction of meanings of fire events in understanding their impacts are valid, we believe this suggests the use of qualitative research methods to go along with the survey approaches that seem to dominate the field at present. Closed-ended surveys only work in this topic area to the extent that the meanings in question are already known and one is merely trying to document the distribution of particular meanings in a population. We suggest that adequate prior knowledge of socially constructed meanings is rarely, if ever, the case. Further, and more importantly, we believe that the processes by which the meaning of wild fire events are created and transmitted is of critical importance and these clearly are best studied through the use of qualitative approaches.

It also is imperative that real time/quick insertion research teams be utilized. We have some modest experience with research projects that deployed researchers into communities in the midst of, or immediately after, significant fires. Just as physical/natural scientists have recognized the need for quick insertion research strategies to capture ephemeral data, social scientists need to think carefully about the time-dependent

phenomena that they are interested in and develop methodologies that allow for real-time data collection. There are a suite of research issues that accompany such designs (how do you have human subjects approval in place prior to the event; what are ethical and respectful research mechanisms among a population undergoing the stresses of a significant wildfire, etc.), but these can be appropriately addressed with adequate planning and design. Quick insertion teams would be particularly useful for understanding the various disconnects that arise between fire managers and local actors in the midst of a fire event.

Certainly one phenomenon that warrants examination is the effectiveness of collaborative approaches for dealing with fire issues. Since the collaborative approach seems to be the paradigm *de jour* in natural resource management, perhaps this research issue needs no discussion here because it will receive sufficient attention without our prompting. But there is much about the issues inherent in the wildfire context that makes collaboration a somewhat different proposition. Collaboration in the pre-fire phase is easy to envision and could easily follow the conventional models. There is a clear and galvanizing shared enemy; there are tangible things that can be accomplished; there are resources available, etc. Collaboration during a fire is a much more problematic endeavor. Much of the literature on discourse-based decision making approaches conclude that they may require more patience and take longer than other decision making strategies. It would seem that the stress-filled rapidly changing decision environment of a large, unpredictable, and potentially destructive fire does not lend itself well to the emergence of collaborative approach (although a well-functioning collaboration could be tremendously helpful in co-ordination and communication). The post-fire phase also creates a problematic environment for the emergence of collaboration. The damage (real or perceived) that a fire causes would likely create a relational chasm between the people who have suffered losses and the agents they feel were responsible to protect them from that damage, typically the land management agencies. Developing collaboration among these parties will require inordinate patience and forbearance.

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Theme Paper 3: Fire Across the Gradient

Social Science Applied to Studying Wildland Fire Across a Gradient

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At first glance, the structure of wildland fire management in the United States gives the impression that fire and its impacts occur across relatively homogeneous biophysical and social surfaces. Even when some topography and vegetation variability is portrayed, details are sparse to non-existent. Yet it is at fine scales that fire impacts occur.

Accounts such as historian Stephen Pyne's *The Fires of 1910* (2001) and journalist John Maclean's *Fire on the Mountain* (1999) give us examples of local and larger scales that may be merged to reveal important human interactions with nature, and with wildland fire. A perusal of the list of references included in *Burning Questions: A Social Science Research Plan for Federal Wildland Fire Management* (Machlis et al. 2002) provides additional avenues for research. A review of the references provided in *Burning Questions* suggests a scarcity of peer-reviewed journal articles or papers reflecting the wide array of potential approaches. On the one hand, this scarcity presents a challenge in terms of having a solid body of thought and research activity on which to build. On the other hand, it presents considerable opportunity to engage in innovative research.

A year ago, a planning meeting was held in Fairbanks Alaska to explore the idea of doing fire-climate-ecology research across a (north-south) longitudinal gradient. Hanna Cortner, Stephen Pyne and I participated in this meeting, but came away a bit perplexed about how wide the representation of non-biophysical science was likely to be in the initiative. Further conversations with one of the meeting organizers, and between Hanna and myself, led me to believe that there was a distinct opportunity to carry out quite innovative research based on the gradient idea, research that, rather than competing with the research by the Alaska contingent, would actually complement it very nicely. What I am offering for discussion here is an outline for how integrated social science might accomplish some really innovative comparative research. This research would be based on a multifaceted set of theories and methods that examines similarities and differences in wildland fire-human relationships across a longitudinal and elevational gradient stretching from Alaska to Mexico, and across an agreed-upon time scale of human occupancy of the gradient area. Of course, we would not cover the entire north-south geographical area; instead we would carefully select representative study sites such as, for example, Alaska, western Canada, the Intermountain West, the Southwest, and a fire-adapted landscape in Mexico.

What kinds of questions arise when we think in terms of this kind of study? Two publications provide insight into how others have addressed this question. The first is *Burning Questions*, which identified a list of social science research themes. I have paraphrased their list in Table 1 on the next page.

Table 1 — Social science research activities identified in *Burning Questions*

Topic area	Type of research activity
Socioeconomic and cultural factors contributing to wildland fire	<ul style="list-style-type: none"> • Develop a general systems model useful for understanding “the human dimensions of wildland fire.” • Develop in-depth understanding of key variables within this model • Acquire an understanding of relationships over time among socioeconomic/cultural variables, and wildland fire
Socioeconomic and cultural impacts of wildland fire	<ul style="list-style-type: none"> • Improve understanding of the socioeconomic consequences of wildland fire • Track these consequences over the long term • Assess the economic costs and benefits of wildland fire management and mitigation strategies • Identify impacts on “communities at risk”
Firefighter health and safety	<ul style="list-style-type: none"> • Evaluate the effectiveness of safety initiatives • Understand professional wildland firefighters’ long-term health and safety • Identify safety issues associated with use of non-regular wildland firefighters
Public health and safety with regard to wildland fire	<ul style="list-style-type: none"> • Develop an inventory and build models of public health and safety exposure • Evaluate risk management techniques, with an eye to reducing public risk
Organizational capacity, decision making and coordination	<ul style="list-style-type: none"> • Develop an understanding of organizational capacity in key federal wildland fire management agency units • Acquire an understanding of the roles and functions of partner organizations • Identify and assess organizational effectiveness • Conduct special studies of organizational capacity
Public values, attitudes, behaviors	<ul style="list-style-type: none"> • Acquire a comprehensive understanding of public values, attitudes, and behaviors relative to wildland fire • Develop an understanding of public preferences with regard to federal wildland fire management • Conduct ethnographic research aimed at understanding relationships with “key publics • Develop understanding of the history of communities at risk
Public communication paths	<ul style="list-style-type: none"> • Develop an understanding of the paths through which public communication occurs • Acquire understanding of the role of the media in wildland fire communications • Evaluate the effectiveness of federal wildland fire education programs

Source: Machlis et al. 2002, pp. 176-177

Another source of insights into potential research questions and approaches is *Wildland Fire Research: Future Search Conference Notes*, based on a workshop held in Park City, Utah, in 1997 (USDA 1998). While this conference did not focus entirely on human dimensions of wildland fire, key issues and research needs were identified in this area. Insufficient social science insight was identified as existing in the following areas:

- Incomplete description of socioeconomic factors contributing to fire
- Scarcity of studies on how managers make decisions, and about their use of decision support systems for planning, budgeting, and fire suppression
- Scarcity of research on fire managers' perceptions, including beliefs and interorganizational roles/responsibilities
- Incomplete understanding of how public opinions regarding wildfire acceptability evolve, and how effective risk communication programs might be designed
- The lack, in existing economic studies, of comprehensive information about short-term and long-term costs and benefits of management alternatives
- Lack of assessments of the vulnerability and resilience of communities that are affected by fire

Concerns were raised about the reactive nature of wildland fire decision making, and the lack of a support structure that would facilitate innovation and risk-taking among managers. Also noted was the need to generate sustained demand for and proactive communication with the public and the media. A theme that recurs throughout the document is concern that fire management increasingly requires a more integrated approach, and is becoming increasingly complex. Managers are flooded with more data and information than they can use to address regulatory requirements and other fire management challenges, including increasing stakeholder participation and increasing risk at the wildland-urban interface. At the same time, conference participants raised the issue of a lack of trust among the public in government. Adaptive management strategies, better funding arrangements for social science work, and improvements in knowledge and effective technology transfer (including maintaining technologies through regular updates) were cited as promising avenues. Improving accountability, and integrating research, planning, and land management were likewise mentioned, as was developing and maintaining monitoring systems that gather human dimensions data as well as biophysical data. Researchable areas and themes identified at the conference appear in Table 2 (page 30).

A third approach derives from my own research experience. I am currently involved in two large federally-funded projects that integrate biophysical and social science research in an effort to assess the impacts of environmental variability and change on society, and of societal impacts on natural processes. One of these projects, Wildfire

Table 2 — Social science research activities proposed at future search conference

Topic area	Type of research activity
Administration and policy	<ul style="list-style-type: none"> • Clarify federal fire policy with regard to wildland-urban interface (WUI) issues • Develop clearer messages to communities regarding WUI strategies • Improve understanding of fuel treatment alternatives in the context of science, politics, social concerns
Risk management	<ul style="list-style-type: none"> • Develop an integrated risk management system useful for land management; and apply it to a management decision system • Provide internal and external education programs • Repackage existing knowledge for practical use by managers
Air quality	<ul style="list-style-type: none"> • Expand public outreach in the context of decision making
"Social science"	<ul style="list-style-type: none"> • Build a social science research community • Obtain social science funding for fire-related research • Improve understanding of how society influences wildland fire issues • Conduct field visits to observe applied research and obtain feedback from field users • Assess needs of fire labs • Integrate social science into fire research • Survey public values regarding prescribed fire and wildfire
Other	<ul style="list-style-type: none"> • Establish and sustain long-term monitoring

Source: USDA Forest Service, 1998.

Alternatives (WALTER), focuses directly on society-climate-fire interactions in the U.S. Southwest (see Morehouse et al. 2000); the other, the Climate Assessment for the Southwest (CLIMAS) project, has wildland fire, in the context of climate and society, as one of its focal areas (see, e.g., Morehouse and Garfin 2001).

In my role as social science researcher on this project, I am particularly curious about how environmental variability and change influence human perceptions and efforts to reduce vulnerability and increase resilience to fire risk, and how humans influence environmental change. This then leads me to wonder about what I might find out if I delved into the environmental histories of specific areas, carried out structured analyses of the social/cultural landscapes in each place, and explored how these factors might vary across the gradient. Further, I'd like to know how perceptions and values might have changed over time regarding human interactions with their landscapes, as well as their perception of their own (and their community's) type and level of risk.

As if peeling away the leaves of a cabbage (they're less weepy than onions), more questions for comparative analysis emerge: how have different economic and livelihood patterns over time affected fire risk, and, conversely, how has fire history affected economic prospects? How have migration patterns changed the nature of place-based narratives, landscapes, risks, and decision options? What kinds of knowledge are brought to bear in defining and addressing problems? What sorts of networks provide conduits for

developing and reinforcing specific kinds of narratives about fire? How have changes in political and administrative structures changed the way fire is perceived and how it is pragmatically dealt with? Is there any evidence of learning from the past, from one's own or others' mistakes—or do we keep retelling the same story? What knowledge, insights, and experiences do we share across the gradient? What are our significant differences, and why these particular differences? I look forward to interacting with the participants in this meeting to evaluate and refine this list, and to identify those components that might be combined to produce a truly interesting and useful gradient-based analysis.

Answering the kinds of complex questions summarized in this paper requires a commitment to interdisciplinary research arrangements; in my mind, it also calls for inquiry into societal constructions of wildland fire. Interdisciplinary research takes time, considerable effort, and good will among the participants. I can personally attest to the difficulties inherent in learning how to collaborate, to talk each other's language, understand each other's disciplinary enthusiasms and constraints, and formulate strategies that leverage strengths and supplement areas of weakness. Integrating stakeholders into the entire research process, which I consider critical to success, adds mores layers of challenge. I know, though, that such efforts can pay off very well, given the right research questions, allocation of responsibility, and venue for sustaining dialogue—and given sufficient time and resources.

What value might come of a gradient study such as the one I sketched out? *First* and foremost, I believe very sincerely that we would have a golden opportunity to demonstrate the wide array of approaches and insights we can bring to issues normally seen as “physical science” problems. It is not uncommon, as I'm sure a lot of you know, for biophysical scientists to bring in a few “social scientists” to fulfill grant agency requirements that their work be societally “relevant”—whatever that means. Thus, an economist, a policy analyst, and/or a decision theorist may be persuaded to become a co-investigator on a grant proposal. These individuals may provide quite useful knowledge to the project, but the full range of potential insights that social science might offer remains unexplored. The experience of global climate change research community provides one of the best examples of lessons learned the hard way: early efforts, focused on biophysical research were roundly criticized for lacking societal relevance (see, e.g., Rayner and Malone 1998). Debates since the late 1980s about how much social science, and what kinds, should be integrated into climate impacts research have begun producing innovative thinking with regard to identifying or devising appropriate disciplinary and interdisciplinary approaches to defining and addressing real-world problems (see, e.g., Miller and Edwards 2001, Edwards and Schneider 2001). For example, an emergent theoretical perspective grounded in science studies seeks to understand how science and policy are or could be co-produced through collaborations between scientists and stakeholders (see Gibbons 2000, Hellstrom 2000, Weingart 1999, Jasanoff and Wynne 1998). The ultimate goal of approaches such this as is to bridge the abyss between science and society and produce results that more closely reflect the needs and concerns of real people living in real places. Practitioners representing disciplines ranging from philosophy and history to anthropology, human geography, sociology, political science, and so on, have a role to

play in bridging the fire-society gap. Likewise, fire science would benefit from broader experiments in collaboration among a broader array of disciplines. Such collaborations are likely to produce some of the most innovative ideas with regard to research questions asked, array of different research collaborators involved, methods used, and means of structuring and delivering results.

Second, we would be building bridges between communities and individuals inside and outside the fire science universe. The capacity of fire science to interact effectively with community members and society more generally is limited at best. There are individuals who are adept in “public relations” but the structure as a whole gives the impression of being very inward-looking. Likewise, societal capacity to understand the fire science world is limited. Critics of fire policy and management often portray decisions and practices as illogical, ill-founded, and downright wrong-headed. Of course, fire experts have been known to say the same things about society as well! In any case, by conducting and sustaining research across the fire science-society divide, we can perhaps facilitate the development of an effective, sustained dialogue.

Third, a gradient study approach would allow us to open inquiry to significant areas and questions not often included in fire-society discourse. For example, we know that Mexico does not pursue the same kinds of fire suppression policies that we do. Canada has different ways of dealing with fire as well. Alaska, while a U.S. state, remains on the periphery of the discourse yet has some very unique biophysical and societal characteristics that influence fire regimes, fire risk, and fire management. Through engaging in comparative studies of these areas, we will certainly answer some important questions about similarities and differences in fire-society interactions. Equally important, we are likely to uncover compelling new questions meriting concentrated research efforts. For example, the globalization of communications capabilities allows access to forecasts and information about fire conditions and events around the world. What are the implications of this kind of access in terms of people’s perception of the role of wildland fire, fire risk, and fire impacts? How might the insights from our gradient study inform this question? What lessons, techniques, strategies, etc., from other areas of the world might be useful in solving problems here?

Fourth, this kind of research may provide a means of holding scientists’ and decision makers’ feet to the fire (so to speak), with regard to assuring that their research activities are indeed relevant to society. I have argued elsewhere that relevance is ultimately defined by society, not by science. This means that effective conduits must be developed to assure that information flows both directions throughout the research/policy formulation process. The flows must be from society to scientists, as well as from science to society. This process is neither easy to initiate nor to sustain, but the potential rewards in terms of developing programs that are acceptable to a broad enough array of interests to assure adoption and maintenance over some longer period of time.

Fifth, interdisciplinary gradient research may provide valuable opportunities for building a community of social scientists interested in wildland fire questions, as well as for advancing techniques and theories, and producing new insights/knowledge within our various constituent disciplines. Such cross-fertilization may produce new hybrids specifically useful for carrying out societally responsive research—perhaps even for more traditionally “ivory tower” research.

I mentioned funding earlier in this paper. My *sixth* reason for believing that the gradient idea has value is that it offers a golden opportunity to compete for funds from granting entities such as the National Science Foundation. It is no secret that funding for the individual researcher, working by him/herself or with a graduate student or two, is becoming increasingly scarce. At the same time, researchers at colleges and universities are under increasing pressure to attract grant funding to fill the void left by cuts in other sources of funding. Gradient analyses would provide an abundance of information useful not only for fire management but also for dealing with all sorts of issues at the human-wildland interface. To give but one example, there are activities afoot to establish a National Environmental Observatory Network (NEON) to gather data about and monitor environmental conditions and change. Some of us have been advocating for a strong social science component, to assure that the design of the network and the operation of its various components, will produce information relevant to societal concerns. There is a clear role for social-science fire research to play in this endeavor.

I am enthusiastic about engaging in dialogue with all of you about the possibilities of the gradient approach, and to envision different permutations of my bare-bones concept. Ultimately, I would like to establish an ongoing communication with a few of you to see if we can flesh out the bones into a viable research proposal—and carry out the research.

Table 3 — Possible “fire across the gradient” research questions

Topic area	Type of research activity
Wildland-urban interface (WUI)	<ul style="list-style-type: none"> • To what extent is this a problem in each study area? • How is WUI defined in each area? • How are the WUI “problems” defined in each area? • How do sociocultural, economic, and policy factors influence the above factors, who gets to participate in problem definition/resolution, and what alternatives are allowed into the problem solving discourse? • What are the vulnerabilities, including nature, degree, and variance over time, space, and social structure? • Related to vulnerability, what is the level of resilience and adaptive capacity to address these problems? • How have the above changed over time and what commonalities/differences exist across the gradient?
Fuels/Treatments	<ul style="list-style-type: none"> • What is being done now to reduce hazard from fuel build-ups, how well are these activities integrated into societal values, perceptions, and behaviors? • What is impeding such activity?
Fire management trends	<ul style="list-style-type: none"> • How advanced is fire management integration in each study area? • How might the intersection between trends in fire management, and biophysical and societal complexities, be characterized? • How does the interaction of these factors differentially influence fire risk?
Knowledge and technology transfer	<ul style="list-style-type: none"> • What knowledge/technologies/data exist but are not being used for whatever reason (lack of access, not in usable format, information overload, etc.) • To what extent are these available to fire managers, etc. shared with the public? • What are/might be the implications of working toward broad sharing of the above? • What knowledge/data/technologies are needed but do not now exist-and societally oriented research might address? • What sorts of capacity building are required to assure use of the knowledge/data/technologies? • Is there a possibility of initiating co-production of science and policy in a process involving scientists, fire managers and members of the public? • How does diffusion of knowledge and technologies occur and how might understanding of the process be incorporated into fire management? • How might a sustainable, integrated, iterative society-fire management collaboration, aimed at developing needed knowledge/data/technologies, be built? • What would a “perfect” integrated model of society-wildland fire interrelations and interactions look like? Who would participate in developing, testing, and using it?

Table 3 — *continued*

Air and water quality	<ul style="list-style-type: none"> • Who is raising/defining the issues, including why, where, when? • How can we objectively measure the extent to which public concern is in fact justified? • How can we measure in some meaningful way the impact of public influence on these issues? • What degree of collaboration exists between the public and fire managers to solve the identified problems? • What modifications need to be made to the present legal, policy, and administrative systems to successfully address the issues?
Integration with larger concerns	<ul style="list-style-type: none"> • How does fire policy and management get integrated into larger concerns about ecosystem sustainability, wildlife management, watershed and airshed management, land use trends and patterns, economic trends and patterns, livelihood strategies, recreation and tourism trends and patterns, etc.? • Where do biophysical processes (e.g., climate, weather, vegetation dynamics, etc.) fit into all this? • How do these kinds of factors affect the nature and degree of sensitivity, vulnerability, mitigation and adaptation (not only to humans, but also to elements in the natural environment)? • How do power relations, decision practices, and sociocultural structures and practices influence the way (if at all) such integration occurs? • What role do structures/practices at higher levels must be considered?
Human interventions in fire regimes	<ul style="list-style-type: none"> • What are the cause and effect relationships between human activities and fire regimes? • What insights would well-structured institutional and policy analyses offer with regard to decision processes? • What sorts of unintended consequences have arisen, might arise in response to different forms of fire-society interactions?
Communications	<ul style="list-style-type: none"> • How are communications among interested/affected parties carried out now? How has this changed over time? • What might network analysis reveal about patterns of communication and influence? • What sorts of communication work and which does not? In what circumstances? • How do gatekeeping and other media practices influence what gets communicated, and how? • To what extent can deeply rooted values/expectations be identified and assessed from analysis of different forms of communication and interaction?
Environmental history and landscape analysis	<ul style="list-style-type: none"> • What can a well-developed environmental history tell us about the past, present, and possible future of human relations with fire-prone environments in each of the study areas-and more broadly? • What sorts of insights into public values and expectations might be derived from structured landscape analyses? • How might these types of studies contribute to improving society-fire management interactions?

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Theme Paper 4: Culture and Ethnicity

Culture/Ethnicity and Fire: The Challenge of Harmonizing Cultural/Ethnic Variations and Traditional Practices Concerning Fire Use and Management with Current Practices

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Introduction

At a world scale the use of fire by human groups has been a major force in shaping ecosystems at the landscape level. Research records show that "...the evidence on the impact of human and natural fires on the natural environment is substantial and complex, and often contentious..." (Langton 1999: 3). From Australia to North America aboriginal people use fire as a tool to control and manage their environment for multiple reasons including religious or spiritual ones. In what is now the United States, anecdotal evidence strongly points toward widespread "...occurrence of fire in the pre-European landscape..." (Stanturf 2002:2). Our natural environment is a result of all the forces of the past, including particularly the use of fire by our ancestors. Many of the ancient fire-use practices have been passed down for generations to the present. However, large increases in population, shrinkage of available open spaces, and modern environmental rules and regulations clash with traditional uses of fire by native or aboriginal people (Langton 1999, Stanturf 2002). Harmonizing the use of fire for landscape-level environmental manipulation with today's environmental rules and regulations and societal fears of wildfires is a major challenge.

This paper focuses on attitudes, perceptions, experiences, and practices of the varied cultural and ethnic groups that interact with land managers regarding fire and fuels management in the Southwest. It briefly reviews the current state of knowledge and recommends areas for future research. Important topics include how (and if) attitudes and perceptions relating to contemporary fire use and management vary along cultural and ethnic lines. Other discussions examine fire management practices of indigenous and traditional peoples and explore ways managers might make use of this body of information.

Why is it important to understand differing cultural perceptions and experiences with fire? There are many reasons, not only in the Southwest, but throughout the country as well. There is considerable land belonging to indigenous and traditional groups that border federally-controlled lands. Management practices on the federal lands can affect those in non-federal ownership and vice versa. Large, landscape-scale management projects encompassing lands under a variety of ownerships are increasingly desirable as means of treating significant areas, such as watersheds. Gathering support for these multi-ownership projects often requires considerable cultural sensitivity and knowledge

of the views and attitudes of the distinct groups who own or manage the land. In addition, many indigenous and traditional peoples maintain special uses and sacred places on forests and grasslands now managed by public agencies. Demonstrating respect and consideration, as well as following legal requirements and agency policies, mandates that groups be consulted and their views concerning fire use and management on and near these sites be valued and considered. Fairly representing the ethnic and cultural constituencies of land-managing agencies, as well as developing representative samples, requires inclusion of the full range of user groups. As discussed by González-Cabán et al. (unpublished paper *b*) some areas of the country have very large Spanish-speaking populations; omitting these Spanish speakers could potentially lead to unrepresentative samples. The same may be true for other minority groups elsewhere in the country.

Current research on fire use, management practices, and attitudes of indigenous and traditional peoples

Historical Research

There is a developing body of historical research concerning the fire use and management practices of indigenous and traditional groups at both the national and regional southwestern levels. The works of Langton (1999), Blaney (1999), and Andersen (1999) in Australia demonstrate that this is not an isolated event. Works by Stewart (1955a, b), Lewis (1973, 1985), Dobyns (1981), Pyne (1982, 1995), Kay (1994), and Williams (1999, unpublished paper) review Native American use of fire and its effects on pre-European-settlement ecosystems. In a 1973 study, Lewis (1973) provides 70 reasons for Native American vegetation burning. Kay (1994), Russell (1983a, b), and Williams (unpublished paper) also have compiled lists of the reasons indigenous groups were using fire. From his extensive literature review of over 300 studies, Williams (unpublished paper) summarizes 11 primary categories of fire use (Table 1). He also points out that many of the same reasons listed for indigenous burning are the same as those for modern times (Williams 1999: 31). It is important to notice that the use of fire was basically utilitarian in nature—that is, to satisfy the basic needs of the native population. Many of the same reasons are found in the aboriginal populations of Australia (Langton 1999). The majority of the North American information comes from research studies in the Pacific Northwest, California, the Northeast, the Midwest, and forested areas of Canada (review of annotated bibliography, William's unpublished paper, discussed in Condie and Raish, in press).

However, research was still needed on specific southwestern practices—consequently a literature review was conducted by Condie in 2001 (unpublished paper) to examine historic, ethnographic, and archeological sources on the use of managed fire in the region. Fires used for land and vegetation management, or those that might have had landscape-scale effects were considered. Groups included the Native Americans, Hispanos, and early Anglo-American settlers of the area. Research was conducted on the following Native American groups: Eastern and Western Pueblos, Apache, Navajo,

Comanche, Ute, Kiowa, Cheyenne/Arapaho, Southern Paiute, and Manso-Suma-Jano-Jocome. The work identified nine main reasons for burning (Condie and Raish in press; Table 2). Clearing land for agricultural purposes, replenishing soil nutrients in agricultural fields, killing woody species in rangelands and pastures, encouraging grass growth, and increasing wild seed production were all important vegetation management techniques of pre-industrial groups, which have the potential for relatively broad scale landscape effect.

“Although our knowledge of formalized burning practices among Pueblo agriculturalists has been preserved erratically, an attitude toward fire as a fertile force still persists in ritual contexts” (Bohrer 1983: 122). Information gained from the review demonstrates that people were very cognizant of the use of fire as a management tool and understood its ecological effects, intentionally using it for specific purposes. The sources show that the history of fire use in the Southwest is long, reaching well back into pre-European-contact times. In certain times and places aboriginal and historic fire use had the potential to create landscape-scale environmental effects, but the role and effects of human-caused burning should not be automatically assumed (Condie and Raish in press; Swetnam and Baisan 1996). For example, third-generation shepherd Leandro Salazar recalls his father telling of fires set by shepherds to enlarge pastures in the northeastern Jemez Mountains in the late 1800s, creating meadows that are still present today (Allen 1984: 131-132). After further research, Allen (in press) notes that fire scar data from the area do not support fall burning, which would presumably have been the time when shepherds fired pastures as they left for the winter. Thus, the fire scar information is apparently inconsistent with Salazar’s claim or the shepherds were burning during some other season (discussed in Condie and Raish in press). Further research is needed on questions such as these, with other lines of evidence brought to bear on inconsistencies between historical information and fire scar data. Archeoenvironmental studies may prove helpful in this regard. Periman (2001), for instance, has examined the growing role and importance of landscape archeoenvironmental studies in clarifying and understanding pre-European-contact burning regimes.

Contemporary Research

There is also a growing body of national-level research and interest in the views on and use of managed fire by contemporary indigenous and traditional groups. The social science fire research review and plan discussed in the National Wildfire Coordinating Group publication (2002), *Burning Questions*, does not focus a great deal of specific attention on working with indigenous communities. However, the report does recommend understanding relationships with key publics in terms of how they perceive federal wildland fire management through ethnographic research. Tribes and individual Native American communities are suggested as groups requiring study.

Research shows that some groups wish to continue the tradition of light burning practiced in prior years (discussed in de Buys et al. 1999). For instance, the conference “Traditional Use of Fire and the National Fire Plan” held by the Confederated Tribes of Grande Ronde and the Confederated Tribes of Siletz Indians in Oregon in 2002

emphasized reintroducing the beneficial effects of traditional burning and accessing National Fire Plan monies to accomplish the task. In a recent study, also from the Northwest, Native American informants and researchers from botany and forestry discuss local fire uses, describing how traditional ecological knowledge of fire is used to create desired ecosystem effects (Boyd 1999). Other information outlines the role of prescribed burning in maintaining and improving vegetation for groups as far distant as the Karuk of California and the Hopi of Arizona. Both of these groups, as well as many others, now work with the USDA Forest Service to assist in fire management projects on both tribal and federal land (Thakali and Lesko, unpublished paper). This is also true in the case of Australia, particularly in the Northern Territory where the Aboriginal people are working with government authorities in trying to maintain, and in some cases reintroduce, traditional burning practices into the management of large expanses of land (Langton 1999). As in the United States, however, there are fears from the general population that this would increase the risk of large wildfires.

Other work is currently underway examining contemporary community knowledge, beliefs, attitudes, and practices concerning fire and fuels management in southwestern forest, woodland, and grassland ecosystems with National Fire Plan funding. This project is in its initial stages and is being undertaken by Wade Martin, Ingrid Martin, and Holly Bender of Integrated Resource Solutions in cooperation with Rocky Mountain Research Station (Carol Raish and Brian Kent). At a broader scale a study funded by the Joint Fire Science Group is looking at the common concerns related to fuel treatments at the wildland-urban interface in different regions of the country (Winter et al. 2002). Although the specific concerns of Native American and other minority groups are not directly addressed in this effort, it provides information on the reasons why people do or do not support different fuel treatment practices. In order to understand how knowledge, beliefs, attitudes, and practices vary with cultural conditioning, residence location, and past experience, as well as to include all the varied user groups, the southwestern study will gather information from Native American, Hispano, and Anglo-American communities (see also González-Cabán et al. (unpublished papers *a* and *b*); Loomis et al. 2002, Loomis et al. 2001). Preliminary information for issue development has been collected in interviews with several Puebloan groups in New Mexico (Jemez, Nambe, and Santa Clara), providing valuable insight into their views and practices concerning fire as a vegetation management tool.

This preliminary work shows a high level of knowledge concerning the positive effects of fire on ecosystems among the Puebloan resource management professionals that were interviewed. Major issues they discussed included a strong desire to manage their own programs (with appropriate assistance as required), a need for better communication with federal agencies, and a desire for additional federal education programs concerning the benefits of prescribed fire that could be used in tribal education programs. Cultural resource sites and sacred areas remain a major concern with groups. They believe that thinning, as well as severe burns, makes sites more visible and more accessible to the public. As prior research has shown (Raish et al. 1999), prescribed or intentional burning over sensitive site areas can also be a problem. Some groups consider archeological sites not only the home of ancestors but also living entities themselves.

Additional important research on the role of culture and ethnicity in conditioning attitudes towards fire and fire management is occurring in the area of economics. A recent study by González-Cabán et al. (unpublished paper *a*), compares survey response rates, protest responses, and willingness to pay for two types of fire prevention programs (prescribed burning and mechanical fuels reduction) for general residents of Montana and members of two Native American tribes in Montana (the Confederated Salish-Kootenai Tribe and the Blackfeet Tribe). The Contingent Valuation Method (CVM) was used with a two-stage phone interview and a mailed booklet. In very brief summary, results indicated that support for prescribed burning was similar between general Montana households and Native Americans. Native American households actually supported the mechanical fuels reduction program at a higher level than other residents, while the overall results indicated there may be more across-the-board public support for prescribed burning than mechanical fuels reductions.

Another similar CVM survey project examined a body of related questions concerning alternative wildfire fuel reduction techniques among English and Spanish-speaking households in Florida (González-Cabán et al. unpublished paper *b*). In general, the survey results showed that “support for wildfire mitigation policies is not statistically significantly influenced by... ethnicity/language of the respondent. Although respondents’ attitude and knowledge differ by language, there is no indication this creates differences in support for wildfire mitigation policies” (González-Cabán et al. unpublished paper *b*).

These studies were undertaken to include the opinions of minority groups and non-English-speakers in developing a body of information concerning forest management in the United States. General fairness, as well as representative sampling, indicates that the many cultural groups of the nation be allowed to express their views. The studies also were designed to assess the effectiveness of the CVM survey technique when used with varying cultural groups and with non-English speakers. According to the authors, they are not aware of any other published comparisons of CVM responses of Native Americans and U.S. general population households (González-Cabán et al. unpublished paper *a*). Including a survey in Spanish was desired because almost all CVM surveys have been conducted in English, despite the fact that some areas of the country have very large Spanish-speaking populations. Effectively omitting these households could lead to unrepresentative samples (González-Cabán et al. unpublished paper *b*).

In general, the projects showed that the CVM survey format worked well for Native Americans in Montana both on and off the reservations. There was a difference in the follow up survey rate (the second of the set of phone interviews), however, with the Native Americans having a significantly lower response rate that reduced the ability to generalize from the sample to the general Native American population. The authors suggest that future surveys explore attempts to increase response rates, such as including a letter from tribal officials in the mailed booklet (González-Cabán et al. unpublished paper *a*). In the Florida survey, response rates of English and Spanish speakers to the entire survey process were similar (González-Cabán et al. unpublished paper *b*).

Recommended future research on fire use, management practices, and attitudes of indigenous and traditional peoples

As mentioned, there is a growing body of information on these topics. However, specific southwestern information is still required in several critical areas, with needed research in both historical and contemporary studies. Research is lacking concerning historical unpublished archival sources, such as documents, manuscripts, records, photographs, and maps relating to fire use and management practices of Native Americans, Hispanos, and early Anglo-American settlers in the region. This work will complement prior studies that have reviewed published sources (Condie unpublished paper). The status, extent, and availability of unpublished information should be assessed, followed by review and synthesis of whatever data are present. A project is beginning in early 2003 to accomplish these tasks for archival sources in Arizona, New Mexico, and the far western portions of Texas and Oklahoma (Rocky Mountain Research Station, Research Joint Venture Agreement with consulting historian Thomas Merlan, Santa Fe, New Mexico).

Continued work with contemporary groups can provide fruitful avenues for gathering important and missing information, as discussed below. Interviews with additional Native American groups in the Southwest, who are currently using forests and grasslands of the area, are needed. Interviews should gather information on contemporary or desired burning and other vegetation management practices that groups would like to implement, as well as attitudinal information on prescribed fire as a vegetation restoration and management tool. Data on problems, issues, and concerns related to burning or to working with public agencies on burning and vegetation management projects also need to be examined. Gathering information on traditional practices for land managers could be accomplished at this time.

The importance of collecting data not only from a variety of groups but also from a variety of people within a group must be considered. In addition to tribal resource managers, religious leaders and general tribal members can provide valuable information and possibly different perspectives; these people should be sought out when possible. Collecting oral history information on traditional practices from the elders is particularly critical. As the older generation ages, opportunities to work with this group become more restricted. Data gathering techniques like participant observation from social sciences such as anthropology can be particularly helpful in this regard (Raish et al. 1999). This same type of information collection program can be undertaken with Hispano communities, community leaders, and members. Conversations with forest and grassland users from these communities, such as grazing permittees and recreationists, as well as land grant members, can provide valuable discussions concerning contemporary and traditional resource management techniques.

It should be noted that Native Americans, Hispanos, and Anglo-Americans are not the only southwestern ethnic/cultural groups with a potential body of information on fire use and management. There are growing African-American and Asian-American communities in the region, as well as religious/cultural groups, such as the Latter Day Saints/Mormon communities, who also should be consulted.

In addition to interview data, which of necessity usually targets a relatively limited group of respondents, more broad-scale survey information is needed from a variety of cultural/ethnic groups across the region. Where appropriate, survey materials and surveys themselves may be in the language of the respondents. Spanish-language work, as previously described for the Florida study, is certainly appropriate for the Southwest. The need for using other languages besides Spanish would require further study and should be determined on a case-by-case basis. Using native speakers as research partners in project choice, design, and implementation is very important and has proved successful in various areas (examples include subsistence resource work in Alaska and tribal archeology and preservation programs in the Southwest, and in Australia) and might be beneficial in this case.

A program designed to gather regional economic survey information using the CVM or other nonmarket valuation technique format in combination with other demographic data could provide an important comparative base for data from other parts of the country. Willingness to pay and preferences for the various types of fuel treatments can be collected across ethnic/cultural groups and across regions. Benefit-cost analysis studies can be used to determine the positive and negative economic impacts on different groups of the fuel reduction programs, and address concerns of social justice. Differences within groups residing in different areas could provide valuable insight into regional variations in cultural traditions, attitudes, and experiences with fire.

Longitudinal studies will help track changes in attitudes and behavior towards fuel treatment practices both from the Native American or Aboriginal point of view and also from contemporary communities. Finally, providing the resulting appropriate attitudinal and behavioral information concerning cultural variations in fire and fuels management views and practices to the land managers responsible for fuels reduction projects is critical. Training sessions, databases, and publications geared to the targeted audience should be developed. Funding for this type of technology transfer is critical and often seems to be overlooked. In addition, scientists conducting the research must be encouraged and rewarded for developing technology transfer materials at the same level as they are rewarded for academic-style publications. There is little practical utility in gathering a valuable body of data if those charged with on-the-ground application are unaware of its existence. Both historical and contemporary research is needed on cultural/ethnic variations and traditional practices concerning fire use and management. Gathering and disseminating these data are challenges for current and future southwestern fire research.

Table 1 — Summary of reasons Native Americans conducted intentional burns (from Williams 1999).

1 -	Hunting
2 -	Crop management
3 -	Insect collection
4 -	Pest management
5 -	Improve growth and yields of wild plants
6 -	Fire-proofing areas around settlements
7 -	Waging war and signaling
8 -	Extorting trade benefits from settlers and trappers
9 -	Clearing travel routes
10 -	Felling trees
11 -	Clearing riparian areas

Table 2 — Uses of fire by Native American, Hispano, and early Anglo-American settlers in the Southwest.

1 -	Clearing land for agricultural fields and pastures
2 -	Replenishing soil nutrients in agricultural fields
3 -	Killing woody species in rangelands
4 -	Encouraging grass growth
5 -	Increasing wild seed production
6 -	Stimulating shoot formation (producing straight shoots for basketry and production of other implements)
7 -	Improving growth of both wild and cultivated tobacco
8 -	Driving and hunting game
9 -	Waging war

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Theme Paper 5: Policy, Political, and Institutional

Policy, Political, and Institutional Dimensions

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Fire suppression was a social choice in the United States over 90 years ago. This choice is now manifested in long-standing policies, budget commitments, institutions, and icons like Smokey Bear. But has more than fire been suppressed? One of the classic works in public administration—as well as fire policy—is Ashley Schiff's *Fire and Water: Scientific Heresy in the Forest Service* (1962), which examines the relationship between science and management in the USDA Forest Service and how the agency effectively suppressed science that challenged the agency's conventional wisdom. Following Schiff's lead, we question whether some kinds of social science research are being suppressed because existing institutional arrangements preclude certain questions from being asked in the first place. To pursue this line of thought, we first consider four questions we think need asking about the politics and institutional dimensions of forest fire management. We then raise some concerns pertaining to the availability (or lack thereof) of institutional support and capacity to explore these questions.

First, how have our current institutional arrangements for fire suppression and prevention emerged, what assumptions are they built upon, and are they still capable of addressing tomorrow's problems? At a fire workshop last year, the preeminent fire historian Stephen Pyne (Pyne 1982, 2001) pointed out that no one has yet written a political history of fire. Having assumed that what Pyne has done historically is pretty comprehensive, hearing this obviously was somewhat of a surprise. What he was talking about was a particular focus on, and analysis of, the choices society has made that ultimately shape the ways in which fire is defined politically as a problem, resources are politically allocated toward recognized problems, institutions are arranged to act upon those problems, and, ultimately, certain interests become vested in ways of doing things. Pyne's observations echo a claim made by political scientist Terry Moe (1989) that policy choices are in fact choices for certain kinds of institutional arrangements, bureaucratic structures, and standard operating procedures. For example, the "10:00 a.m." rule as a policy choice required a rapid response force for suppressing fires as quickly as possible. The corresponding institutional arrangements and bureaucratic structure became an enduring militaristic incident command system that stands apart from other land and resource management functions, despite the fact that the 10 a.m. rule is no longer practiced. Even if we want to change how we politically define and address "the fire problem," we still have to contend with institutions set up to address a 90 year-old political definition of the fire problem. In sum, political history asks us to step back and reconsider whether we

are taking for granted what the problem is in the first place. Knowing how and why policies and institutions evolve around a certain problem definition helps us identify leverage points for change and develop strategies for overcoming deeply entrenched obstacles to change. Who is up to the task (and risk) of developing this political history of fire?

With such background information we can focus on the questions Schneider and Ingram (1997) suggest we ask about the design of all policies. One question in this regard concerns the behavioral assumptions underpinning current policies and programs. Behavioral assumptions influence how we view the targets of fire policies and programs, and the particular policy tools we choose to influence the desired behavior. In the area of prevention, for example, we frame appeals to homeowners on the behavioral assumption that it is rational for them to take action to reduce risk to property, rather than on the behavioral assumption that not taking action may also be rational. Fire prevention education also assumes that all homeowners—especially homeowners in the so-called wildland-urban interface—care primarily about their structures rather than the various aesthetic and environmental qualities of the surrounding landscape. Given the whole range of social and policy *disincentives* for homeowners to take the actions desired of them (insurance payoffs, disaster relief, aesthetic value of surrounding trees), the various reasons homeowners give for not taking desired action (Smith and Rebori 2001), and the multi-dimensional values held by homeowners living in or adjacent to wildland areas (Burns 2002), we may need to rethink our policy strategies in the area of homeowner and private property fire education. The community development approach facilitated by University of Nevada-Reno cooperative extension agents, for example, offers one alternative approach informed by different behavioral assumptions. The rapidly changing demographics of homeowners and communities within or adjacent to wildlands further calls into question the behavioral assumptions of existing policies and policy tools.

A second area of inquiry involves the interjurisdictional and cooperative arrangements that surround fire policy. Several years ago Cortner was involved in a Forest Service policy analysis of the agency's emergency services and mutual aid activities (Cortner et al. 1990). Agency concerns prompting the study were two-fold. First, historically it had been common practice for Forest Service units to respond to reported structural fires, vehicle fires, and vehicle accidents within the agency's jurisdiction and mutual aid response zone, but the frequency of such responses increased during the 1980s as the wildland-urban interface situation intensified. A second driver behind the study began with the 1985 Ojai fire and the 1987 fires in California and Oregon. To the Forest Service it seemed that wildland fire suppression resources were being committed to structural fire protection while wildfires burned unabated in valuable stands of timber—which were in many cases valued many times greater than the involved structures. The agency questioned to what extent the complex set of cooperative and mutual aid agreements it had with state and local fire and emergency services were moving the agency beyond its traditional wildland firefighting roles and into situations for which it was neither equipped nor trained. The study found that the role of the federal firefighter had changed in response to interface situations, and made a number of policy recommendations about training and equipping wildland fire forces and about changing some

provisions in the agency's cooperative arrangements and mutual aid agreements. It was not able, however, to document tradeoffs between forest resources and built structures because the data weren't there. Yet, today this remains a germane question, and one where the evidence might now exist. This evidence can be examined in light of the emerging fire-related federalism instigated by the National Fire Plan (NFP).

The NFP bolsters existing, and creates new, resource and technology transfers from the federal government to state and local authorities for achieving a wide range of objectives and activities. In some instances, the NFP goes beyond traditional cooperative agreements; it is designed to create new institutional arrangements for managing wildland fire risk to communities and the environment. As noble as the intent of the NFP might be, it, too, carries assumptions—the primary one being that the federal, state, and local governments as well as communities all share the same goal. At a general level, this assumption may hold true. But there are inherent tensions between objectives of the NFP, which are to reduce wildland fire risk to communities, and the objectives of many state governments and local communities, which are to continue to foster developments in the wildland-urban interface. Are these policy objectives compatible? To what extent, empirically, are these objectives mutually exclusive across the U.S.? With a public investment of \$1.2 billion (nearly 40% of the Forest Service's total annual appropriation!!), we surmise that such questions need to be asked and answered.

A third line of inquiry concerns future policy development and change. Cecilia Danks (2000) has suggested some potential new institutional configurations for fire management as adaptations to new ecological and community-based approaches to wildland fire management emerge. For example, fire management would need to change from an institutional structure of strategies, procedures, and tools organized mainly around episodic, immediate fire suppression activities to one where resources are allocated on an ongoing basis and mostly for forest restoration and fuels management. What then would be the ramifications of such changes and what politically would need to happen to make them occur? Danks has also pointed to the need for institutional adaptations that would include moving away from an institutional structure built around a centralized capacity to respond to fire, to one based on a decentralized capacity to manage.

But certainly, as Matt Carroll is finding, there are some real barriers and political tensions surrounding the involvement of local people and local resources in decision making on the fire lines. During the fires of 2002 local folks met full force the large, centralized technocratically-based fire structure that constitutes the fire suppression culture. The *Economist* magazine (August 17, 2002) also recently posited that there was a fire-industrial complex dependent upon large fires and fire suppression, including the private contractors that benefit from supplying everything from toilets to tractors on the fire lines. What do we really know about the political power surrounding these arrangements, and what can this tell us about how these stakeholders may affect the feasibility of making policy changes? Without stealing the thunder of Steve Daniels and Matt Carroll, what is the capacity of communities to develop and sustain collaborative approaches to reducing fire risk to a manageable level without breaking the bank? How durable are community-level institutional arrangements?

Fourth and finally, what will be the politics of policy change? If there is recognized need for reform, what will be the policy impacts, both intended and unintended? We seem on the verge of making considerable new policy in terms of NEPA environmental impact analysis and appeals processes for fuels reduction projects, for example, without much data or analysis to shed light on the various claims and counterclaims being offered up in the current debate. But it's also politically logical that it's not data and analysis that are wanted. Given the political rhetoric to define and redefine the nature of our fire problem and, more significantly, who is causing the problem, what we may indeed see politically is that forest health, restoration, and fire are strategically being offered up as the new playing ground over which to carry out debates about environmental policy and public lands management in general.

For example, last April a meeting was convened in Fort Collins entitled, "Fire, fuel treatments, and ecological restoration: proper place, appropriate time" attended primarily by fire scientists and forest managers. The day the conference ended, another conference convened by a coalition of environmental organizations started in Boulder entitled, "Restoring public lands: reclaiming the concept of forest restoration." We don't know if the timing was intentional or merely coincidental, but the juxtaposition of the two conferences illustrates the highly politicized nature of the debate. It has also been a rather clever political strategy by the Bush administration and certain western congressional representatives to paint environmentalists as the evil doers in the forest health debate—a strategy which has implications for defining the winners and losers in other environmental debates as well. That the environmental organizations have intentionally sought to "reclaim" the problem definition makes it apparent just how high the stakes may be in changing fire policy and its attendant consequences for fuels treatments.

The above questions might be added to other identified areas of policy-institutional research, including those highlighted in *Burning Questions* (Machlis et al. 2002), e.g., organizational capacity and decision making effectiveness. The goal, however, should be to move beyond enumerating questions to developing the organizational capacity and support to start answering them. There is no point in building the research agenda forever. So we now turn our attention to examining whether there is sufficient political support and institutional capacity for actually making significant and sustainable progress on these research agendas. As a first point of departure, we ask: where in the federal natural resource agencies (Forest Service, BLM, NPS, USGS) are there research units actively centered on addressing the identified questions in a consistent, coherent, and focused manner? Where are the political scientists and other kindred souls assigned to do research on such questions? Where in the fire science program do these questions fit and are funded?

There is still the predominant political mask of scientific determinism in the natural resource agencies that results in fundamentally political questions being viewed simply as technical problems, i.e., "if only we can get the (biophysical) science 'right,' then the problems will be solved." This, of course, is reinforced by political decisionmakers who are threatened by research and analysis challenging their own privileges/stakes under current institutional settings. It is far easier to conduct research to maximize acres treated

than to acknowledge that in large part social and political factors have gotten us into the situation we are now in and will determine how we democratically work through this situation.

To the extent that agencies are either loath or not supported by Congress to ask many of these questions, where else can support be found? NSF doesn't support large amounts of applied research that the mission agencies are supposed to do. Foundations also shy away from studies that don't translate into on-the-ground projects serving their particular policy agendas. That perhaps leaves the few policy scholars in the universities privileged to their share of McIntire-Stennis or agriculture experiment station (Hatch) dollars. That, however, leaves out scholars in other areas, who might have the expertise but not the required departmental or college affiliation, from fully engaging in such research. Forestry departments, for example, jealously guard their right to control these dollars for the benefit of their departments.

Least you think that this is just a lament about the unappreciated state of social science research, more generally, and a plea for more government funding, in particular, let's also look at two other issues: the responsibilities of researchers themselves and the pitfalls of publicly-funded research. First, social science researchers in the policy sciences also have some responsibilities. In applied research, the focus is first and foremost on addressing pressing public problems. Unfortunately, a long-standing debate, at least in the public policy arena, has been the extent to which the scholar's first priority should be the problem or developing disciplinary theory. Research results that use fire simply as a convenient tool to develop, test, and refine theory will necessarily be of less interest to agencies and congressional appropriators who must respond to constituents interested in saving forests and homes. Of course, theory is important and helps frame and explain research results. Young faculty especially are expected to contribute to the literature and advance theory in their disciplinary fields. But the reality is that while research addressing the advancement of disciplinary theory may often get you published in the *American Political Science Review*, it also reinforces the perception that such research is irrelevant to solving real-world problems. If we aren't to simply bemoan our fate, we need to acknowledge the responsibilities that also go with policy relevant, and publicly-funded, research. Moreover, all researchers, including social scientists, have to examine the culture of their science and determine needed changes. Are social scientists, many of whom are embedded in positivist research traditions, ready to accept and use new models of civic science that engage citizens in the research process, to acknowledge the legitimate role of other systems of knowing, e.g., experiential and indigenous knowledge, and to confront explicitly their roles/obligations to advance their research results in a timely manner in the policy arena? Participatory research is already upon us, an example being the Ford Foundation's Community Forestry Research Fellowships that are granted on condition that the fellowship recipient uses participatory research approaches. But where are the training, mentoring, and publishing outlets that help this kind of research be meaningful? It isn't just a matter of funding; it's also a matter of institutional arrangements embedded in the culture and institutional arrangements of social science research itself. Whereas positivist social science seeks to generalize based on statistical models and to test universal theories

of behavior, participatory research seeks to improve specific situations, eschews models, and is generally ambivalent to universal theories. Promotion and tenure tend to value the former; real-world problem solving is increasingly calling for the latter.

Second, let's stop to look at the political consequences of publicly-funded research. While client-driven research conjures up noble notions of relevancy, we have not yet totally passed the age of active suppression of research results in many areas, whether it is medical or agricultural research. The entity that pays necessarily comes bearing political strings that determine what questions are asked in the first place, and the boundaries surrounding the questions that are asked. And as many scholars have found in the case of proprietary research, the client even controls the results. Moreover, we are already seeing a war on terrorism—a war without any discernable end—being used as justification to affect who engages in research and what research results are publicly disseminated. The rules for sponsored social science research are being rewritten and the researchers themselves are most likely sitting on the sidelines.

Finally, as university cultures move to prize externally-funded grants and contracts as a way to bolster declining revenue streams—and not coincidentally as a measure of faculty worthiness on an annual basis—we need to ask what price do these new institutional arrangements carry for free inquiry in a democratic society? Many penetrating studies of politics and policy have occurred without external funding. So the question is how will the universities of the future regard their obligations to provide a climate (including institutional support and resources) in which *un*funded researchers can freely examine questions that challenge the status quo or threaten the politically powerful? Are we setting up an institutional structure in which science in service of the state and/or corporate America is the rewarded standard and the independent non-funded scholar is increasingly negatively regarded?

We are hopeful that our discussions at this workshop will provide us with a better picture of what actually has been done to examine questions of fire policy, politics, and institutional arrangements in the past, what is going on now that we are obviously unaware of, and what realistic opportunities there are for more work in this area. It is also not enough to simply lament the poorly-funded state of social science in general or policy sciences in particular—as long as the whole array of institutional arrangements by which we define, fund, and conduct fire-related research remain unquestioned. Many of the questions that we can identify as highly germane to developing socially equitable and politically feasible solutions to our fire and forest health problems, we posit, do not have the research infrastructure to attract and sustain a coherent and cumulative research program. The result is the suppression of questions that need to be asked concerning critical political information about who wins, who loses, and who is even being asked to play the game. There needs to be serious examination of the institutional arrangements for fire research itself.

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Policy Response

Ross W. Gorte^a

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Goals seem like a good place to start. What are the goals of wildfire management? Three different goals are commonly articulated: (1) preventing loss of life and damage to property and resources; (2) preventing catastrophic/crown fires; and (3) restoring natural fire regimes. Are these goals compatible? Not in all circumstances. In some ecosystems, for example, the natural fire regime is periodic crown fire, often at long return intervals; in this situation, goals 2 and 3 could not both be achieved. Even the relative simplicity of goal 1 is not without ambiguity. This is the standard goal of federal wildfire management, as established in the 1995 *Federal Wildland Fire Management Policy and Program Review*. At that time, the policy was revised to balance property and resource protection, following fire control efforts in Washington in 1994 where substantial timber volumes were apparently sacrificed to protect a few houses. Preventing loss of life and property damage strongly implies a focus on the wildland-urban interface (WUI), but protecting resources implies a broader focus on wildlands with resources that can be damaged by wildfire (typically timber). This raises the question of whether protection efforts in the WUI should take precedence for *federal* efforts and money over broader wildland protection. Defining the goals and priorities, with possible variations for different ecosystems as well as with involvement of the public, seems like a necessary first step for wildfire management.

Both the National Fire Plan and the Bush Healthy Forests Initiative have focused on the need to reduce fuel loads to prevent losses (life, property, and resources) from uncontrolled fires (presumably goal 1). If one follows the money, however, it is clear that Congress and the Administrations (both Clinton and Bush) have continued the strategies of the past, with the majority of the money spent to control wildfires. It appears that both Administrations have studiously avoided looking at the relative benefits and costs (especially the costs) of fuel reduction. In 1999, GAO estimated that it would cost \$12 billion to reduce fuels on the 39 million acres of national forest land then estimated to be at high risk of catastrophic wildfire (which is more like goal 2)—\$725 million annually through 2015.^b Since then, the national forest acreage at high risk of “losing key ecosystem components” in a wildfire has risen to 51 million acres (up 30%), with another 23

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^b U.S. General Accounting Office, *Western National Forests: A Cohesive Strategy is Needed to Address Catastrophic Wildfire Threats*, GAO/RCED-99-65 (Washington, D.C.: April 1999).

million acres of other federal land at high risk.^c Furthermore, many proponents of fuel reduction advocate treating lands at moderate risk—80 million acres of national forest land and 75 million acres of other federal land. At \$300 per acre for treatment (the cost given to GAO by the Forest Service), it would cost \$39 *billion* to treat the national forest lands, and another \$29 *billion* to treat the other federal lands. At the current (FY2002) appropriation level of \$395 million annually (\$209 million for the Forest Service and \$186 million for Interior), it would take 172 years to treat all these lands. The first time.

There is little information to assess the costs of addressing other goals (1 and 3). There appears to be no basic data on the extent, location, or value of structures in the WUI and how the WUI is changing (presumably expanding). Some information might be gleaned from secondary sources, such as Census data, but it is unclear whether such data might be adequate for examining the situation. There is even less certainty for assessing the costs of restoring and maintaining natural fire regimes in any one ecosystem, let alone the myriad of ecosystems that exist in North America. Let me add that, while the focus has been on the intermountain west, this is not just a western, federal land issue. Southern pine, jack pine, some hardwoods, and other ecosystems of the south, the midwest, and the northeast are also adapted to periodic surface fires, but restoring and maintaining natural fire regimes in areas with a multitude of private landowners is an even bigger problem than for the predominately federal timberlands in the intermountain west.

The social impact research can be separated into the four significant components of wildfire management: (1) firefighting preparedness (personnel and equipment); (2) fuel reduction; (3) initial attack; and (4) large-fire suppression. Questions include how much, of what type, when, and where, and what difference it makes in the ecological, environmental, social, and economic setting.

Wildfire management has traditionally focused on simple, straightforward policies—the 10:00 a.m. policy, the 10-acre policy, the “let-burn” policy. Why? The institutional structure of the wildfire management organization is probably the most rigidly hierarchical organizational structure outside the military. During large-fire suppression, which has dominated expenditures since the 1910s, this may well be necessary—time and clear lines of authority are often of the essence for firefighter safety, and questioning or debating decisions is infeasible and dangerous. The result is: simple (simplistic?) policies, a simple message (“Only you ...”), a focus on control, and belief in the desirability and feasibility of fire control.

Knowledge of the desirability of fire control has evolved over time. In the 1920s and 1930s, information about wildfire benefits was suppressed, for fear that it would encourage arson fires. Since the 1970s, broader public understanding of ecology and the natural role of fire in many ecosystems has led to acceptance of prescribed burning, even when

^c USDA Forest Service, Fire Modeling Institute, *Historical Fire Regimes By Current Condition Classes: Data Summary Tables*, version 2000 (Feb. 22, 2001); accessed at www.fs.fed.us/fire/fuelman/data_summary_tables.pdf on December 27, 2002.

the fire's cause was natural (the prescribed natural fire policy). Even as recently as 1988 (the Yellowstone fires), there was still a vigorous public outcry over not aggressively suppressing every fire. But by 2000, in the debate following Cerro Grande (the escaped prescribed fire that burned 235 homes in Los Alamos, New Mexico), the issue was not whether prescribed burning was wrong, but whether the timing and conditions had been appropriate.

Feasibility of control is a different issue. The feasibility of controlling wildfires, especially crown fires, is both always questioned and never questioned. Observations about our inability to contain raging infernos are commonplace, even among experienced firefighters. However, the idea of sitting around and waiting for the weather to change (or for the fire to run out of fuel) is anathema. Even though many of us suspect (and occasionally say) that firefighting makes little or no difference,^d we still put forth our best efforts to try to control catastrophic wildfires. Not only that, but we're still willing to "throw everything we've got at the fire" to try to make a difference. This approach is not really surprising, since not trying (and presuming that our efforts were largely a waste of time and money) would be the hypocrisy and cognitive dissonance on a grand scale.

The result is that most wildfire management professional experts are strongly biased with the belief that successful efforts—in preparedness, fuel reduction, initial attack, and large-fire suppression—are (or at least must be) both feasible and desirable. This biased expertise is reflected in many of the fire models used to assess all aspects of wildfire management. The influence of this biased expertise is more pronounced than in many other forestry specialties, because of the difficulties in conducting research into wildfire effects and control. Prescribed fires are often not useful for research purposes, because the weather and fuel conditions under which they burn typically do not reflect wildfire conditions. (If they did, they'd become wildfires, not prescribed fires.) Wildfires are often not useful for research, because the *a priori* weather and fuel conditions are generally not known; the conditions can sometimes be extrapolated after the fire, but local variations in fuels (loads, moisture, arrangement, etc.) and in winds make the validity of such extrapolations questionable. Conditions in wind tunnels and fire chambers can rarely duplicate the complexity of wildlands. And experimental wildfires are politically unacceptable. (Dr. Jack Cohen went to Canada for his experiments on protecting structures from crown fires.) Thus, the scientific basis for fire models is less developed than in many other areas, and models are therefore more likely to be based on biased professional expertise, belief, and expectations.

^d Interestingly, in congressional briefings in May and June of 2002, the agencies noted that they were likely to deplete their fire suppression appropriations sooner than ever before. The reason given was the severity of the 2002 fire season, which at the outset was worse than the severe 2000 fire season. No one seemed to question that it might be because they had more firefighters, trucks, helicopters, and airplanes than ever before, because of the substantial increase in appropriations for fire preparedness in FY2001 and FY2002.

Let's turn to the politics of wildfire management. Politicians need to be seen trying to do something about the problem. We have demonstrated that we can generally control fires in homes in cities and towns, why can we not protect homes in forests? The answer has to do with the relative cost and efficiency of concentrated vs. dispersed control organizations, as well as the ecology of wildfires in some wildland ecosystems. Ignoring perceived widespread problems (as well as real ones) is the surest way for a politician (local, state, or national) to get retired by the voters.

Nationally, forestry issues have traditionally focused on federal lands. This is largely the result of the debate over federal regulation of private forestry practices from the 1920s through the early 1950s that concluded with the federal role limited to encouragement/inducement of desirable forestry practices, and state regulation. Hence, federal control over forestry is limited largely to federal forestlands, and for wildfire management, the focus has been on the need to reduce fuels on federal (especially national forest) lands to protect private homes built in the forest (in the WUI). This leads to two concerns: (1) the effectiveness of fuel reduction to protect homes; and (2) the federal responsibility for protecting private homes on private lands.

The first of these two issues is largely one of scale and priority—how much fuel reduction is needed, and where. While substantially a fire science question, economics certainly has a role in such analysis and decision-making. Furthermore, this returns to the question of goals and priorities raised at the outset.

The second issue, however, cuts to the core of wildfire management (and most other governmental action)—responsibility for funding and for results. Traditionally, federal agencies were only responsible for wildfires on federal lands (plus lands protected under negotiated cooperative agreements); states had the primary responsibility for wildfire protection on state and private lands (including most of the WUI). Over time, especially with the development/expansion of the WUI, federal responsibility for wildland fire protection has evolved to include initial attack on fires that threaten homes near federal lands. This was partly a result of firefighting capacity, but also a recognition of funding capacity—the feds have always been seen as having a bottomless pit of money, particularly since funds for “emergencies” are not counted under annual budget caps, while nearly all states are constrained to balanced budgets by their state constitutions. In 1995, the FS and BLM revised their federal wildland fire policy to make it clear that states had primary (and exclusive) responsibility for wildfire protection on state and private lands, including homes in the WUI. The states (*via* the National Association of State Foresters) expressed serious doubts over their ability to fully absorb this responsibility, at least in the short run, and the federal agencies acknowledged that they would not ignore fires on state and private lands, while asserting that the states would have to improve their capacities for initial attack on wildfires in the WUI.

Rather than contracting, as might have been expected under the 1995 policy, federal responsibilities and funding seem to have expanded. Federal wildfire funding for preparedness and “basic” (non-emergency) firefighting on federal lands doubled in the wake of the severe 2000 fire season. Federal assistance to state and local governments for firefighting more than tripled (to nearly \$100 million annually), while a new federal

assistance program was established for communities affected by the fires in 2000, in addition to the existing Federal Emergency Management Agency disaster relief programs. There has been little information upon which to base rational decisions about fire financing, and as a result, the U.S. Government has spent, and continues to spend, billion of dollars on the problem; the conventional myth is that “the government pours money on the fires until they go out.”

Research is needed—lots of research on lots of different aspects of the problem. Research is needed on costs and effectiveness of various efforts—for preparedness, for fuel reduction, for initial attack, and for large-fire suppression—to inform public decisions about feasible goals and priorities. Research is needed to assess the consequences of alternative organizational and financing structures for wildfire management—for preparedness, for fuel reduction, for initial attack, and for large-fire suppression. The research needs to reflect the vast array of natural ecosystems and socio-economic conditions (*e.g.*, landownership patterns and government responsibilities), with the understanding that a wide variety of “answers” might be appropriate—that there is no “silver bullet,” no single, simple solution.

Manager's Response

Steven Eubanks

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Thank you for inviting me to share with you one Forest Supervisor's perspective on the challenges of managing public lands. I've always enjoyed spending time with researchers. One of my first postings as a district ranger was on a district with an experimental forest. I found that I benefitted and enjoyed my interactions with these scientists not just for the new knowledge they could share, but also for their different ways of looking at things. Coming to this meeting has reminded me of how much I enjoy that exchange.

I've been thinking about what I'd like my legacy to be as a public land manager, and I've come to the conclusion that I think I'd like to be remembered as someone who worked regularly to arrive at a consensus on how the public lands should be managed. I believe we can reach this consensus by talking about general goals, by working collaboratively to develop desired future conditions of our forests, and by focusing on promoting and sustaining healthy forest ecosystems.

When we talk about building consensus we know that it's much easier to accomplish at smaller more local scales than broader scales. At the project level, we know a lot about how to work collaboratively and build consensus because of the work of social scientists. At the project level you're working one-on-one with people, working on building the relationships necessary to achieve consensus. It's easy to go out on the ground, to actually look at the areas the project will affect, and to talk sensibly about our project options.

However, sometimes even at the project level there are times when you need to find a way to handle the radical fringe. This may necessitate marginalizing those radical, fringe individuals, remembering that although you may need to marginalize individuals, you don't want to just dismiss radical ideas either—remember Copernicus. Even though we know how to accomplish project-level consensus, we don't do it well and we don't do it consistently.

Reaching consensus at the forest plan level is very tough. We had a process outlined in the Sierra Nevada Framework that held the promise of being truly collaborative. The first meeting in Davis, California drew nearly 350 people representing a broad range of interests—these were people who were very knowledgeable and willing to contribute and work within the process outlined. However, Forest Service leadership changed, and we lost the commitment to a collaborative process. We then reverted to a traditional Forest Service planning approach, with much of the work being done by an agency planning team. The planning team pops in and out of its planning hole to update us on progress, but we've lost any thought of a truly collaborative process. People believed that with the Sierra Nevada Framework everything was in place to move toward consensus through collaboration, but we moved away from Framework. Why?

One reason we shy away from collaborative processes is that we've learned how one person can believe so strongly in their position that they sabotage the process. It's not that they think their position can win, they just want to be sure that the other position doesn't win either. Often they win by default just by stalling the process. This is what one reporter calls "tyranny of the minority."

Perhaps one of the biggest hurdles we face in public land management is a basic reality in our system today, the judicial system. Even when we have broad support for a process or outcome, one unsatisfied individual can take the issue to the courts and, with the unsympathetic judges we deal with (some would say hostile to the government), we lose on technicalities and the project is sidelined. There are literally dozens of technicalities and more come to light every week, so determined individuals have an advantage. The frustrating thing is that their challenges or the court decisions often have no real connection with the merits or quality of the project on-the-ground.

One other point I'd like to raise about public land management has to do with members of our society taking personal responsibility for our choices and their consequences. This includes taking responsibility for where we chose to build our homes, and taking steps to help manage the wildfire risk. When we look at the expanding wildland-urban interface, we know that wildland firefighters cannot protect the wealth of diverse benefits found in our forests if they are protecting homes. Somehow we need to get across the message that people must take personal responsibility for their property. Who takes care of the water values and wildlife habitat if we are protecting private property? There is no "insurance" for resources like there is for homes—so if we lose clean water or wildlife habitat, it can't be quickly replaced.

The responsibility message also includes taking responsibility for the impacts of our patterns of consumption. As an agency, we have become almost apologetic about timber products coming from our management. In California, over 75 percent of our forest products come from somewhere else. We can no longer ignore this fact, and need to have a dialogue about what this means for our public lands and forests around the globe. Sustainable management is a must, but we have to get beyond simplistic statements about "preserving" our forests.

Finally, I would like to also state one worry I have in focusing only on fire in sessions like this one. I think there's a danger that we can lose the ability to manage forests if we give the impression that we should only manage them if there is some connection with fire protection. I am becoming worried that our focus on wildfire management has shifted our priorities away from our true mission, to manage forests for sustainable, healthy ecosystems.

Synopses: Breakout Sessions

Compiled by

Tony Cheng

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Individuals

- **Individuals are embedded in social and cultural contexts** and this understanding is needed in order to motivate behavior. It is not enough to just measure perceptions, attitudes and distribute persuasion brochures.
- Individuals are **effective agents of change if they have appropriate resources and rewards**. One way to connect with individuals is through their networks and by paying attention to cultural relevance.
- **There is a disconnect in expectations of locus of responsibility** for risk management and protection between agencies and homeowners.
- What we know about “who” is out there in the wildland-urban interface is based on **conventional wisdom**—need to be more precise in understanding.
- Where and how do individuals **access information**, and how do they sort through conflicting information?
- We can measure and know a lot about individual attitudes and knowledge, but not nearly enough about **behavior**. Behavior may modify attitudes. So, what are the mechanisms of behavior change, how do they work, and why are they effective?
- Base federal fire management on improving natural landscape and ecosystem management rather than **scaring homeowners into action**.
- What is the **appeal of “forest health” vs. “fire risk”**? Making this distinction can help clarify public information and interaction.
- Individuals **do not process risk in the same way professionals do** (heuristics vs. probabilistic).
- **Assumption of rationality ignores the emotional aspect of fire** and can affect communication.

- **Identify and remove barriers to social learning** within a community.
- **Incentives for reducing risk**—is the money being applied towards the right actions?
- **Individual motivations for living in high risk areas and their adaptation strategies** given their awareness of risk. Is the individual looking outward from his/her structure to the landscape, or looking inward toward the structure from the landscape.

Communities

- The **meaning of community** has so many definitions which is confusing for managers and agencies. Fire is a spatial event, so default is spatial definition of community. In this way, community is often defined as a specific entity versus an “interactional field.” How are these two definitions related and how do these dual definitions affect the way resource managers define “community involvement.” Perhaps one way in which they differentiate is the “agency” within the community—motivations, rationale for action.
- Natural resource **managers are part of communities—but don’t know how to study and engage them.** The default is the rational actor model which focuses on individuals and community as an aggregation of individuals. Need help in defining community in different ways and engaging each definition in different ways.
- There are many **myths and romanticizations of communities.** One key point is that **community is a social construct** and is engaged in social construction of reality. External forces change communities (e.g., in-migration, fire, economic downturns), which in turn change how community is constructed and constructs. This is key in the context of increasing focus on community in natural resources management. For example, fire can galvanize or fragment communities. We need to know why. Fire also affects community identity and experience—which affects how communities engage in future decisions about fire and forest management. Perhaps it makes more sense to define “communities at risk” as ones with the least amount of capacity/capital to respond positively to fire events.
- “**Fire Adapted Communities**” is a useful concept for creating a typology for managers. From a biophysical perspective, it allows managers to assess the physical risks fire poses to the community. From a social science perspective it allows managers and communities to assess levels of capacity, readiness, or “agency” to create defensible space, institute landscape treatments, and/or other necessary steps.

- One trend that we may be seeing is that people's **quest for community is a choice** for many populations moving into the wildland-urban interface. Community institutions are more fluid (e.g., "binge-volunteerism," "thin"). People are not necessarily forced to engage in traditional community institutions ("thick") like schools, Scouts, churches, etc.. NR managers need to identify and figure out how to **work with these new emergent community institutions**.
- **Diffusion and adoption** of innovations is an extremely valuable concept to wildfire and community preparedness. There exist accepted methods that can be readily shared with managers.

Fire Across the Gradient

- We need to **move past isolating "fire social science" as its own distinct form**. It is an integral part of sustainable natural resource management.
- **Biological gradients may not be useful for social gradients**, such as rural ⇒ urban. This gradient is not a uniform continuum—different fire regimes, vegetative communities, population size, proximity to urban centers, length of residence, social capital, etc. Differentiation across gradients may not fit into policy, which creates a paradox: do not simplify or use generic descriptors. BUT...this creates problems for agencies which need to know how to proceed across the entire organization.
- Thinking in terms of "**gradients**" is important so that we can avoid the pitfalls of false dichotomies or classifications (e.g., definition of WUI). However, care must be taken because the gradient concept may not be universally appropriate.
- There is a need to **integrate existing and new data** (e.g., census, USFS inventory, plus ethnographies, focus groups) into studies that utilize social and biological conditions. Use a matrix format, for example: (Biological conditions) X (Social conditions). New social data for the cells can be generated by ethnographies, key focus groups, surveys, etc. There is a need to use same methods across regions to develop comparisons. Funding agencies can use such a matrix as evaluation criteria to leverage cross-gradient research. We also need to develop research plans where work accretes to a larger body of knowledge.
- **Cutting across gradients implies a collaborative process**, whether it is disciplinary, organizational, or environmental. First and foremost, increased/adequate resources will enhance both the quality/reliability of studies and the

ability to communicate information to stakeholders (e.g., publicly elected officials). But regarding collaboration itself, there is a need to revisit roles, expectations, and accountability across all involved—managers, public stakeholders, and researchers. Collaboration should not be confused with consensus. Collaboration may be more useful as a social learning process than a decisional process. But there is a tendency among resource managers to think of collaboration as a means to achieve a consensus around a preferred decision. There is a historically-rooted mistrust that we need to pay attention to up-front in any collaborative process. Lastly, cutting across all collaborative efforts to sustain natural resources is an unspoken paradigm of consumerism; historically, stakeholders simply demand more from resource managers and expect them to continue to produce/protect resource values. Stakeholders need to take more responsibility at the same time they are placing demands.

- **The scale of analysis needs to correspond to the scale of the issue/problem.** A one size fits all concept is not appropriate for dealing with complex/“wicked” issues and problems. By extension, centralized/hierarchical approaches may not be appropriate for all situations (such as community-based initiatives/collaborations).
- **Appropriate scales for different processes.** Collaboration may be appropriate at the neighborhood and landscape scale but what happens to the decision-making process when it is moved to the national scale? Are there other processes that are more appropriate or do we default to traditional processes (e.g., litigation, rational planning) when in fact they may produce less desirable outcomes?
- There is a need to understand how to **embrace uncertainty and stochasticity** in resource management decision-making. Adaptive management offers one important perspective—especially the emphasis on experimentation and learning. One concept that needs to be revisited is “desired future conditions”—it implies a singular, static future that may be unrealistic and sets up agencies for “failure” for not achieving desired future conditions due to unforeseen circumstances (stochastic events).
- The focus on public lands fire management needs to broaden to **recognize private land neighbors**. It may be that the greatest challenges to public land management are the rapid changes occurring on adjacent private lands—parcelization, demographics of owners, etc.

Culture and Ethnicity

- Within the realm of culture and ethnicity there is a need to share with managers the **sensitivities** regarding communication, research methods, and other forms of interaction. This will require a reorganization of how managers view formal and informal elements of community. It will also require a reorganization of our notions of within and between group memberships. Within groups we cannot assume homogeneity in attitudes, values, and behaviors. Between groups we cannot assume transferability of research methods, means of communication, or the values. Resource managers (and social science researchers) must begin working with the multiple groups to understand their perspectives. They also need to develop and apply **multiple strategies for interacting with multiple publics**.
- A **one size fits all concept is not appropriate** for dealing with complex/"wicked" issues and problems.
- One way for resource managers and researchers to understand culture is through the **concept of identity**.
- Claiming a **way of knowing** about land, resource, etc. defines identity.
- Certain environmental attributes and practices are **integral to producing and re-producing cultural identities**.
- Land management **decisions inevitably either foster or impinge upon cultural identities**. This may explain in part how/why environmental conflicts are so emotional and deep-seated.
- Acknowledging the **indigenous role** in what we consider "natural" opens the door to recognizing the role of humans' management of the ecosystem.

Policy, Political, and Institutional

- There is a universal perception that existing political/governmental **institutions and processes are not working**. The hierarchical, military structure of fire suppression has implications for communities and public participation in general. Other factors include: contracting, "analysis paralysis," the sole focus on fire suppression and fuels reduction. There are two indicators that the institutions and processes are not working: appeals and litigation—they are often the only courses of communication. Furthermore, the **training** by agencies does not match well with new challenges, especially in the context of downsizing and bureaucratic inertia. More training is needed for agencies in

terms of communication as well as allocating skills relative to changing demands.

- **Conventional wisdom** might suggest that certain groups are more litigious than others regarding forest management. Congress reacts to this “wisdom” in the form of policy change. The role of social science is to inform policy by proving or disproving the conventional wisdom and not just accepting current problem definitions to guide our research.
- There exist **multiple definitions and dimensions of the wildland-urban interface** that is context driven (i.e., no-one-size-fits-all) and is dependent upon varying biophysical characteristics as well as social characteristics and values.
- The **budget** forces all subordinate structures to adapt to its logic. Institutional and budgetary structures do not correspond to on-the-ground problems, which are complex and require flexibility. Similarly, centralized/hierarchical approaches may not be appropriate for all situations (such as community-based initiatives/collaborations). But we can not implement flexibility in institutional and budget structures without agreeing on the mechanisms for achieving accountability for outcomes.
 - e.g., interagency cooperation for sustaining natural resources requires flexibility, but is difficult to achieve because of dispersed accountability.
 - e.g., agencies can not spend dollars allocated to fire use (prescribed burning for fuels reduction) to achieve resource management goals.
- **Increased/adequate resources** will enhance both the quality/reliability of studies and the ability to communicate information to stakeholders (e.g., publicly elected officials). We also need people on the management side to transmit what we know. Technology transfer can be more of a face-to-face dialogue, but we also need to find more ways to express the benefits of social science research.
 - e.g., Fire Information Officers and Fire Marshall's Offices need information about variations in community responses they can expect during a fire, and the social needs after a fire.
- **“Stovepiping”** fire management separate from natural resource management might amplify this problem of rigid institutional/budgetary structures. The question is: who wins and who loses from such a structure (e.g., fire use benefits “early seral constituents” like cattle, elk, some kinds of birds). In fact, the kinds of institutions we have established such as the National Fire Plan may affect who “wins” and “loses” in some communities.

- **Institutional reward systems** both in agencies and universities encourage certain research questions and management outcomes that tend to emphasize how to efficiently achieve a goal, without questioning the goal itself. The irony is that there is quite a lot of research dollars available, but they are not for questions the agency does not want addressed. There is a premium on protocols and templates, which are efficient, but the goals themselves are taken-for-granted.

The Merging of Management and Science _____

Barriers to Manager/Science Merging —

- Manager access to research and researchers
- Cultural differences
- Promotion and tenure "boogie man"
- Narrow definitions of scholarly productivity
- Technology transfer not valued
- Line officers belief that there is no relevant research
- Lack of personal relationships
- Panel process values technology transfer
- Speed
- Office of Management and Budget, Institutional Review Board

Access/Opportunities for Merging —

- Timing
- \$\$
- New climate of managers—open to research, proactive, organizational change and decentralization of authority
- National Wildfire Coordinating Group, Social Science Task Force
- New acceptability of interdisciplinary research in the academy (e.g., *Society and Natural Resources*)

Models of Manager and Science Interaction and Cooperation —

- Field recognition of hitting the technocratic wall—social acceptability is central
- Multiple agency linkages and communication
- New skills and technology—GIS/imaging, communication, simulations
- Drive to democratize

Mechanisms for Interaction and Communication —

- Clearinghouse of research and researchers
- Intergovernmental Personnel Act assignments/ Memoranda of Understanding
- Interagency Fire Center (Boise)
- Outlets—*Society and Natural Resources*, *Journal of Forestry*, General Technical Reports, National Advanced Resource Technology Center
- Universities—researchers, extension, continuing education, “WICHE” (Western Interstate Commission for Higher Education) structures
- Regional Cooperative Ecosystem Study Units

New Institutional Forms Required —

- Resource Advisory Councils
- Watershed councils
- Citizen Monitory Groups
- Experimental events/replication (without controls)
- Passion

Actions – NOW

- “Introduction to social science” pamphlet
- Searchable expert roster
- Snowball the conversation and network of relationships
- Fire versus sustainable forest management

Actions – 1 YEAR

- Annualize this meeting with Manager/Science Roundtable
- Create local linkages
- Partner with ISSRM meetings
- Quick products (e.g., characterize WUI residents)
- Clearinghouse of research and researchers—terms of availability and access
- Quick questionnaire of management issues (e.g., top 3 issues and why are they tough)

Actions – LONG TERM

- Coordinate multiple site research
- Influence Joint Fire Science funding
- Evaluate “firesafing” programs—develop evaluation systems and methodologies
- Promote the Manager/Scientist merger

Closing Presentation

Jim Burchfield

University of Montana

What Did We Accomplish?

- Understand more about each other and the ongoing work in humans, fire and forests.
- Learned of the current need to apply social science and some strategies to cross the manager/scientist boundary.
- Recognized many of the barriers regarding the application of social science:
 - 1) Our own recognition of complexity and the contextual nature of problem solving make it difficult for research to “accrete.”
 - 2) Social science findings reveal difficult normative tensions. Fire is both good and bad:
 - Fire is good for the ecosystem.
 - Fire is good because it brings dollars to firefighters and rural communities.
 - Fire is good for firefighting institutions. It brings clarity of purpose, organizational cohesion, and confidence in the staff—plus huge budgets and stories to tell.
 - The media loves fire—drama, visuals, and heroes.
 - Fire is bad because it is destructive and dangerous. Firefighters die, houses burn, aesthetics change, smoke is created. It is also enormously expensive.
 - Because of the significance of context, social science will continue to be important to address this normative tension by asking when and where is fire good or bad, and particularly, for whom is it good or bad and why?
 - 3) Social science also reveals difficult policy disconnects, especially regarding actual roles of actors and the official statements of responsibility:
 - There is a social contract for agencies to protect private property, even though the responsibility officially is to protect resources.
 - The cost of fighting fires is not associated with other agency responsibilities, except to become a threat to normal operating budgets.
 - There are difficulties in addressing ecosystem or landscape level conditions affecting fire when social organization adheres to “jurisdictions.” The ability to clarify boundary responsibilities remains as a continuous challenge. Plus, there are different goals among those proprietary interests across the landscape for the management of the forest.

- 4) We can't separate the institutional behaviors from the policy environment. We also have to recognize the barriers presented by societal tensions for the purpose of public forests.

Where Do We Go From Here?

- Develop a framework for the integration of fire social science into sustainable forest management (“common language”).
 - 1) Matrix presented in the morning (critical gradients: characteristics and how they are applied geographically)
 - 2) Meta-analysis is possible
 - 3) Event driven model of social science measurements and analysis based on
 - Before fire event-preparedness at different social scales
 - During the fire-what managers do in addition to putting out the fire.
 - Post fire-recovery and linking fire to sustainable forest management.
- Foster communications protocols among ourselves and between managers and scientists
 - 1) Personal relationships of convenience
 - 2) Regularly scheduled meetings of social scientists
 - 3) Marketing, promotional materials
 - 4) Questionnaires and responses to managers
 - 5) Clearinghouse of research and researchers
- Advance a series of “Sesame Street” findings; the simple principles of how social science makes a contribution. Not only the principles, but explanations and descriptions of how these principles function in real world examples, such as:
 - 1) There are disconnects between people's attitudes and behaviors. Surveys might say that people want to have a fire-wise property, but they do not actually do it. This also allows us to explain the limitations of social science tools.
 - 2) Adoption of new behaviors is affected by the action of peers. We know a great deal about the diffusion model. It leads directly to implementation programs to reduce fire risks via fuel treatments. For example, apply a project at the neighborhood scale, rent a chipper for a group of neighbors to use.

- 3) Organizations and bureaucracies strive for efficiency and standardization. They move toward rigidity. As Incident Command teams have matured, they are predisposed to be insensitive to local needs. There is a trade-off between efficiency and adaptability.
 - 4) People have limited attention spans and cognitive capacities. Public meetings and collaborative processes can't last forever.
 - 5) People respond to positive incentives. They might treat their properties based on a desire to reconstruct naturalness and to obtain a desirable aesthetic.
- By developing a few well crafted "stories" of how well-researched social science principles have been applied, researchers can help managers recognize that the story isn't a recipe, but an inspiration for their own action.

Who Is To Do This? _____

Who is to do this and the various roles to be played need to be negotiated on the basis of the specifics of each organizational environment.

Summary Report

Courtney G. Flint

Penn State University

A. E. Luloff

Penn State University

Donald R. Field

University of Wisconsin-Madison

The January 2003 *Humans, Fire, and Forests* meeting was convened to discuss the role of social science in fire research and management. As indicated by Hanna Cortner, Don Field, and Pam Jakes earlier in these proceedings, the magnitude of the wildfire problem, the large infusion of research funds, and heightened research interest in the study of fire presents both a critical need and opportunity for collaborative social science research on fire. In response, forty participants from academic institutions, federal research and management agencies, and independent organizations gathered in Tucson for three days to share ideas about relevant, applied, social science research on fire. Interest in collaborations among researchers and managers on the relationships of people and wildland fire were central to these discussions.

Five theme papers and presentations were offered: Individuals; community; fire across gradients; culture and ethnicity; policy, political, and institutional issues. After these theme presentations, perspectives from management and policy makers were offered on how social science can assist public land managers in working with people on a broad range of resource management issues, including fire. Following these presentations, breakout groups met to discuss each of these themes and synthesize and distill fundamental points where social science plays a role and to highlight potential research outcomes. The discussions indicated considerable integration across perspectives and subject matter. Attendees found considerable common ground.

Thematic Presentations

Individuals: Terry Daniel (University of Arizona) presented a psychological perspective on the role of individuals in fire risk management. He contrasted technical assessments of probabilities of damage over space and time with public values and motivations regarding acceptance of fire risk. Risk awareness and perceptions of hazards are part of a larger context of value tradeoffs. The psychology of fire prevention and suppression differs from the more contemporary psychology of fuel management where multiple motivations come together to influence individual actions. He offered an alternative amalgamation of low hazard, good ecology, and high beauty motivations to move beyond the traditional, narrower frame of fear and safety for individual action.

Communities: Matt Carroll (Washington State University) and Steve Daniels (Utah State University) emphasized the dynamic relationship between community and fire. They established that our traditional examination of the effects of fire on communities needs to be balanced by an understanding of the reverse relationship. Fire is a socially constructed concept formed by the interactions between social institutions and complex events. These social constructions of fire affect recovery behavior within communities. Longitudinal studies, consisting of pre-fire, during fire, and post-fire experiences of particular communities, and multiple methods are needed to appreciate the feedback from the transformations and outcomes of community capacity which affect fire conditions.

Fire across the Gradient: Barbara Morehouse (University of Arizona) explored the use of gradients as an organizing concept for facilitating interdisciplinary research. A method was presented that bridged biophysical conditions (e.g., biomes, climate, and topography) with comparative studies across multiple levels of analysis using multiple perspectives and theories. Using this framework, scientists and managers can better identify and understand similarities and differences in the complex web of people, community and fire. One example of this methodology is discussed in more detail later.

Culture and Ethnicity: Carol Raish (USDA Forest Service-Albuquerque, NM) and Armando González-Cabán (USDA Forest Service-Riverside, CA) linked historical and contemporary perspectives to an exploration of fire use, management practices, and attitudes across and within cultural and ethnic groups. Central to their discussion was the notion that what happens on federal land affects adjacent land and vice versa. In the context of multiple ownership and values of forest resources, culturally sensitive research is needed to look beyond impacts to improvement and collaboration. In the name of respectful and fair representation across cultural and ethnic groups and/or constituents, the transfer of information, in both directions, is facilitated by use of innovative methods that involve local research partners.

Policy, Political, and Institutional: Tony Cheng (Colorado State University) and Hanna Cortner (Northern Arizona University) suggested that we needed to pay increased attention to both the context and the nature of problems related to fire as they are constantly changing. This problem is exacerbated by the fact that fire institutions are typically based upon outdated assumptions of problems and on the notion of rational action. Not surprisingly, there is a “disconnect” between federal and local priorities. Despite the merits of public collaboration being well known, the hierarchical fire industrial complex is not geared toward high public involvement. They asserted that positional rhetoric is systematic of a larger environmental policy and management debate.

Manager and Policy Responses: Ross Gorte (Congressional Research Service) highlighted the fact that wildfire management goals are not always compatible and are often ambiguous in application. The costs, benefits, and feasibility of fire reduction and prevention programs are not well understood. Policy is often based upon conventional

wisdom drawn from biased expertise and rarely reflects the diversity of contexts in which fire is experienced. For example, there is a divergence between urban fire experience and wildland fire experience, suggesting that clarity is needed to articulate appropriate responsibilities and priorities for effective fire management.

Steve Eubanks (USDA Forest Service-Tahoe National Forest) addressed the problem of reaching consensus regarding fire and forest management. While consensus is easier to reach at the project level by marginalizing the radical fringe, consensus at the forest plan scale is tougher. Eubanks lamented the power of minority interests with nothing to lose. In addition, the role of personal responsibility was raised as an important theme. A disconnect between public expectations and personal consumption has led to competing interests. Reframing the issue around sustainable management of healthy forests may help to bring the role of personal responsibility and product consumption into focus with fire management.

Discussion

A number of central themes arose in the thematic discussions. The concepts of context and scale were seen as important for framing specific areas of contribution. There was broad recognition that appropriate levels and units of analysis should be articulated for different problems. For example, the development of fire management plans might be handled at the county level, whereas project implementation and interaction with landowners might be more successfully focused on a community or neighborhood scale. Moreover, the adoption of a multiple-method framework for addressing fire problems was seen as necessary to uncover contextual differences across space and time and also to engage in collaborative research.

There was general agreement that a framework or organizing matrix was needed for the conduct of these studies. This matrix would be built around the variety of gradients and thematic intersections associated with the human dimensions of fire, as well as fire's biophysical considerations. A preliminary outline for such a matrix is offered at the end of this summary.

A recurring theme throughout the meeting was that many of the assumptions made about the human dimensions of fire are based upon conventional wisdom. Since such assumptions often play important roles in shaping policy and the implementation of management decisions, social science has an obligation to test them. Concern over the false application of conventional wisdom was raised in a number of contexts: (1) Who actually resides in the wildland-urban interface? (e.g., what are their socio-demographic characteristics?); (2) how are communities affected by fire, and how do they affect fire?; (3) what are the repercussions of the assumptions of homogeneity across cultural and ethnic groups and how do they affect our ability to generalize findings?; and (4) how do we properly reach conclusions about the social impacts, costs, and benefits of fire management?

Concomitantly, a number of disconnects were highlighted that have led to consternation and frustration on the part of researchers and managers alike:

- Federal objectives vs. local priorities
- Organizational and jurisdictional aspects of fire management vs. interactional aspects of community
- Knowledge and perception vs. behavior and action
- Technical knowledge vs. local perception and knowledge
- Spending directives vs. opportunity costs in a larger context
- Probability of damage vs. individual and community values

The notion of rationality in decision making and actions was questioned and the legitimacy of social constructions of meanings of fire and community were highlighted as having significant influence. Local and historical experience was seen as playing an important role in the creation of community narratives and identity. Experience and identity were seen as influencing decision-making and the impacts of and for fire.

Fire was seen as both a galvanizing issue (as therapeutic aspects of community emerge) and as a disintegrating factor (as priorities clash leading to litigation and general disagreement). A need was articulated to look at variations in attitudes and practices, both across and within cultural and ethnic groups, as well as across society. Sensitivity is crucial, both in research and in collaborative management of forest resources and fire issues. Collaboration and technology transfer were repeated areas of discussion and many different methods and examples were raised.

The adoption and diffusion of innovations was seen as a function of community capacity. However, the costs, benefits, and feasibility of different decisions and policies were not seen to be well understood. The political dimensions of fire issues were discussed including the constant presence and power of rhetoric.

A number of meaningful outputs will be generated as a result of this conference and efforts are being made to connect the efforts here to other forums for further discussion and collaboration. Subgroups have been formed to discuss the framework or matrix across fire issues as well as the production of contextual anecdotes/narratives that illuminate the intersections of critical issues as experienced in practice. Workshop proceedings and summaries will be disseminated and a special issue of *Society and Natural Resources* will be devoted to the meeting themes. A website is being developed to allow for further interaction among researchers and managers and will include an outline of individual and collaborative research interests. Upcoming meetings will provide venues for continued discussion, including panel presentations at the 2003 Natural Hazards Workshop, the 2004 International Symposium on Society and Resource Management (ISSRM) meetings, and a 2004 conference in Madrid regarding fire economics and strategic fire planning and management.

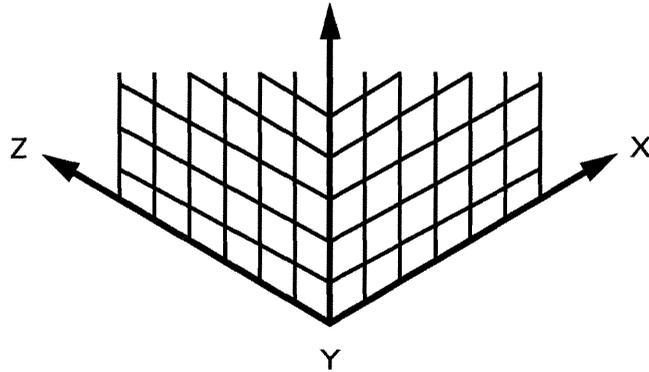
Conclusion: Towards A Matrix Approach for Social Science Contributions to Applied Fire Management

The range of issues and concerns identified by the attendees suggested a need for some organizing mechanism for social science research associated with fire management. Too many incompatible studies have been and are being conducted which prohibit an accretion of findings. This is traced to the absence of a common methodological frame. To help address this issue, and because it is impractical and prohibitively expensive to mount a study of all forest-fire situations in the nation, the group opted to use a typological framework to identify case studies. A typology is an abstraction of reality that allows the researcher to maximize similarities while minimizing differences among a set of cases. This facilitates analysis in that representative cases can be identified for in-depth study. Typologies are used to organize data; they represent a conceptual model useful for guiding research and developing policy.

Our typology of the human/fire intersection relies on the identification of several key dimensions: (1) Biophysical conditions (including land use and cover; topography; climate; and soils); (2) socio-demographics (including population size and characteristics; migration; densities; development patterns; and housing characteristics); (3) social, cultural, and ethnic considerations (including patterns of use; jurisdictional relationships; traditions; attitudes; perceptions; organizations; and institutions). Embedded within, and integrated across each of these dimensions, are concerns about fire experiences, levels and units of analysis, public policy, and property-rights issues. Moreover, temporal and spatial dimensions are seen as critical.

Utilization of a typology helps provide a resource-based coherence to help frame multiple sets of criteria (e.g., regional, strategic, and/or ethnic differences in response to fire threats and emergencies) for analysis. Proper conduct of studies using this typology would require the use of a multi-method protocol, one based on both qualitative and quantitative techniques, as well a plurality of theoretical approaches. As a result of using this set of core vectors, studies would be compatible and nested, and as a result would make a more significant contribution to our knowledge. The accompanying figure on page 86 provides a heuristic model of this typology. We view this typology as a useful framework for organizing the heterogeneous characteristics of fire management, both for the wildland-urban interface and in a much broader, societal level context.

It is hoped that the preliminary matrix described above can initiate further discussion about how a collaborative research process can be framed. By linking our research both within and across specific cells and dimensions, we can begin to accrete our collective knowledge and offer a rich and coherent framework for applied social science and fire research.



Heuristic Typological Framework for Social Science
Contributions to Fire Management

Where -

- Z = Social, Cultural, and Ethnic Considerations (with cells identified for patterns of use, jurisdictional relationships, traditions, attitudes, perceptions, organizations, and institutions);
- Y = Biophysical Conditions (with cells identified for land use, land cover, topography, climate, and soils); and,
- X = Socio-demographics (with cells identified for population size, population characteristics, migration, density, development patterns, and housing characteristics).

Agenda

Humans, Fire and Forests: Social Science Applied to Fire Management

January 28-31, 2003 — Best Western Inn at the Airport — Tucson, Arizona

Tuesday, January 28 —

6:00-7:00 Cash Bar and Open House

7:00 Dinner

Wednesday, January 29 (Moderator, Hanna Cortner) —

8:30-9:00 Welcome, Introductions, Logistics

9:00-9:30 Theme 1 Paper: Individuals
Presenter: Terry Daniel, University of Arizona

9:30-10:00 Theme 2 Paper: Communities
Presenters: Matt Carroll, Washington State University
Steve Daniels, Western Rural Development Center, Utah State University

10:00-10:30 Break

10:30-11:00 Theme 3 Paper: Fire Across the Gradient
Presenter: Barbara Morehouse, University of Arizona

11:00-11:30 Theme 4 Paper: Culture and Ethnicity
Presenters: Carol Raish, USDA Forest Service
Armando González-Cabán, USDA Forest Service

11:30-12:00 Theme 5 Paper: Policy, Political, and Institutional
Presenters: Tony Cheng, Colorado State University
Hanna Cortner, Northern Arizona University

12:00-1:15 Lunch

1:15-2:30 Breakout Sessions for Theme 1 (Individuals)
The goals of the breakouts are to 1) synthesize what is known about the theme, 2) address the “so what” question (even if we know it, what are the implications for policy and management?), and, 3) discuss potential collaborations and innovations to move forward needed research on the theme.

- 2:30-3:00 Break
- 3:00-4:15 Breakout Sessions for Theme 2 (Communities)
- 4:15-5:00 Report-outs for Themes 1 and 2
- 7:00 Dinner

Thursday, January 30 (Moderator, Pam Jakes) —

- 8:30-9:15 Manager/Policy Responses/Perspectives
 Presenter: Ross Gorte, Congressional Research Service
 Presenter: Steve Eubanks, USDA Forest Service
- 9:15-10:30 Breakout Sessions for Theme 3 (Fire Across the Gradient)
- 10:30-11:00 Break
- 11:00-12:15 Breakout Sessions for Theme 4 (Culture and Ethnicity)
- 12:15-1:30 Lunch
- 1:30-2:45 Breakout Sessions for Theme 5 (Policy, Political, and Institutional)
- 2:45-3:15 Break
- 3:15-4:15 Report-outs for Themes 3-5
- 4:15-5:30 Open Space—organized by participants
- 7:00 Dinner

Friday, January 31 (Moderator, Don Field) —

- 8:30-9:30 Synthesis: Tying the Themes Together
 General Discussion
- 9:30-10:00 Break
- 10:00-11:00 Research Issues and Opportunities
 Issues such as Obtaining human subjects for OMB approval, gearing up for the 2004 Symposium on Society and Resource Management (ISSRM), Natural Hazards conference, special issue of *Society and Resource Management*. Final list to be developed during workshop by participants.

ERI Papers in Restoration Policy

11:00-11:45 What Did We Accomplish? Where Do We Go From Here?
Who Is to Do It? Roles for Agencies, Universities, Extension,
Communities?

Presenter: Jim Burchfield, University of Montana

General Discussion

11:45 Adjourn

Workshop Sponsors: National Park Service Intermountain Region, Northern
Arizona University, University of Wisconsin-Madison, USDA Forest Service North
Central Research Station, Western Rural Development Center

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ERI Papers in Restoration Policy

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ERI Papers in Restoration Policy

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Participant Research Interests

Compiled by

Jonathan Taylor

U.S. Geological Survey

Co-Chair, NWCG Fire Social Science Task Group

Absher, Jim

Contact information on page 91

1) Impacts of wildfire on tourism, 2) pre-attitudes of fire: beliefs and values, 3) acceptability of management actions relative to situational influences, 4) qualitative assessment of fire imagery, especially Smokey Bear, 5) communication effectiveness of wildland fire messages.

Becker, Dennis

Contact information on page 91

Economic Utilization of Small Diameter Timber - Research on the economic efficiency of harvesting systems to remove small diameter timber in the Southwest U.S. Research also includes product grade and quantity recovery of small diameter timber and the identification and development of consumer markets for such products with particular emphasis on community development opportunities.

Collaborative Partnerships to Effect Forest Restoration - Research on the development of collaborative planning efforts with an emphasis on measuring progress and in developing a peer-to-peer training program to increase capacity for community and agency involvement in collaborative planning.

Bender, Holly

Contact information on page 91

Current research focuses on understanding individual decision-making (public input) regarding fire and fuels management issues. This considers values, tradeoffs and goals/objectives conflicts and how this influences/explains behavior. This work is being implemented in Region 2/Manitou Experimental Forests/Pike San Isabel and Region 3.

Burchfield, James

Contact information on page 91

Fire and Communities: Project to develop an event-driven model to describe simple monitoring protocols for agencies and local governments that capture community-level concerns prior to a fire, during a fire, and after a fire. This project is also evaluating community-level responses to wildfires based on both comparative case studies and surveys. Working with Matt Carroll, Steve McCool, and Dan Williams on this project.

Social acceptability of fuel treatments on western public lands: Identified research questions for social science regarding fuel treatments as organizer and host of a conference in Missoula, Montana, in October 2000.

Utility of Geospatial Data in Wildland Fires: Completed a field study of the use of GIS and GPS data on wildland incidents in summer 2002 in conjunction with the National Center for Landscape Fire Analysis and the Geospatial Task Group (GTG) of the National Wildfire Coordinating Group (NWCG).

Burns, Sam

Contact information on page 91

Conducting 30 focus groups in Western Colorado on community definition of the "fire problem," values at risk, how to expand community dialogue, and desires and preferences regarding fire prevention messages and methods.

Chavez, Debra

Contact information on page 91

Current research in fire-prone outdoor recreation sites which determines fire-related constraints to outdoor recreation as well as perceptions about fire management strategies.

Contact outdoor recreation visitors at high fire risk sites to acquire their perceptions about fire, fire risks, recreation behavior, and fire management strategies. Work is conducted in cooperation with Dr. Bill Hendricks, California State Polytechnic University at San Luis Obispo.

Cheng, Tony

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Current Fire Social Science - *Improving forest policy, planning, and management decisions at the landscape scale:*

Clarification: Decision-making at the landscape scale (e.g., watershed, bioregion) can be improved when stakeholders collaboratively work to clarify the problem situation, share information, jointly develop and analyze possible courses of action, share implementation responsibilities, and learn through monitoring and evaluation.

Projects:

Key stakeholder assessment for forest thinning in Colorado's Front Range public forest lands, funded by McIntire-Stennis Program 2000-2005.

- Identify outcome frames held by key stakeholders
- Systems view of the relationship forest conditions, fire, and thinning held by key stakeholders.
- Assessment of behavioral strategies of key stakeholders in collaborative planning process.

Designing, facilitating, and evaluating Collaborative Learning workshops on historic and current forest and wildfire conditions, and possible future courses of action, funded by McIntire-Stennis Program 2000-2005.

Development and implementation of a community-based peer-to-peer training program to improve collaborative planning efforts to reduce wildland fire risks, proposal submitted to 2003 Joint Fire Sciences Program.

Primarily conducting research in the design, implementation and evaluation of community-based collaborative approaches to managing wildland fire risks to communities and public environmental resources: Interface with policy and institutional change within federal land management agencies.

Collins, Tim

Contact information on page 91

Dissertation research - *Sustainable Responses to Human Ecological Crisis on the Mogollon Rim, Arizona*: includes the topic of wildland-urban interface fire hazard—specifically, second home development and the relationship between the Phoenix Metropolis and the production of environmental crises on the Rim, with an explicit consideration of both human and environmental spatial and temporal trends. Social science questions: 1) what are the individual and group characteristics of Mogollon Rim landscape stakeholders and how do these characteristics map over space; 2) what are the constraints placed on the transfer of stakeholder human ecological knowledge into sustainable actions; 3) What can be done to increase knowledge and minimize constraints?

Thesis research - *Individuals and Wildland-Urban Interface Fire Hazard*.

Based on a survey of wildland-urban interface homeowners in a Sierra Nevada foothill community, and focused on environmental values, hazard perceptions, and property level adjustments to fire hazard.

Findings: the values that attracted residents were essentially those that produce extreme fire hazards; residents typically underestimated what is in actuality extreme hazard; in general, residents did not make the adjustments needed to minimize risks on their properties; specifically, lower income and renting residents had similar hazard perceptions but made less fire-safe adjustments than higher income and home owning residents; residents of larger parcels were not capable of effectively managing vegetation on their properties.

Cortner, Hanna

Contact information on page 92

Current Research - The institutional, policy, and political aspects of ecological restoration more generally, and fuels reduction more particularly.

Public Acceptability. Current research on synthesis of previous research on public attitudes and perceptions of fire management options. Previous survey research examining public attitudes and perceptions toward alternative fire management practices and alternative policy tools for preventing and mitigating wildland-urban fire hazards.

Previous and ongoing research - *Institutional and Policy Factors:* Examining the institutional and policy barriers and incentives to formulating and implementing ecological restoration projects more generally and fuel reduction programs and projects more specifically. Examination of the Forest Service's mutual aid and emergency services responsibilities in light of the growing severity of wildland-urban interface issues.

Risk: Previous research on risk attitudes and perceptions of homeowners toward fire hazards, Previous research on the risk perception of fire managers.

Member, National Fire Protection Association, Technical Committee on Rural and Wildland Protection, 1990-1994; National Academy of Science/National Research Council, Committee on Natural Disasters, 1988-1991

Daniel, Terry

Contact information on page 92

Lay ("public") perception of fire hazard and preferred tradeoffs among "safety," aesthetic, "naturalness," and economic outcomes of specific alternative risk management actions (especially fuel treatments).

Davis, Charles

Contact information on page 92

Research on 1) Intergovernmental aspects of wildfire policy in urban/wildland areas, 2) compatibility of Forest Service organizational culture with changing policy initiatives/expectations.

Field, Don

Contact information on page 92

Title - *Human, Lakes and Forests:* The study is an examination of the similarities and differences between seasonal and permanent landowners and their communities on a variety of resource management issues. The work takes place in northern Wisconsin in a forested region in transition from extractive resource dependency to amenity-based dependency.

Flint, Courtney

Contact information on page 92

Penn State University and USFS/PNW Station. My dissertation research is on community risk perception and community action regarding forest risks on Alaska's Kenai Peninsula. My broader interests connect natural resource sociology with disaster and risk research.

Fowler, Cynthia

Contact information on page 92

I have been selected to be a research ecologist/forester in the disturbance work unit of the USDA Forest Service's Southern Research Station in Athens, Georgia. However, that position is contingent upon congressional budget approval. In the meantime I am working through a contract with Auburn University to author entries for the online encyclopedia of southern fire science which is the project that I will be a senior editor for if/when the research ecologist/forester position is funded. I also teach anthropology at Wofford College in South Carolina (near my home).

González-Cabán, Armando

Contact information on page 92

Current research - Research on whether *culture/ethnicity* affects individuals' and communities' *attitudes* and *perceptions* toward fuels reduction programs; also whether the vehicle of survey implementation affects response rates and willingness to pay for such programs. Doing additional work on decision-making processes in wildfire suppression events, particularly by incident commanders.

Previous research with paper surveys and telephone interviews have shown that there is support for the implementation of many of the fuel treatment programs. I have started a new line of research trying to determine whether the *vehicle of survey implementation* (a video versus telephone interview) *affects response rates* and *willingness to pay* for different fuel treatments programs.

Problem of the high risk of wildfire damage in the urban wildlife interface: Currently there is no procedure to evaluate the economic implications of risk mitigation factors in the urban-wildlife interface. A new project using conjoint analysis to evaluate the economic trade-offs associated with wildfire risk reduction in the urban-wildlife interface was started. One major problem facing wildland fire managers is the ever increasing cost of fire suppression. Managers are trying to find better ways to control these expenditures, which requires understanding the decision processes during a wildfire event. An approach for representing wildfire incidents is to codify them in terms of decision modeling techniques. The formal representation of a fire incident could identify the various options that appeared open to the decision maker(s), the information at hand, the sources of uncertainty, the values at risk, the trade-offs inherent in the problem, and the potential outcomes ensuing from various courses of action. This research proposes development of a decision modeling approach for analyzing wildland fire incidents.

Gorte, Ross

Contact information on page 92

Current research on congressional authorization and appropriations related to wildfire management and on Administrative programs and proposals affecting wildfire management at the federal/national level.

Past work on/interest in fire effects appraisal.

Hodgson, Ronald

Contact information on page 93

Application of communication theory and principles to fire and land management. How people and groups of people acquire and process information especially to cope with threats. How disturbance influences social communication networks (interpersonal networks). Communication and environmental perception and behavior.

Hoover, Anne

Contact information on page 93

Current Research - *USDA Forest Service R&D National Fire Plan (NFP) Coordinator for Community Assistance:* Provides Forest Service national support and coordination of NFP funding for community assistance research.

Jakes, Pam

Contact information on page 93

Current Research - *Diffusion of Innovative Fire Planning: Communities Sharing Strategies to Reduce Risk and Loss from Catastrophic Fires*: With Victoria Sturtevant, Southern Oregon Univ., and Sarah McCaffrey, NCRS, Evanston to looking at successful community-focused wildfire education programs. Interest is in how features of fire programs (e.g., simplicity and divisibility) interact with social and ecological settings (e.g., social capital and fire frequency), and measuring success via changes in homeowner perception of risk and preparedness behavior (e.g., creation of defensible space) and adoption by the community (planning for wildfire). Programs being considered for inclusion in the study include TNC Fire Learning Network, FireWise Communities, FireSafe Councils, FireFree, and the Student Conservation Association.

Managing Fire Across Boundaries—Essential Elements For Collaboration. Applied for JFS funding to work on identifying essential elements of successful collaborative wildfire management, and developing tools to build and sustain these relationships. To accomplish these tasks we will conduct six case studies addressing research questions about critical collaborative activities such as: 1) developing outreach, 2) building relationships, 3) conducting civic science, 4) managing across boundaries, 5) sustaining collaborative efforts, and, 6) developing indicators of success.

Previous Research - *Community Preparedness for Wildfire*: Study funded by the National Fire Plan to identify the activities communities are undertaking to increase wildfire preparedness and to identify the resources necessary to support these activities; 15 cases across the country in communities that range in preparedness and resources from OR and WA to MN and WI to NY and NJ to FL and TX. Cooperators include Linda Kruger, Pacific NW Research Station; Victoria Sturtevant, Southern Oregon Univ.; Kristen Nelson, Univ. of Minnesota; and Martha Monroe, Univ. of Florida The latest information on this study can be found at: www.ncrs.fs.fed.us/4803/Highlights.htm; paper copies available from P. Jakes.

Kent, Brian

Contact information on page 93

Collectively the research of Wade and Ingrid Martin, Holly Wise, and Carol Raish includes the fire social science I play a role in.

Kruger, Linda

Current and developing interests -I have been working with Pam Jakes and others on a community capacity and fire preparedness study. I am interested in innovation and adoption of new ideas and approaches. What are the conditions that enable innovation and that enable diffusion and adoption of those ideas in other locations. I am also interested in exploring the use of different public participation processes in developing and implementing treatment plans. This research could be done as a companion to bio-physical research studying difference applications on the ground.

Titles and clarifying questions:

- 1) *Community Capacity and Fire Preparedness*. What are the conditions, factors, qualities that enable and facilitate community action?
- 2) *Innovation, adoption and diffusion of fire preparedness activities*. What conditions facilitate innovation and community action and how do new ideas take wing and sprout in additional locations?
- 3) *Public participation in fuels treatment projects*. How successful are different approaches to public participation used in conjunction with fuels treatment planning and does public participation contribute to development and implementation of fuels reduction programs and if so how?

Previous/current fire social science work:

I have been working with Pam Jakes, Vicky Sturtevant, Kristen Nelson, and Martha Monroe, Shruti Agrawal, and Erika Lang (Pam Jakes is PI) on a community preparedness study. I have been working directly with Vicky Sturtevant doing five case studies in Washington, Oregon and Montana.

Luloff, Al

Contact information on page 93

Sustainable forest management, risk perception and management differences in the Kenai; Knowledge and use of Montreal criteria by forest landowners.

Ingrid, Martin

Contact information on page 93

Research focuses on understanding individual decision-making (public input) regarding fire and fuels management issues. This considers values, tradeoffs and goals/objectives conflicts and how this influences/explains behavior. This work is being implemented in Region 2/Manitou Experimental Forests/Pike San Isabel and Region 3.

Martin, Wade

Contact information on page 93

Research focuses on understanding individual decision-making (public input) regarding fire and fuels management issues. This considers values, tradeoffs and goals/objectives conflicts and how this influences/explains behavior. This work is being implemented in Region 2/Manitou Experimental Forests/Pike San Isabel and Region 3.

McCaffrey, Sarah

Contact information on page 93

Current Research - *Modeling People's Responses To Stand And Landscape Level Treatments For Preventing Wildfires and Restoring Fire-Affected Areas*. Series of studies to assess current public views of fuel treatments, factors that affect those views, and regional similarities and differences.

For Want of Defensible Space a Forest is Lost: Homeowners and the Wildfire Hazard and Mitigation in the Residential Wildland Intermix at Incline Village, Nevada: Study using natural hazards and diffusion of innovations theory assessing effectiveness of a wildfire education program and factors associated with success and more progressive views.

Morehouse, Barbara

Contact information on page 94

Current and Developing Interests - Institutional analysis, co-production of science and policy, knowledge/technology transfer.

Integrated modeling of fire-climate-society interactions in the U.S. West: I am conducting research aimed at determining links between perceptions of wildland fire risk among managers and residents of fire-prone areas and decision processes. This research is being used to inform development of a web-served geospatial model that produces fire risk maps for strategic planning.

Fire-climate knowledge transfer: I have been actively involved for the past four years in effecting knowledge transfer between fire managers, fire scientists, and climatologists, with the goal of improving the production and use of climate information in wildland fire management.

Comparative studies of wildland fire-societal interactions: This is a developing area of interest. I am interested in conducting research that compares and contrasts fire risk in selected study areas, from the following perspectives: a) identification of the range of options deemed to be acceptable for managing for fire risk, b) community identity formation and construction of narratives about fire risk within the natural landscape of the study areas, and, c) capacity to co-produce science and policy with regard to wildland fire risk management.

Moote, Ann

Contact information on page 94

Current Research Projects - Southwest community forestry needs assessment: An interview-based, regional assessment of the types of communities involved in forest-health-related projects, their goals and activities, and challenges they are facing.

Multiparty monitoring of forest restoration projects: Working with a team of researchers developing and field testing a multiparty monitoring manual for community-based collaborative groups in the Southwest.

Research Interests - Collaborative and community-based institutions: How do collaborative and community-based approaches to natural resource management (especially restoration and fuels abatement) interface with more traditional governance structures and power networks?

Accountability: New approaches to fire management based on decentralized decisionmaking, collaboration, and flexibility raise concerns re: decisionmaking authority and national standards—how are these being addressed?

Raish, Carol

Contact information on page 94

Current Research - Evaluating Community Knowledge, Beliefs, Attitudes, and Preferences Concerning Fire and Fuels Management in Southwestern Forest, Woodland, and Grassland Ecosystems.

Project with Wade and Ingrid Martin of California State University, Long Beach, and Holly Bender of Integrated Resource Solutions to design and implement data collection and analysis on the forests and grasslands of the Southwestern Region, USFS, concerning community knowledge, attitudes, practices, and preferences on prescribed fire as a vegetation management and restoration technique. This information will be provided to land managers in various, user-friendly formats.

Evaluating the Role of Fire in the Southwest: Historical Background.

Projects with Carol Condie of Quivira Research Associates and Thomas Merlan, Consulting Historian, to provide reviews of both published literature and unpublished, archival sources on historical fire use and attitudes of Native American, Hispanic, and early Anglo-American communities in the Southwest.

Ribe, Rob

Contact information on page 94

Exploring how visual imagery and cognitive information interact in influencing perceptions of alternative timber harvests and forest treatments across ideological groups. No current Fire related research.

Sturtevant, Victoria

Contact information on page 94

Current Research - Community-based efforts at fire planning. Case studies of communities with public education and incentive programs preparing for and reducing risk of wildfire to property and natural resources with special attention to the role of community capacity and agency collaboration.

Diffusion and adoption of innovation fire planning. Evaluation of community wildfire planning programs and networks as to their effective adoption and “fit” in communities with varying ecological and social conditions.

Taylor, Jonathon

Contact information on page 94

Current activities -

- 1) Co-Chairing the NWCG Fire Social Science Task Group. This Task Group has been created to facilitate communication between Fire Management and Social Science researchers.
- 2) Studying motivation for WUI residence, focus groups on fire preparedness, knowledge and actions. Conducted focus group discussion in Los Alamos regarding the Cerro Grande fire, and focus group plus short survey in Jackson/Wilson, WY regarding the Green Knoll Fire (2001).
- 3) Proposed research on Fire Incident communications with Ron Hodgson, Judith Downing, and Shana Gillette.

Past Activities - Studied effects of Prescribed Fire and Severe Wildfire on public perceptions of Scenic Quality and Recreational Acceptability of forest areas (dissertation, Terry Daniel, dissertation director). Collaborated with Cortner, Carpenter, Cleaves, and Zwolinski on studies of public response and acceptance of Prescribed Burning (telephone survey), of Fire Managers risk-taking/ risk-avoidance and the influence of factors (safety, resources at risk, information reliability) upon fire management decisions.

Vaughn, Jacqueline

Contact information on page 95

Assessing the role, process, impact of administrative appeals and litigation on forest policy; development of a national database of appeals since 1997.

Forest Service Administrative Appeals and Litigation - This research focuses on the nature, impacts, and outcomes of appeals and litigation related to Forest Service projects nationwide. It includes the development of a database of appeal decisions since 1997 and analysis of case studies of decisions and stakeholders.

Learner-Center Education on Ecological Restoration - This is a two-year project to develop undergraduate/graduate level courses in ecological restoration and fire/forest social science from a political/policy perspective.

Publication in Progress - Vaughn, Jacqueline. 2003. *Show Me the Data!—Wildfires, Healthy Forests, and Administrative Appeals*. (Paper prepared for delivery at the *Western Political Science Association* annual meeting, Denver, March 2003).

Watson, Alan

Contact information on page 95

Mapping relationships/values and documenting trust, commitment, social responsibility and public purpose perceptions for landscape level, multi-jurisdictional fuel treatment projects; restoring/protecting traditional relationships with complex systems.

Williams, Dan

Contact information on page 95

Current Research - Adaptive management and effectiveness monitoring of the social/community effects of the 2000 fires in the northern Rockies. Currently planning a survey of four case study communities and analyzing data collected during the summer of 2002 to evaluate this model as a framework monitoring for community/social dimensions of fire recovery efforts (with Burchfield, Carroll and others).

Potential/Developing - Public Perceptions and Collaborative Strategies for Community Protection and Ecosystem Restoration on Colorado's Front Range: In one form or another I will be providing social science research support for the newly formed "Colorado Front Range Fuels Treatment Partnership," which will likely involve analyses of public perceptions related to wildfire as well as collaborative activities of stakeholders in addressing fuel treatment (with Brian Kent and others).

Improving Interaction and Communication Between Type I Wildfire Incident Command Teams and Local Authorities During and Immediately After Large Residential Interface Fires: If funded, this project would employ a "rapid response" strategy to systematically observe and describe the interactions of Type 1 teams and local entities during a large fire suppression event with the aim of identifying the factors that contribute to effective local coordination and response to the event (with Burchfield and Carroll).

Wise, Charles

Contact information on page 95

Current work has been on implementing the national fire policy-management aspects, with a focus on risk and accountability as they affect federal managers. Currently working on case studies of how communities are organizing for wildland fire prevention.

Implementation of U.S. national fire policy: The focus has been on the organizational and management factors of federal land management agencies that have affected and are affecting the implementation of the National Fire Policy. One study focused on management and fire context factors that involve risk and accountability and how they affect the implementation behavior of federal managers.

Community Mobilization for Wildland Fire: The focus of this study, which is now underway is on what communities are doing or failing to do to prepare themselves to deal with wildland fire in the pre-fire, during fire, and post-fire phases. It compares the activities and characteristics of several communities in Arizona and California.

Fire Publications Bibliography

Compiled by

Jonathan Taylor

U.S. Geological Survey

Co-Chair, NWCG Fire Social Science Task Group

- Burchfield, J. (ed). 2001. *National conference on social acceptability of fuel treatments on western public lands*. Proceedings. School of Forestry, University of Montana. Missoula, MT. 90 p.
- Burchfield, J., T. Miller, L. Queen, J. Frost, D. Albright, and D. DelSordo. 2002. *Investigation of geospatial support of incident management*. Bolle Center for People and Forests and the National Center for Landscape Fire Analysis. University of Montana, Missoula, MT. 36 p.
- Carpenter, Edwin H., Jonathan G. Taylor, Hanna J. Cortner, Philip D. Gardner, Malcolm J. Zwolinski, and Terry C. Daniel. 1986. Targeting Audiences and Content in Forest Fire Information Programs, *Journal of Environmental Education* 17(3): 33-41.
- Collins, Tim. 2000. *An Integrated Appraisal of the Wildland/Urban Interface Fire Hazard, Forest Ranch, California*. Master's thesis, Department of Geography and Planning, California State University, Chico.
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- Conley, Alexander, and Margaret A. Moote. 2003. Evaluating collaborative natural resource management. *Society and Natural Resources* 17(5): 1-17.
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