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NATIONAL CONFERENCE ON THE SOCIAL ACCEPTABILITY OF FUEL TREATMENTS ON WESTERN PUBLIC LANDS

FINAL REPORT

The University of Montana

Joint Fire Science Program

Forest Service U.S. Department of Agriculture

Bolle Center For People And Forests

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INTRODUCTION

The western United States is undergoing a profound transformation at the beginning of the 21st century, and the relationship of residents to the region's public lands is a central element within this transformation. The human population of the region is growing at a record pace, people are wealthier and more mobile, and there is a growing awareness of the complexity of values associated with public lands. After nearly two centuries of Euro-American influence, the tension between human demands and natural processes is being played out in significant political conflicts over energy production, water resources, wildlife and fish habitat, urban sprawl, and roadless areas. Yet among these issues the presence of wildfire stands apart. After decades of extensive, even spectacular effort to suppress wildfire, the reality of fire's occurrence in western life has become all too evident. From 1987 onward, the west has experienced large-scale fires in nearly all its sub regions, pointing to a continuing trend of cyclical fire. The scope of the wildfires in the summer of 2000 made plain the native pedigree of this powerful seasonal visitor.

The question that remains to western residents is the shape of their accommodation with fire. People fear the destructive power of fire, yet have grown to recognize its vital ecological role. Land managers are charged with a challenging dual responsibility: to suppress fires to protect lives and valued resources, while incorporating fire's ecological benefits into their management prescriptions. With nearly half of all lands in western states under public administration, decisions to incorporate fire into land management become public issues.

Through funding and support from the Joint Fire Sciences Program, the Bolle Center for People and Forests within The University of Montana's School of Forestry hosted a national conference on the social acceptability of fuel treatments in Missoula, Montana in October 2000, to take stock on public attitudes and concerns regarding fuel management. The conference convened on the heels of the escaped prescribed fire at Los Alamos, New Mexico, and the extensive fires of the 2000 fire season, when the memories of severe risk were fresh and the political will to act was strong. Conference participants reflected an intentional mix of social scientists, fire management professionals, landowners, ecologists, and fuel management practitioners.

Through structured interactions and a series of invited presentations, the conference acted as a workshop to explore the major questions facing the management of fire on western public lands.

This report summarizes the conference proceedings and concludes with a series of observations on the potential direction for future research in fire and fuels management. Notes and transcriptions from eight plenary presentations and four small group exercises were edited and summarized to capture the major points of the speakers and resulting discussion sessions. Readers will note that these are not technical proceedings that contain independent, invited papers. The content and tone of these proceedings demonstrate the conversational, interactive nature of the conference as an exploratory exercise to gather ideas, analyze barriers, and offer constructive critiques of fuel management programs on public lands. The diversity of participants offered fertile opportunity for a collision of viewpoints on several issues, including fuel management, planning processes, and agency policies. This dialogue provided the basis for workshop conclusions and recommendations for future research.

The conference was supported by two related pieces of work that are available under separate covers. First, Michelle Byington-Anderson examined the history and role of fire policy in fuel management, analyzing the effectiveness of the policy in meeting its stated goals. Her paper is available directly from the Bolle Center for People and Forests, School of Forestry, The University of Montana, Missoula MT 59812. Second, Yoshi Kumagi and Steve Daniels circulated to conference participants a draft of their annotated bibliography on fuel management. Their work has subsequently been published separately by Oregon State University, and is available from the Forestry Communications Group, Oregon State University, 256 Peary Hall, Corvallis, OR 97331-5704, under the following citations: Kumagi, Yoshitaka and Steven E. Daniels, 2001. Social science in fuel management: An annotated bibliography on prescribed fire. Research contribution 36. Forest Research Laboratory, Corvallis, OR.

CONFERENCE OBJECTIVES

The National Conference on the Social Acceptability of Fuel Treatments on Western Public Lands created a problem-solving experience for key scientists, policy makers, and practitioners in the treatment of forest and grassland fuels to accomplish the following objectives:

- Promote greater understanding of the variation of social acceptance of fuel treatments based on social, economic, and political conditions; and

- Develop focused research questions to assess the processes and practices affecting the social acceptance of fuel treatments.

CONFERENCE STRUCTURE AND SPEAKERS

The conference was organized over a four-day period, from October 22-24, 2000. It opened with an evening session with two keynote speakers, Mr. Rocky Barker, a journalist and long-time environmental reporter from the Idaho Statesmen, and Senator Max Baucus, the senior Senator from the state of Montana. The keynote speakers identified the political salience of the conference and the public demands for greater understanding of the issues affecting the application of fuel treatments. The second day of the program combined plenary presentations with small group sessions to examine current understanding of the concept of social acceptability, and to address three focusing questions: (1) What do we know about the benefits and costs associated with fuel treatments? (2) Where on the landscapes can we treat fuels and why? And (3) What do we know about the preparedness of our institutions to treat fuels? The day opened with Bruce Shindler of Oregon State University providing a summary of his ongoing research with Mark Brunson of Utah State University on the contours of the social acceptability concept in natural resources management. Matt Carroll of Washington State University followed-up on Shindler's remarks, offering a series of potential social science research questions that he had developed with Steve Daniels of the Western Rural Development Center. Conference participants then broke into four small groups to address the focusing questions, eventually reporting back to the plenary session on their groups' priorities and conclusions.

The third day of the conference opened with a presentation by Steve Daniels on participatory approaches in fuels and fire management, emphasizing the inseparability of fuels management and fire psychology. Following Daniels, two speakers addressed the ecological and practical considerations of treating forest fuels. Peter Landres, ecologist with the Forest Service's Aldo Leopold Wilderness Research Institute detailed the ecological considerations for using prescribed fire, and Vincent Corrao, President of Northwest Management, Inc., described his over twenty years of experience as a contractor to treat forest fuels on both public and private lands. Jerry Williams, Director of Fire and Aviation of The Forest Service, provided a closing summary on the new era of organizational cooperation. Subsequent to these presentations and discussion periods, the group

embarked on an afternoon field trip to the Bitterroot Valley to observe the impacts of the largest wildfire of the 2000 fire season, the Valley/Skalkaho Complex. During the field trip, the group heard from three landowners in the area, Larry Campbell, Marshall Bloom, and Ralph Luther. The latter two landowners commented to the group standing within an intensively burned forest area on Ralph Luther's property.

The final day of the conference opened with a panel discussion session to provide synthesis on research priorities. Panelists included Dave Cleaves, National Program Leader for Fire Systems Research of the Forest Service; Alan Watson, Research Social Scientist of the Forest Service's Aldo Leopold Wilderness Research Institute: Amanda Kaplan, Research Specialist with the National Park Service; Ron Wakimoto, Professor of Fire Science at the University of Montana, and return appearances by Bruce Shindler and Matt Carroll. The conference closed with a facilitated open discussion session among the 65 conference participants on guiding questions for future research.

CONFERENCE OPENING

JIM BURCHFIELD

This National Conference on the Social Acceptability of Fuel Treatments on Western Public Lands brings together a remarkable assembly of experience and knowledge. Among conference participants are landowners and conservationists, ecologists and social scientists, timber operators and firefighters - people who have for many years been working and thinking about how we may coexist with western forests.

In the last two decades it has become all too apparent that Westerners live in a fire adapted environment. Whether we like it or not, we live in a place where fire happens. Maybe that's a new bumper sticker for the Rocky Mountain States! And although we spend a great deal of time considering the physical and ecological attributes of fire – the nuances of fire behavior, the rules for suppressing or starting a fire, the outcomes we expect for wildlife or vegetation - we haven't spent sufficient time considering people's perceptions of fires. What do people expect a fire- adapted forest to look like? Who will benefits from treating forests with fire, and who will be harmed? What risks are present from the accumulation of fuels, and who remains at risk by decisions to not treat fuels? These are questions this conference intends to address.

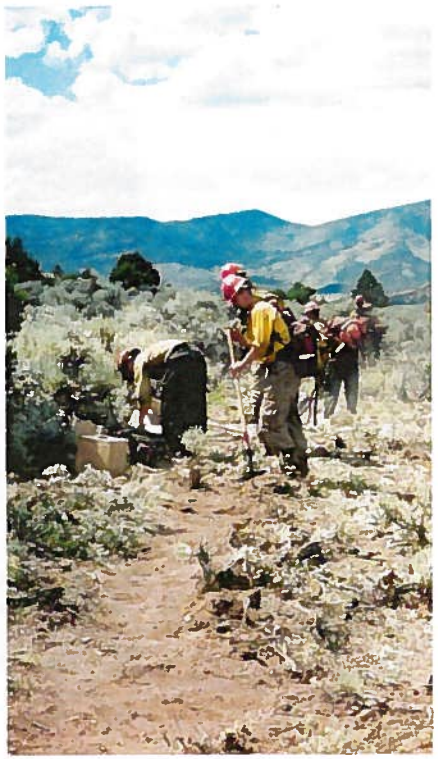
We've come together to learn about people's responses to modern life in a fire-adapted environment. The task of this conference is to clarify questions that will help guide a new generation of research into the social, political, and institutional issues that so profoundly affect natural resources management. Our questions will be focused on a specific arena – the intentional application of fire as a management tool for publicly administered forests and grasslands. In the end, we wish to learn what people think and what they expect when agencies manage the forests that the people own. If we develop good questions, then our work in answering these questions could lead to a more fruitful coexistence between people and our public lands.

In the spirit of developing good questions, the conference's operation will be one of openness and deliberation. Each speaker, including the two major voices of the West in the opening presentations, will allow for extended discussion periods after their prepared remarks. Within this interaction, we hope to gather the most productive insight into the many layers of complexity affecting our management choices. Let us move forward with our program.

CONFERENCE PRESENTATIONS

ROCKY BARKER PRESENTATION

In 1988 wildfires in Yellowstone National Park burned their way into the collective consciousness of the American public. For nearly two months viewers watched entire mountainsides aflame, racing through America's most sacred natural shrine. The images on their television sets told them that fire was destroying Yellowstone, an idea not easy to accept for a society raised on Smokey Bear. Yellowstone's fires were confirming what forty years of the most successful advertising campaign in history had told them: Forest fires were bad.



As one of the reporters who covered those fires, I found that while the fires burned that summer most of us ignored the real story – the ecological side of the story. We focused on the flames. We reported the destruction of a national treasure. Several of my colleagues and I had to run for our lives during the firestorm that raged at Old Faithful that year. Experiences like those tend to shape your coverage!

Yellowstone was only the beginning of a pivotal shift in public awareness of fire behavior in the American West. Since then, huge fires have burned through Oakland, California, the Boise National Forest, through Malibu, to the deadly South Canyon Fire in 1994 and the fires of 2000 which swept through Los Alamos and the Bitterroots. Once again, it's brought fire into the homes and lives of people all over the world. The collective effect of all these fires is that people have begun to understand that there is complexity to all of this. They understand that a century of fire suppression has contributed to the size and intensity of the flames they watch on their television screens and out their back doors. Reporters and television producers also have become more sophisticated. News organizations returned to Yellowstone many times since 1988 to report of its rebirth and to tell the story of fire ecology.

Most people recognize now that simply preventing forest fires won't make their forests healthier. This new understanding doesn't make people more comfortable with fire though. That is the challenge of authorities

from the federal level down to the local. If we're to develop a successful fire policy, the public will have to learn to be comfortable with fire. That's a tall order.

Fire officials have to build a system wherein the comfort of people is justified. We need a policy that promotes the transformation of forest communities into fire-wise communities, with defensible space between the wild and the urban. We need vital and effective local fire departments and private homeowners prepared to defend and protect their own property. Where consensus can be found we need a rational, cost-effective restoration program in the low elevation forests that includes prescribed burning, mechanical thinning and logging.

Once we've made our forests and forest communities safe for fire again, we must return fire to the ecosystem with the frequency that's as natural as our human values can bear. The barriers to such a policy are trust, obstructionism and fear. The first two can be addressed by empowering those willing to move beyond the traditional lines of political debate. A growing number of environmentalists recognize that leaving the dry elevation forest as it is will make it more susceptible to stand replacing fires that destroy the overgrowth they want to protect. Others are strongly supportive of thinning programs in the immediate areas surrounding forest communities. On the other side, many in the timber industry are prepared to step back from programs that tie forest restoration efforts to the harvest of big, green trees. They are willing to forego salvage programs. They believe that scientifically based restoration of fuel treatment programs will produce wood they can turn into products. The other issue is tougher. Fear can only be addressed by bringing people together to face it rationally and realistically.

In the last thirty years there has been a growing recognition that man's influence on the natural world is far more wide ranging and pervasive than we once thought. Air pollution and global warming affects virtually every ecosystem on the earth. The loss of biological diversity transforms ecosystems far more than we can know.

Several polls show a majority of Americans support banning commercial logging in National Forests. Yet many environmentalists who support zero cut in national forests this year also support thinning to restore old growth Ponderosa pine forests. For example, many of you know Mike Bader, the founder of "The Alliance for the Wild Rockies." His goal is to lock up more than 15,000,000 acres in the Northern Rockies as wilderness. He too has used the courts to stop timber sales and to protect bull trout and grizzly bears. No one who knows him will call him a moderate. Yet he used to work in Yellowstone National Park. You don't have to convince Mike Bader that thinning forests immediately around homes and communities makes sense. He remains skeptical about ambitious forest restoration projects focused solely on fuel treatment. Believe me, the last thing he'll ever approve is anybody going and doing a lot of harvest up in the high elevation forest. He said to me, in a story I wrote, that he is willing to support active management if it's limited to the immediate areas surrounding communities and he says he won't obstruct such a program. Quote: "I give them a yellow light. Proceed with caution!"

Zero cut has become nearly a reality for the timber industry in the Northern Rockies. They have suffered from the public's distaste for clearcutting – something I don't have to tell Montanans about. Today the timber industry and its supporters in Congress have accepted a thinning program uncoupled from the sale of large, green trees. Industry leaders are seeking common ground with their opponents. Part of the reason is that industry leaders believe that scientifically based restoration of the forest will provide them with wood that they can run through their mills. The industry's

biggest concern is protecting its growing trees from fire. That's a legitimate concern. Any long-term fire management program must protect investments in commercial timberlands. That doesn't mean we have to pay for all of it, but there has to be a legitimate system that is defensible. With timber prices down right now, the industry appears patient and willing to work with environmentalists who want to sit down with them to develop restoration programs at the local level that both can accept.

The changing position of both the timber industry and environmentalists offers the federal government and the states an opportunity to restructure their land management apparatus so they can restore the trust necessary to develop a fire policy to protect human and natural values. Only when public trust is regained can we protect what we value and become comfortable with fire back in our system. We must be educated. We must be a part of the decision making process, and we must take responsibility for our own roles in fire protection. Many people who are here tonight are doing just that. This education process will not happen overnight. People who live in the woods today will have to transform their homes and communities into fire-wise places with defensible space. We need a combination of zoning laws and incentives to encourage people who move into high-risk areas to acknowledge their own risks and responsibilities. This is not an easy job. It's at least as large as the thinning problem. It's about changing people's attitudes and values.

One suggestion is to develop a mandatory fire insurance program, like our current program for insurance in flood plains. Let's face it – fires and floods are just bookends of the same thing. It's time we treat them the same way. We have to be careful here because if you remember in the 1970's, we set up the flood insurance program. It was mandatory, but you always could get it. We put together model floodplain ordinances for communities that were not particularly strong, and today, most of those floodplains, at least in my area, are all developed. We didn't get what we wanted out of the early flood insurance program because people who lived in the floodplains believed that somebody was going to bail them out. The big flood in the Mississippi Valley in 1991 changed things, and it did let people how serious this can be. So, if we can develop something on a national scale, local communities can use the tools, and we can start to reshape people's thoughts on these issues.

And let's not leave Smokey out of this. He's a powerful tool the Forest Service needs to bring into this campaign. But transforming Smokey into an advocate for thinning and burning probably won't work. I know the Forest Service is pretty protective about Smokey, and for good reason. It's been an amazing campaign that you can't simply throw away. Yet there must be something new in Smokey, perhaps becoming a voice for preventive measures around forest homes. "When you build your home in the middle of my home . . . only YOU CAN PREVENT FOREST FIRES FROM BURNING YOUR HOME DOWN!"

Once we have made forest and rangeland communities safe from fire, then we can restore fire to the system in a rational manner. Where fire did not destroy the Ponderosa pine forests in the Bitterroot Valley this year, it provided a treatment program for which no agency EIS could have ever received approval. There are some advantages here that we don't always plan even in the worst events. The challenge is to maintain what nature has done. This means regular thinning and in some cases, burning. Those communities of lodgepole pine also must be made safe. Then, when fire comes in drought years, we need only prudent defense measures, not all-out battles that essentially throw money on fire. We can make our urban communities safe from fire through building codes, preventive programs and effective fire departments. We need to make our wildlands and our wildland interfaces just as safe. We need to return fire to the forest in the rhythm in which it evolved. Then we must evolve with it.

DISCUSSION SESSION

- My interest in coming is that although I definitely see prescribed fire as a necessity, I think a person like myself can take exception. I don't know if you're familiar with the Lung Association's slogan, "If You Can't Breathe, Nothing Else Matters." If you want people on your side, the side of good management, I think you need to think about your questions so that you're asking, "How can we do things in the way that has the least possible impact." Especially for something as significant as air quality. Too often, agencies ask instead, "How can we have people learn to accept what we want to do?"

- Stephen Pyne in his book World Fire talks about the coming of the internal combustion engine, putting so much carbon in the atmosphere. He says we may not have the opportunity to put fire back the way it was, say 100 or 200 years ago and live with the internal combustion engine at the same time. We may have to choose between those two.

- QUESTION: Your notion was that we should reintroduce fire to the landscape in its natural rhythms only after we've ensured the safety of the communities. What if ensuring the safety of the communities is never possible? *Rocky Barker Response.* First I think what we need to do is to make people recognize what risk they are in. We go as far as we can go. But then if you're going to build your community out in the middle of the forest, that is, lodgepole pine and there is a drought and the wind starts blowing. Guess what? You're in trouble and there's not much we can do. We can do something, though. We can make those communities and settlements as defensible as possible.

- QUESTION: How would you anticipate the resistance on implementation of countywide zoning and other regimens that you would suggest that need to be mandated when it comes to suburban wildlife interface? It's been holding up the struggle when it comes to land management. *Rocky Barker Response*: In many cases, it won't happen until after the burn. Even after the burn, some of it is going to be tough. Most of you know that this past year is not going to be an out of the ordinary year in the next decade. At least in the lower elevation forests, I can see this continuing quite a bit. As people watch their neighbors' houses burn, things begin to start changing. It's been twelve years that we've matured in our understanding of fire. Twelve more years and we may be a lot further along. I'm a strong believer in personal responsibility and rights and I think we can take ourselves a long way with true traditional western values to doing this job and zoning is a tool and it's not the only tool. That's why I look at insurance. I like to look at the idea of communities doing it themselves and building outward. When you get about six or ten people doing the right thing and then four guys not doing the right thing, they start to say maybe we need to pass a law to make those people come around. That then tends to get two of them to say, "We don't need a law – I'll do it!"

SENATOR MAX BAUCUS PRESENTATION

This conference, what you're trying to accomplish here, is so necessary for us to move forward, both in terms of managing the forest and in getting our state's economy going. My main effort is to get people to avoid extremism, to avoid partisanship, just to get the facts and come together because we are all in this boat together. We're all really looking for the same thing: a high quality of life which includes open space, clean air and water, to be able to hunt and fish, and get out and enjoy it. It's the special nature of Montana and the West. It is also necessary to have good paying jobs so that so many people don't have to struggle as much as they do.

I wonder when that's going to happen? I think that if we go the extra mile and keep partisanship and extremism out-of-bounds and don't let it be a part of our discussions, I think we can move forward. This sort of approach is needed when it comes to taking stock of what happened during this last fire year. We know that we're never going to totally eradicate fires, nor should we make the forests fireproof, but there are certainly actions that we can take.

First, regarding the fire season of 2000, I saw my job primarily as helping all the men and women who were working so hard to have the resources they needed in the short term, containing the fires and helping the volunteers get compensated. I was amazed, frankly, at the myriad of rules and regulations that got in the way of people trying to do their jobs. They included things like waiting rules about reimbursing volunteers or restrictions on using retired personnel. We've got to address a way to expedite these rules so that they're not barriers in the future. There are also roles that can be played by our National Guard. I think it makes good sense to train Guard personnel to meet all kinds of natural disasters, whether it's fires, floods, or other disasters. They could be very useful, and it's a process of thinking more creatively and merging different cultures so that they can work for the better.

Second, I'd like to address this subject of fuel management and what we can do about it. I recognize, as I know all of you do, that the subject is contentious because some see fuel reduction as a code word for excessive logging. For that reason, some oppose fuel reduction activities altogether. On the other hand, some are going to see the need for logging as a requirement to accomplish fuel reduction to protect and manage forests, for these forests are susceptible to large

wildfires if just left alone. Others simply want to see logging that has nothing to do with fuel reduction. To emphasize my earlier point, we have to reject both extremes. We must move beyond this particular debate. While I recognize that years of fire suppression have contributed to unnatural fuel build-ups, we also recognize that some of our old logging practices have actually made some forests more susceptible to fires. Finally, we recognize that fires are a natural part of our western landscape. We need to reduce the risks, we need to address problem caused by fuels, and we have to make sure that fires are not unnaturally large or intense. Our goal should be not to end wildfires, to do so would set us up for failure, but to reduce risks to acceptable levels, especially risks in the urban wildlife interface.

More and more, people realize that there is a need to address the problems that arise when people build their homes in the forests right in the line of wildfires. This is important not only for protecting homeowners, but for protecting the lives of firefighters who are called in to save homes. It's also critical because we spend an inordinate amount of resources protecting homes where those resources can be better used elsewhere. I believe we need to focus in basically two areas. First: Improve the ownership patterns to reduce the numbers of in-holdings in our National Forests – to have more logical patterns of public and private land ownership. For the past ten years I have worked to help implement a series of large land exchanges in our state to help eliminate the checkerboard land ownership that is left over from the era of the railroads. It makes it easier to manage both public and private lands and reduces the potential for development to occur in our National Forests. By eliminating the checkerboard ownership patterns it reduces the likelihood of scattered developments in the urban wildlife interface, thus reducing cost to respond to fires and risks to human life and property. This is one of the many reasons I have strongly support programs such as The Land & Water Conservation Fund, which could help with these exchanges.

In addition, I think we should get counties and local governments the tools they need to help shape development in the manner that reduces the risk to property damage during wildfires. In the past month, the Senate and the Congress as a whole, approved a bill, S-1608, known as the Rural Schools Stabilization Act. It means that counties will have the option of taking out the traditional 25% forest receipts for schools and roads but also have the option to take any three of the highest receipt years of the last 12 years, and that will dramatically increase the payments to counties. Under that law counties will also be able to use 15 to 20% of receipts for activities and actions to educate people and homeowners about fires, purchase easements, and take other actions to minimize the dangers of the interface problem.

I'll conclude by saying thank you very much for what you're doing. We all depend upon you to generate ideas that can help us address our resource management problems.

DISCUSSION SESSION

- It seems that an integrated fire management organization would help us deal with the issues of both wildfire and prescribed fire. A concern that some of us have is that if you build a superstructure to manage this kind of organization, the tendency will be take away discretion from the agencies that must complete on-the-ground resource management activities. The hard part right now is that the resource people in the agencies are so strapped that they don't have time to do the necessary planning to conduct integrated work, and they can't line the things up to accomplish fuel treatments or prescribed burning. It's not just funding to address fire or fuels management, agencies need the resource specialists to be funded as well to complete this integrated work.

- *Senator Baucus*: It's also about entrusting people with more responsibility so that they can make more decisions quickly without having to check off boxes in so many different places. We have to figure out a way to streamline processes in a way that trusts the judgment of professionals to know what they're doing.

- QUESTION: To my knowledge, all of the mandates for the Department of Interior and Agriculture's missions don't address protecting private property and homes, and yet large proportions of the summer of 2000's energy and staffing really ended up protecting private property. As a legislator, does that bother you to think there will be any discussion of what those mandates really mean in our current culture, where the wildlands and private lands are all intermixed? *Senator Baucus responds*: Clearly, if there is a fire that threatens a home, volunteer firefighters are immediately going to do what they can to protect that home. The more fires around homes, the more resources will be devoted to this. I think we need to figure out ways to consolidate ownership patterns and educate people, then we won't have to spend quite as much time, proportioning energies and money on protecting homes.

- It's suggested that there will be close to a 50% attrition in the next ten years in the Forest Service based on personnel retirement. I would suggest that the federal government will need to find a way to sustain the level of personnel in the Forest Service to address the issues of fuels management.

QUESTION: Do you think that one of the ways we might make a change to address integration and the needs of agencies would be to re-examine the idea of putting all of them in one Cabinet Department? *Senator Baucus responds*: If we were to start all over again it might make sense, but this is 2000, and there is a lot of history in these agencies. My view is that it matters less what the flow charts are, and it matters more who the personnel are, who the people are. If you get really good people in these agencies, we'll work these problems out.

BRUCE SHINDLER PRESENTATION

What we know about social acceptability and why is it important?

My job is to provide a context for the social acceptability concept. We all recognize that public acceptance is important for reaching decisions about fire management that enjoy long-term support. We are all looking for more durable decisions. My presentation is really a synthesis of a lot of people's ideas and research over time.

If we start back in 1960, Walter Fiery developed a model that examined why certain natural resource management systems or practices persist over time. He said that they need to satisfy three basic requirements:

1. They need to be physically possible, especially if we consider terms of what is sustainable;
2. They need to be economically feasible, and with the exception of government appropriations, this means they have to be profitable; and
3. They need to be culturally adoptable. This is where we come to the social acceptability idea. Even if practices are physically possible and economically feasible, they stand little chance of successful implementation if they lack acceptance by the wider community.

Although we know that few management decisions are based simply on the scientific information that tells us what is physically possible, we recognize that incorporating sound biological knowledge in natural resources decisions is important. Economic conditions are also important because financial benefits drive our system. This is a little bit different on federal lands than on private lands, but a constant consideration nonetheless. It tells us about the consequences of our decisions. Finally, social and political support must account for public concerns and represent public sentiment rather than the simple interests of decision-makers. This is the idea of social acceptability. Each leg of the triangle imposes a constraint on the system and each constrains the others. All three of these elements must be present to prolong the system.

Social acceptability is derived from a political perspective. In our system there are two types of power. For those of you who work for management agencies, you have jurisdictional power to carry out the law. The second kind of power is political power - the power that is held by citizens. As long as agencies are carrying out their responsibilities in a way that is generally viewed as acceptable and appropriate (they are doing a "good job"), these same practices will garner support from the political power base. If certain segments of the public don't understand ideas or practices or see them as unacceptable or confusing, and this constituency becomes large enough, that power can be withdrawn over time.

Public judgments are also subject to change. Both political and natural systems are dynamic. One of the things about acceptability is that it is both continuous and provisional. We can look for opportunities to discuss, debate, talk about issues, and provide interchanges of ideas. Social acceptability is not simply a calculus of interests and demands; it also is a concept that is deeply affected by process.

One of the issues affecting our understanding of social acceptability is confusing terminology. The idea of social acceptability emerges from a field of other surrogates: appropriate management; preferred alternatives, or desired future conditions. Each of these terms has been used in natural resource management and collectively we see there are qualitative differences in these various descriptions.

We might think of the acceptability concept as an archery target. The bulls-eye in the middle is DESIRABLE. That's what people want to have happen. For example, it might be that I don't want active timber management anywhere. That's my desire. But logically this might not be the decision because others desire a different condition. So we expand the circle beyond the bull's-eye to the next concentric circle, which I've called PREFERABLE. Now a choice is involved. I don't want management around me, but maybe over there in another location, far from my home. But again, I may not get what I prefer; other preferences are involved. Thus we look at the outer ring of the target; the area that's not desirable or preferred, but ACCEPTABLE. I can accept outcomes given the choices and consequences. So the idea of social acceptability has emerged within a field of terms where there is potential for movement along a scale. None of these terms are exact, yet the social acceptability idea is a way we can come to some aggregate form of public consent. We can share judgments about what we think is politically relevant.

In summary, allow me to offer five of the key characteristics of social acceptability. We'll follow this with nine problems in applying social acceptability principles to fuel management issues. The five characteristics are as follows:

- Social acceptability derives from a political perspective;
- It recognizes that systems are dynamic and that we have altered landscapes;
- It involves choices, each with its own costs;
- Judgments are made by individuals, but usually evolve to some aggregate form of public consent; and
- Judgments can be at two different levels: those that involve personal interests or benefit a single group; and those that develop a broader shared agreement about what should occur for the larger community of interest.

Returning to a few of these characteristics, social acceptability involves choices each with its own costs. Unfortunately, the easy choices in natural resources are long gone. We can't choose between cake and ice cream anymore. What we usually have now is a choice between spinach and broccoli. Those are a little tougher choices and we are going to have to work a little harder at understanding these decisions. We also know that judgments are made by individuals, but these usually fall to some aggregate form of public consent. The usual way we make decisions involves personal interests that benefit a single group. But the rarer, more preferable form of decision-making, involves developing plans that benefit a larger community of interests. This means doing what benefits our society as a whole, putting aside our own particular personal interests. It is evident that social acceptability is represented by a suite of factors, not all of which are relevant in every situation. But from a practical standpoint, resource professionals need ways to consider social acceptability in the context of particular places and resources. This is why I'm going to move on to nine problems that I see as common occurrences in public acceptance of resource management. This discussion helps provide an organizing framework to the suite of factors affecting social acceptability.

PROBLEM ONE *–RESOURCE AGENCIES FOCUS TOO GREATLY ON THE SOCIAL ACCEPTABILITY OF THEIR DECISIONS INSTEAD OF THE ACCEPTABILITY OF THE DECISION-MAKING PROCESSES.*

If we step away from our scientific viewpoint or remove our managerial hat, we can look at fire management decisions from a public perspective. We begin to see that success is more often dependent on the process of how and why decisions are made than it is on the decision itself. The public's idea of fairness and legitimacy frequently involves the quality of the decision making process, including the degree of their meaningful participation. Consider how decisions are frequently appealed or litigated and the tremendous cost of NEPA documents. I see a "process gap" between agency intent

and outcome. The missing components of this process gap are public places to discuss and learn; open examinations of risks and alternatives; transparent experimentation and evaluation, and serious attempts at trust building.

Often we start off on the wrong track. We ask ourselves questions like, How much land should we treat? Which treatment should we use? When should we do it?" Our colleagues from Canada have been trying a different model they call "Up front thinking." This model proposes that organizations need to think through in advance and agree on a plan for making decisions, particularly complex and controversial ones that involve citizens. It begins by asking such questions as: "How will decisions be made? Who should be included? What do we hope to accomplish by involving the public? Who is the public for this issue? What is the public's role in this discussion? What do they need to know to participate? Not all situations are created equal. We can consider the internal aspects of planning through up-front thinking. When this is done, it avoids costly mistakes later on. Agency personnel have a better chance of success when they are prepared, and when they open the door to let the public in staff are sending a common signal.

PROBLEM 2 – *MISTRUST OF NATURAL RESOURCE INSTITUTIONS IMPEDES ACCEPTANCE AND IMPLEMENTATION OF FUELS REDUCTION STRATEGIES AND ALSO ERODES SUPPORT FOR DECISION-MAKING PROCESSES.*

Gaining the public's trust is essential. Mistrust is the trump card that can dissolve any kind of planning process or project. We should recognize there is a history among people in a particular management area, such as a ranger district, and those relationships influence peoples' expectations. Trust is built with local citizens by listening, developing a common objective, and then making good on your word. One of the problems we are finding in our most current research is that these relations in local communities are being confounded by national politics. For example, people might trust Joe their local FMO to do the right thing, but they just don't trust the agency or the institution to let him do it.

The things that build trustworthy relations are inclusiveness in decision-making, sound organizational planning skills, setting objectives, sincere leadership, and continuity throughout a project—essentially efforts that result in action. That's the public's expectation. Bill Shands summed it up nicely, when he wrote, "For public agencies, the real product of planning is not the plan, but an enduring relationship with the agency's constituents, clients, and customers. Properly done, the benefits of public involvement will continue long after a plan is complete or the decision is made."

PROBLEM 3 *– ADEQUATE ATTENTION HAS NOT BEEN GIVEN TO ALL CONTEXTUAL ASPECTS - SPATIAL, TEMPORAL, AND SOCIAL, WHEN EVALUATING THE ACCEPTABILITY OF FUELS MANAGEMENT PRACTICES AND RESOURCE CONDITIONS.*

In recent years agencies have taken seriously the notion of planning over large landscape levels. That's what we are working on pretty hard these days. We have also been acquiring a lot of temporal data; including how landscapes have changed, the frequency of fire return intervals, and what this means for risk in specific fire regimes. Yet the specific context of where people live remains most relevant for citizens. For example, this photo is a shot from the backyard of my son's new home in the Oakland Hills in California. It is what he cares about most and is a much different spatial context than the large landscapes fire managers must plan for.

When we talk of context for people, we talk in terms of places. These are how people identify what is important to them. It could be recreation places, it could be very small places like the view from their backyard. The uniqueness of place is a concept that helps us understand the NIMBY phenomenon and why people are concerned about the consequences of both wildfire and prescribed fire. If we learn to think in terms of the uniqueness and importance of place, and we learn about why places are important to people, then it gives us a useful tool when we plan for temporal, spatial, and social contexts.

PROBLEM 4 *– THE PROMISE OF ECOSYSTEM MANAGEMENT SUGGESTS WE CAN REACH A BALANCE AMONG MULTIPLE AND OFTEN COMPETING RESOURCE OBJECTIVES, YET ATTEMPTING TO ACHIEVE MULTIPLE OBJECTIVES INCREASES THE DIFFICULTY IN FINDING ACCEPTABLE STRATEGIES.*

Ecosystem management is about having it all, and we've been telling people that they can have it all for quite a while now using this form of management. Few people are able to define sustainable ecosystems, but there is a public expectation that managers can produce whatever is necessary. People know what they want. They want clean water, clean air, a constant supply of wood products, decent jobs, recreation places, scenic vistas, and no risk of wildfires to their property. Social scientists are pretty good about getting opinions about these kinds of things. We ask people continuously what they want . Do you want smoke? "No." Do you want clear cuts? "No." We're pretty good at the opinion polling type research, but we haven't done particularly well at finding out how people understand and view the tradeoffs of the tough choices.

A purpose of this conference is to work on the next step: knowledge of the kinds of trade-offs that help people work through multiple objectives. We need to study the kinds of processes we can use to help people sort through conflicting outcomes and what various treatments are actually going to mean for the long term.

> ***PROBLEM 5*** *– NATURAL RESOURCE MANAGEMENT AND RESEARCH PROGRAMS - SUCH AS FUELS REDUCTION - ARE DOMINATED BY TECHNICAL, SCIENTIFICALLY-BASED MODELS. HOWEVER, RELYING SOLELY ON THESE MODELS FOR MANAGEMENT OF PUBLIC FOREST LANDS IS INADEQUATE AND HAS BECOME INCREASINGLY SUBJECT TO DISPUTE.*

Our reliance on science-based models for management of public forests lands has become increasingly subject to scrutiny. Researchers tend to think and talk through a technical perspective that doesn't connect well with people. You know, I was out the other night with my wife and ran into a couple that also worked at the university in research. They invited us to go contra dancing with them. I was pretty concerned I wouldn't know what to do. They said, "Don't worry, you'll have no problem; it's all based on mathematics!" Guess they didn't realize I was a social scientist.

Those in charge of managing forests and fuels have always had a technical bias. We came through school that way; it's our training. Many students in natural resources still come to the university because they want to work in the woods. They go on to join a group that's pretty good at standing around green trucks talking amongst themselves, looking at maps and figuring out, technically, what needs to be done to management the forest. Today, we've improved things by looking at higher tech maps in the form of GIS layers and other new kinds of technical approaches to help us figure out the system, but we're still not doing very well at learning the social side of forestry.

> ***PROBLEM 6*** *– EFFORTS TO MAINTAIN OUR CHIEF NATURAL CONDITIONS ARE CONFOUNDED BY A WIDE RANGE OF PERCEPTIONS ABOUT WHAT NATURAL CONDITIONS MIGHT BE.*

Dan Williams, a social scientist at the Forest Service's Rocky Mountain Station, has argued that an ecosystem is a social construct. Ecosystem restoration is also something that we have latched onto recently, but it too developed as a socially derived goal. Much of the demand for managing natural resources centers around the maintenance of something "natural," but we are not very certain what we want natural to look like. The Native American view of forest had credence because of their long interaction with forests and grasslands, but the forests have changed since those days. Even a kind of turn-of-the-century forest where we try to convert forests back to what things looked like before agencies starting suppressing fires depends on who is defining "natural." For generations, Smokey Bear's decree was to snuff all forest fires. Now that's not such a good idea anymore. It's not natural. So we've got to come to some agreement on what natural is and what we want things to look like.

PROBLEM 7 *– NATURAL RESEARCH MANAGEMENT INVOLVES A GOOD DEAL OF UNCERTAINTY ABOUT HOW SYSTEMS WORK AS WELL AS A DEGREE OF RISK IN IMPLEMENTATION. HOWEVER, FEW PLACES EXIST WHERE DISCUSSIONS CAN OCCUR TO HELP PEOPLE UNDERSTAND THE RISKS, ALLOW THEM TO WEIGH THE TRADE-OFFS, AND THUS INCREASE THE ACCEPTABILITY OF MANAGEMENT APPROACHES.*

Social acceptability is a comparative process. Public opinion exists only in a meaningful way if people understand more than one side of the issue. Do we want to suppress wildfire? That's an easy call. Sure. Do you want no smoke, or do you want smoke? That's an easy call. Do you want erosion, or no erosion? Those are easy. But people's opinions lack meaning when no real choice has been offered. Choice is about comparing and enjoying some level of knowledge about potential outcomes. My colleague, Mark Brunson, and I often discuss this in terms of the uncertainty of outcomes. Uncertainty and risk are related to questions about the feasibility of practices and the equitability of outcomes. We can predict the feasibility of what a particular treatment will produce in 30-50 years, but we have little experimental evidence to show people. The equity issue can be equally far-reaching – consequences will be borne by generations who had no opportunity to help determine the outcome. If citizens do not understand the risks involved, many would prefer not to obligate their children or grandchildren to find out the hard way.

PROBLEM 8 *–CONFUSING INFORMATION PROVISION WITH INCREASED PUBLIC UNDERSTANDING, AND ULTIMATELY WITH PUBLIC ACCEPTANCE, IS A MISTAKE. INFORMATION ALONE IS RARELY SUFFICIENT TO PRODUCE CHANGE. PUBLIC EDUCATION IS BASED ON A SUITE OF FACTORS WRAPPED IN THE CONTEXT OF PERSONAL EXPERIENCE.*

Natural resource agencies think their job is to develop information and provide it to the public. And we've managed to do this pretty well. But we are not likely to change people's minds solely on the basis of technical information. The idea that all we need to do is educate people and they'll agree with us is a worn out notion. Simply people learn and change their behavior based on relevant personal experience. We should be creating places where people can see and experience for themselves the choices and consequences of various management alternatives. For example, some very good interpretive programs (both agency and private industry) have begun to spring up here in the west regarding the use of fire, including a small set of demonstration forests. The idea is that as people become aware of and see the set of choices, even limited ones, people will choose the lesser of the two evils. But they have to understand these choices and their implications.

PROBLEM 9 *– THE INITIAL BASIS FOR PERSONAL JUDGMENTS OF LANDSCAPES MAY BE VISUAL, BUT IT IS CLEAR WE NEED TO AIM FOR A MORE COMPREHENSIVE, HOLISTIC FORM OF PUBLIC EVALUATION OF FOREST CONDITIONS.*

We have a considerable amount of research that shows visual aesthetics are an important factor in people's judgments of forest landscapes. But we have also begun to see that other influences, such as how and why conditions got that way, are essential in forming opinions. Thus understanding the context of how people view the forest is essential, not just to develop a better perspective from a managerial standpoint but also so that we can help citizens form a more comprehensive evaluation of conditions. Once we see through the public's eyes we can tailor our messages to the needs and interests of local communities. For example, we know that smoke is a major issue for most fuels managers especially the last few months here in the Bitterroot Valley. In Oregon, it's the same way.... people see a field burning off in the distance and they get pretty excited. On the other hand, I conduct research in southern Georgia and the running joke is that smoke is really only a problem for people when they can't see their TV's anymore. They live with fire and expect the management agencies to burn. The point is, each area has its contextual differences and concerns. If we learn what these are, we can work in our communities to develop a more comprehensive evaluation of forests that allow us to deal with more than visual appearances.

DISCUSSION SESSION

- Regarding physically possible, economically feasible and culturally adoptable. You defined economically feasible as profitable. I'm wondering if you haven't left out the whole question of re-investment in public lands and whether restoration activities should be expected to return a profit? *Shindler responds*: We're all dealing with that right now. This is a model that reflects the way we have done business over time. But your mandate or the federal agency mandate has become different and that's part of the current debate. We need to sort out the economics of restoration and if there are other areas of economics or other kinds of social value calculations we should use beside profits. Perhaps we need to include the economic values of wildlife or streams.

- One of your very first assumptions with social acceptability is that it emerges from a political perspective. Is it possible that you are wrong? How confident are we if we consider this when discussing fires in the wilderness. Is this derived from a political perspective? Should we be looking to scientifically investigating social acceptability and those things that drive the political perspective? *Shindler responds*: Public views drive the political process. I work with a number of other scientists in my university and a statement that came out from one researcher was that we set policy and people respond to it. Well, the social scientists jumped on that one – it's the other way around. Policy is derived from social demands and the resulting give and take. People certainly respond to policy, but there is a tremendous amount of social perspective that goes into policy – for policy is a social process.

MATT CARROLL PRESENTATION

Institutional Issues in Fuel Treatment programs

My presentation offers a series of ideas that my colleague, Steve Daniels, and I developed which could be refined into social science research projects regarding social considerations in the shifting fire/fuels management paradigm. I will offer six proposed studies, and within each of these are a number of hypotheses we wish to advance for discussion within this conference. The six studies could be grouped into three sets of projects with two research projects per set.

The first set proposes two studies that are organizational in nature. We're suggesting an in-depth look at the Forest Service. If you look at natural resource organizations, the Forest Service has a mammoth responsibility in terms of land management and fire management. It's a great place to start. We propose a look at the recent changes within the Forest Service fire organization and how those changes may affect these agencies' overall management strategies in the future. The second set of projects has to do with communication processes during, before, and after fires. The third set has to do with specific social responses to fire events, including a study on post-fire psychology and social responses to smoke from prescribed fires.

Let's examine each of these projects in turn. The set of ideas we'd like to present in the first project has to do with demographic change in the Forest Service and the agency's ability to manage fire. There have been major changes within the Forest Service over the past decade. Some of those changes have implications for the agency's ability to manage fire in the future. We begin with a premise that even in an ecosystem-based management

world, the Forest Service needs to deal with fire in a competent, professional manner. When there's a wildfire emergency the agency still needs to deal with it, even though management considerations about fire's role in the ecosystem have changed.

The first hypothesis we would offer is that there's been a huge loss of fire fighting expertise and experience within the agency in recent buy-outs and retirements. Because the recent buy-out targeted particular job classifications with high concentrations of fire people, it has basically taken the top off the skill pyramid in terms of dealing with wildfire emergencies. This has important implications for fire managers and the agency's ability to manage fire in the future. Our hypothesis suggests that the loss of expertise will have a negative impact on the agency's ability to respond to a number of fire scenarios. Urban fringe fires, for example, have become more common, and multiple, simultaneous fires or high intensity fires as we experienced this past summer present significant challenges. Our hypothesis is that the people who have left the land management agencies, and the Forest Service in particular, have taken with them knowledge that is vital for efficient and effective fire management.

Our proposed method for examining this hypothesis is via an organizational study that undertakes longitudinal measurement of the number of people in particular skill categories by level of supervisory capacity and area, such as fire behavior or aviation. The study would examine personnel in the agency - who's still there and who's lost - through the recent downsizing. We would also hypothesize that other fire fighting organizations simply do not have the capacity to fill the gap left behind by the Forest Service. Although there are a lot of other organizations struggling with the issues of fire, we're hypothesizing that the resources just aren't there to replace lost Forest Service capacity.

In addition, we would hypothesize that career and family aspirations, in terms of early and mid-career Forest Service employees, are incompatible with fire duty. The Forest Service employee who was described in Kaufman's book, The Forest Ranger, in 1960, was a very different person who occupied a very different social situation than an employee today. We would suggest this has implications for people's willingness to pursue fire-fighting careers. The method we would propose for this part of the project would be a survey of GS-5 and GS-7 fire management personnel within the agency, looking at red card and non-red card employees to profile what is going on in the agency today. We would also suggest low project staffing in all locales affects initial attack capacity. Finally, we're hypothesizing that technology does have potential to mitigate the effects of the loss of personnel and expertise to an extent, but we're not sure to what extent. Thus, the first study we propose would look at the Forest Service as an organization and its capacity to deal with fire in terms of the personnel changes that have happened over the past several years.

The second study we propose would also focus on the Forest Service. In this case, we'd concentrate specifically on the fire organization. We all know that fire managers occupy a subset of the larger, Forest Service culture. We could consider fire managers as a culture within a culture. Since the larger organization has undergone a great deal of change over the past several years, how has this affected fire managers? What we're hypothesizing is that the Forest Service as an agency has changed more rapidly than the fire organization within it, and this overall change creates tensions within the agency that has important implications for fire management. The data generated by the first study would identify the number and type of people in the current fire organization, and we would hypothesize that the fire subculture does not mirror the rest of the culture. The fire subculture within the agency is older, whiter, more male, and dominated by those with forestry and engineering backgrounds. In other words, they are more the traditional people you would have expected in the Forest Service twenty years ago. This study method would involve a demographic interpretation of the

personnel data within the agency. We would also hypothesize that members of the fire subculture see themselves as marginalized within the agency. We would test this by interviews, surveys, and focus groups of Forest Service staff, particularly the people within the fire organization.

This study would also allow us to examine the extent to which the fire subculture possesses reservations about the paradigm shift occurring with respect to fire. That paradigm shift is a movement from fire control to fire management. There may be reservations among some people who deal with fire within the agency about this paradigm shift. We are also hypothesizing that the fire subculture is changing more slowly than the larger culture within the agency in terms of demographics, values, and attitudes. This has important implications for the agency's ability to manage fire in the future. Since fuel management is likely to be the most significant source of vegetation management on western public lands in the foreseeable future, it's difficult to imagine how we can have effective management of fuels and fire with an internal organizational disconnect. We postulate that there are important organizational dynamics going on within the agency that will affect the agency's ability to deal with this new fire management paradigm.

Within this same study we would suggest that the fire management paradigm requires more sophistication than the old fire control paradigm in terms of fire behavior, fire suppression tactics, the media, and communication. The old message was simple: "Put it out by 10 o'clock!" The new message describes fire as part of a larger, complex ecosystem process, raising the question of fuels management and much greater communication with

the public about what is going on. That summarizes the two organizational studies we propose as ideas for continued social research into fire and fuels management.

We can now move onto the third study, which deals with the issue of risk assessment in communication and management. Although much has been done in the social sciences on risk assessments, such as in waste sites or mining disasters, there's been relatively little done about wildfire risk. We believe it is high time we bring these threads together to try and apply insights from other risk assessment work and discover which of those findings are relevant to questions about the threat and prospect of fire.

The first premise of this proposal is that risk communication is more complex in the fire management paradigm than in the fire control paradigm. It's a lot more complicated when talking about the role of fire in the forest ecosystem versus the old notion that you could simply exclude fire. The first hypothesis of this study is that risk management strategies developed for fire control are insufficient when applied to fire management. This is evidenced by the low level of success to date with individualized voluntary efforts at fireproofing private property and the increased complexities of managing fuels across mixed ownerships. We would hypothesize that simpler messages are correlated with higher levels of compliance among the public to reduce fire risk. If fire is a complicated phenomenon and the role of fire in the ecosystems is a complicated subject, how do we simplify the message so the public doesn't get lost in the midst of all the technical details? It's a significant paradox.

We would hypothesize that the model of experts dispensing knowledge to subjects is an insufficient model of technology transfer. This "top-down" notion is not effective. We need more sophisticated ways to do this risk communication than the "top down" approach. We could consider the role of mediating social institutions. These mediating institutions include people from community-level organizations who have listened to the debate, so it's not a matter of a few experts talking to the public as a mass of unconnected individuals. People who are connected at a local level can help formulate opinions. Their experience can identify what works and what doesn't. Paying attention to community-level organizations and how they think may be terribly important in trying to do risk communication.

We also hypothesize that the fire control paradigm is still predominant in the urban fringe. People don't want their houses to burn down. But the fire management paradigm may hold sway in marginally populated forest areas, and we think it's important to understand the degree to which this hypothesis stands up. Fire as a potential vegetation management tool in the urban fringe is a provocative proposition. It's a lot easier to talk about prescribed burning in areas where there are relatively few residents. This suggests that forest landscapes create different perceptions of risk: the values that are at risk, and the manner in which human interventions affect that risk.

The fourth study we'd like to propose is related to the previous study, since it examines the communication processes that occur throughout fire events. Fire people, because of their training and experience, tell the public what they want them to learn. Fire people are most interested in predicting fire behavior and planning a fire suppression strategy. That's what they are able to communicate. But what does the public want? What about residents who may have to evacuate sometime soon? They want information that reduces their fear. A large fire coming at their homes and communities causes an emotionally unsettling fear and is a very disordering experience. These residents want order back in their lives. They need information that permits scheduling. They want to know when they can come back to their homes. They want information that conveys a sense that

there is some control, that this event is not completely uncontrollable. We hypothesize, then, that fire managers tend to communicate from a cognitive perspective. They have a sophisticated understanding and have been taught to be rational and analytical and to ignore their emotions. Fire victims on the other hand, don't use these cognitive skills, because for them fire is a very emotional experience. We are not suggesting that fire fighters need to learn counseling, but we would hypothesize that agency training is inadequate in regard to these kinds of empathetic communications activities.

We would also hypothesize that people don't accurately process the information they receive when they're in a crisis situation. Rather, their perceptions of what they hear and understand are selective. People in crisis take in information and use it to confirm existing feelings. They use it to attribute causality –usually to human agents, when they're in the midst of a crisis. There is a psychological need to look for human agents to blame in times of extreme stress. We hypothesize that people will construct a very narrow causal schema, reflecting a dislike of a human agency. People look for somebody to blame.

This leads us into the fifth proposed project, which we label Post-Fire Social Psychology. We just talked about what happens during fire. Now we wonder what happens after fire. We begin with the premise that people are uncomfortable with the notion that fire is an uncontrollable phenomenon. Wildfire is not a comforting notion for people who live in fire prone areas. We suggest it's possible to develop a classification system for understanding the types of losses people experience from uncontrolled fire. It's possible there is a whole matrix that could be developed to categorize various kinds of losses people experience in fires. These could be resource concerns, the loss of a special place, personal concerns such as injury, death, or the loss of personal belongings. In terms of methodology, there's a lot of literature that could be examined, and we could also conduct personal interviews.

We would also hypothesize that members of the public tend to make an agent attribution error when relating to catastrophic fire. People want to find others to blame – a human agency to blame rather than understand the crisis as something that happened because of nature. We suspect the more people feel a sense of loss, the more likely they are to make an agent attribution error. We propose interviewing people affected by fires, looking at the kinds of attributions they make. It would be interesting to see whether those attributions change over a period of two months, three months, or a year.

The last study is the most recent one we've added to the mix. It examines the differential acceptability of smoke. We know that smoke creates problems for many people. We recognize how acceptability is more complicated than simply a "presence or absence" test, depending on how conditions and actions are framed. Is it possible that certain levels and durations of smoke are more acceptable than others depending on how reasons for the smoke are framed by authorities and the media? Acceptability of the smoke that is affecting my community today could be greatly affected by perceptions of its naturalness. Conversely, if the smoke is seen as something that's never been part of the system or something that's intended for commercial benefit. We would hypothesize there are a number of things that could affect how people react to smoke. As we heard earlier, there are issues of context and trust. It's very possible that the reaction to a given smoke event could be quite different because of other intervening factors. The methods that we would utilize in this final study would be similar to some of the earlier studies, employing focus groups, interviews, and surveys.

In summary, what we have proposed are six studies with provisional hypotheses within each. It will be fascinating, throughout the course of the conference, to listen to your ideas and the responses you have to the studies that seem the most relevant to you.

DISCUSSION SESSION

- The first study that looks at the Forest Service as an organization cannot ignore the fire research community. Fire research has been developing tools for fire management over the long term. What we need to be looking at is the capability of the agency to adopt those new tools and put them into practice, especially with the loss of expertise we have suffered over the last years.

- We run a real peril if we strive for perfection and extend this expectation to the public. We're very concerned, as you are, with our capacity to be effective. We're going to do a more sophisticated job, but what we need to figure out what part of the job we will actually be able to do. It's going to be much tougher, since we've raised the bar of expectations and it scares us to death.

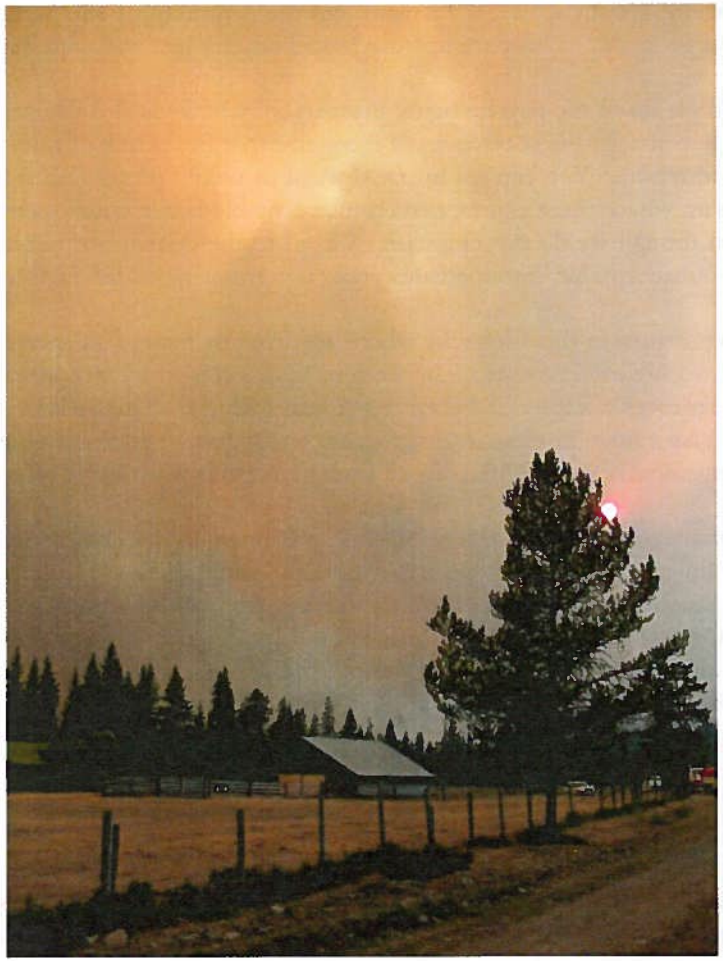
- As an agency the Forest Service has not made an effort to determine exactly what we can do. Now, all of a sudden, Congress is saying, "We're going to give you another $800 million." That's great, but what if we don't have the people to do anything with it? We're going to have a few hundred people running like hell to stay behind! It takes ten to fifteen years to build the capacity in new people to deal with these different areas of concerns.

- Both fire control and fire management are necessary as long as the public wants us to put out fires. We need fire management and fire ecology. At the same time, we can't forget fire suppression, when the public demands certain fires should be put out. That's the balance.

- How do we deal with the diversity of Forest Service employees? We've got resource people who have not had much to do with fires, and it's now being forced down their throats. They don't have the tools to deal with fire. We've got managers who don't understand fire, and we have a whole generation of staff overwhelmed with new demands.

STEVE DANIELS PRESENTATION

In addressing participatory approaches to fuels and fire management, my remarks are going to emphasize the inseparability of fuels management and fire psychology. I had an opportunity before the conference to travel down to the Bitterroot and take some photographs of the aftermath of the fires of 2000. The emotional impact of these fires is hard to overestimate. People who built their houses in the valley had powerful feelings about their place in nature. Consider the names they give to their ranches and their private streets out in the forest. The name "Sacred View" on the street sign leading up to a small group of houses exemplifies the importance of natural views to the residents. People's dreams as well as their life savings are connected to their homes and their properties; they identify with the land around them, and now it's burned. When their house or their neighbor's house is destroyed, how do they evaluate their place in nature? What do they think about their house being there, in a setting that they have considered "sacred?"



No matter where you lived in western Montana over the last year, you were affected by fire. Everyone experienced the smoke, the threat, the uncertainty. The drama of the fire events was inescapable. For those not living in the Bitterroot or in the wake of other fires, the newspapers and television reports describing the movement and destructive force of the fires shaped people's perceptions, keeping their focus on this extraordinary event. This was a big deal for people, what we could consider a theic life event. The fires didn't last for just a day and disappear. Fire was with these communities for four, five, or more weeks. At one level fire sweeps clean the ecological landscape, but at a more profound level, the fire also sweeps clean the relational landscape. Since this fire, people have different relationships to the forest, to each other, to the Forest Service, and to the firefighters who came into their lives. So we have this change in people after the fire, and we need to understand the psychological issues surrounding fuels and fire management if we ever want to approach the question of social acceptability.

In addition, I want to stress to managers the centrality of the participatory model in developing, implementing, and monitoring a fire or fuels management program. This participatory model doesn't just end with managers, for fire research demands a participatory approach as well.

If we think about the psychological inseparability of fuels and fire, we can start with a consideration of a hierarchy that affects the acceptability of fuels management. At the root we must recognize that fire is one of human beings' fundamental fears. We're hard wired for this. Fire frightens people and for good reason. You can get hurt. Most of us would prefer not to treat fuels at all. In the short term it's not an attractive proposal. It's only in the long term, where there can be certain unacceptable larger consequences, that treating fuels makes sense. For example, how many of us go to the dentist even though we do not enjoy it? We go to the dentist not because we think it's fun, but because we know the outcome if we don't go. Our tolerance of unacceptable, intermediate events is contingent on the unacceptability of larger consequences.

Now lets return to this hierarchy where we progress toward an acceptability of fuels management. At the base is the understanding of our place in nature, our worldview of nature. The western tradition is to try to control nature. We have powers to control what goes on around us. And from this worldview emerges a series of beliefs regarding forestry. This is how the forest works and this is how we should be interacting with the forest. Managers make a huge mistake if they attempt to separate fuels from other land management decisions. Fire and fuels management are really a part of forest management. The acceptability of fuels management is deeply affected by our worldviews, our beliefs about forestry, and our attitudes about fire.

Fuels management discussions must be informed by psychology if they are to be effective, and these discussions must also account for the differences in psychological responses based on three distinctly different phases of fire events: pre-fire; mid-fire, and post-fire. Pre-fire fuels psychology might be the most difficult to address, since during this phase the idea of treating fuels lacks salience. People mis-perceive the likelihood of a fire event, so why should we be worried about fuels? The problem of course, is that this inattention to the problems and risks associated with fuels leads to under-action. This is why these other phases are so important. During the mid-fire and post-fire phases, the focus shifts sharply to the centrality of fire and dealing with its consequences. During a fire, or in the mid-fire phase, the idea of treating fuels or managing the forest falls out as a priority. There's but one job to be done. Just put out the fire, please! This is the immediate and single priority. We'll worry about being prepared later. It's the post-fire phase that is the area that offers the most interesting and rich psychological considerations, where the time is ripe for changing relationships and changing behaviors.

In the post-fire phase the fuels question retains a high salience, yet there are other powerful emotional responses underway. Foresters don't think of this, but the aftermath of a fire creates this incredibly fertile, emotionally laden environment. This is a key point: managers must manage the post-fire social environment tremendously well if they hope to manage fuels on a meaningful scale.

In post-fire psychology we have agencies under the spotlight, for we heard earlier about causal attribution, about the psychological need for people to find a human agent to blame for the crisis or harm that happened. Questions of competence and motivation arise. This is time of tremendous sensitivity for the agencies. The agencies have to know that this stage is happening and not get their feelings hurt. Even though recrimination may happen, it's vital to keep the relational momentum up. People who have been working 18 hours a day fighting fires and doing the heroic stuff are confronted by people who say, "Hey, you didn't put my woodpile back! You came and moved it and now who's going to put my woodpile back!" I've

heard that kind of stuff. It hurts. Fire people who risk their own houses so they can be someplace else protecting someone else's house get blamed for people's problems. At the same time, there is this moment, a relational moment, a person-to-person connection where discussions are real and where there is the opportunity to forge trust.

This is a critical time, a time when managers must be open and honest. At a time like this, when everyone is stressed, I would just love agency people to say, "I never saw a fire like this! I hope I never see a fire like it again – it scared me to death!" There would be a moment there, a connection. It becomes quite clear during the fire event that people need one another. There is the immediacy of a shared goal, and it creates a different kind of relational space. The question then becomes: does this cathartic event create the conditions for relationships that allow us to break free from old styles of relations and communications?

Managers also have to allow time post-fire for grieving to occur. They need to validate significant losses. They need to accept the irrational recriminations graciously. They have to take pride and be humbled. Forestry people are trained to suppress all of this, but they have to acknowledge the enormity of fire's impacts on people. Not all these impacts are the same; there are gradients of types of impacts. Did you lose a home? Was it threatened? Were you evacuated? Did you lose livestock? Were you scared? All of these have effects. We often think that fire affects only people who lose property, but people whose houses are left more or less intact have some of the most profound psychological issues to work through because they have survivor guilt. They know they are the presumed winners; their house is still there but they feel awful. I talked to a woman up the East Fork of the Bitterroot. It had been a month since the fires. She'd been evacuated three times and out of her house for six weeks. Three times she had a half- hour to choose what it was she wanted to take. It was a month since her last evacuation and she could not put the family pictures back on the wall. She could not, emotionally, hang the pictures back up. She was afraid she might have to take them back down. Psychological impacts occur in all sorts of people and at different rates over time. The Forest Service can come to a post-fire meeting and talk about salvage and sanitation, and people can sit there worrying, drumming on the table top, unable to deal with these terms because they are still processing their experiences with the fire.

Fires are disturbances, to be sure. They are ecological disturbances, but they are social and psychological disturbances as well. Managers tend to focus on the ecological disturbances, but my message is that they focus on this at their own peril. A richly communicative approach is the only means of rebuilding trust to move forward in the wake of a significant fire. NEPA just doesn't cut it.

Let me turn to my research colleagues and include them in this demand for participatory processes. Research from afar is ineffective. Research should be interactive, shaped by the questions, demands, and concerns of people who live with the consequences of natural resource disturbances. We still consider the scientists to be the most effective people to shape questions regarding fuel treatments, and yet now more than ever, we need to gain insight from a dialogue that can only stem from conversations with an engaged and worried public. In addition, traditional research takes too long and is cast too narrowly. Fire research demands at least a real-time approach, and at bests a participatory approach.

The will to manage fuels, fire, and forests will emerge from the furnace of political discourse. Concepts and measures of acceptability won't matter a whit. There is no list of the types of behaviors that are perfectly acceptable – acceptability emerges from people, their situation, beliefs, and how they relate to the environment. The search for acceptability is a misplaced quest for a rationally correct approach to a fundamentally political process. Although managers may wish for a formula, acceptability cannot be studied in order to produce a formula that possesses any managerial significance.

What then can be the greatest contribution of research for understanding how people relate to fire and fuels? Research can create and evaluate new learning processes so that when managers, researchers and community members wade into the discourse, effective means to communicate and build trust are available. Research can also offer some specific breakthroughs and tools that can support this discourse. It can design and test new simulations and visualizations allowing people to see the potential impacts of forest management actions. Research can also help groups with real time process evaluation, so when they are in groups attempting to work out ideas and solutions, they can get an immediate sense of precisely where the group's agreements and disagreements lie.

Why does any of this matter? Why is it important to understand the role of participatory processes in the management of fire and fuels? My view is this: in fire and fuels management lie the seeds of either destruction or renewal of public lands forestry. We all recognize the importance of the public lands to the West. The controversies that have enveloped public land management in recent decades have eroded the confidence of public land managers to carry out their professions. We have attempted to move from multiple use to ecosystem management, but we haven't arrived. Ecosystem-based management demands discussion of the role of fire on western lands.

We might wish to think about two alternative images of fire. The first is Nero, the emperor of Rome, fiddling while Rome burned. The fire situation of today cries out for attention. Are we going to ignore public demands for a new type of fire management and forest management and fiddle away this opportunity? The second image is of the Phoenix rising from its flames – a rebirth of natural resource management agencies. Will this be the image that fire brings to public lands – one of regeneration and flight into a new territory of responsive, confident management?

Can fire management replace fire suppression as a core competency of the Forest Service? We considered this question in earlier presentations. If yes, then a new social contract is emerging, one in which fire events frame the relationship between the agency and the community. If not, the political

base for federal land managers will continue to erode. It is necessary to acknowledge that federal forestry refers to politics. And as we saw this past summer, fire refers to fear. The best hope for dealing with the politics of fear and distrust is a participatory public discourse the likes of which we have never attempted in forestry with citizens, managers, politicians, and researchers as learning partners.

DISCUSSION SESSION

- Some of the issues you raised are the exact issues we face now in other sectors beside fire. Wildlife biologists who care for animals and their habitats speak from their hearts and not their brains, and we have to deal with those folks. We have to be able to convince people in our agencies, especially the research people not involved in fire any more, to speak out and listen in a new way that acknowledges emotions.

- You made a very good case for the need for discourse, but we didn't have time to hear you talk about the role of technical and scientific information in that discourse. Could you comment on this? *Steve Daniels responds*: I want to go back to the notion of necessary and sufficient. I believe that our best science is absolutely necessary. It's essential. Our operating space is now very narrowly crafted because of the values we care about and all the places we are able to put houses. So we need top quality work to understand what we can feasibly do. Yet our attitude as technically trained people is that good science is sufficient. I'm arguing it is not sufficient. It's not either/or. It's not political discussion or science. If we break it that way, we're all going down in flames. Neither choice is sufficient. One deals with complexity, and one deals with controversy. We've got to find ways to deal with both simultaneously. It's good science located in the body politic.

- The basic question is how we deal with uncertainty. There's always the assertion that we don't really know, so what can we do? *Steve Daniels responds*: There's a dynamic. The answer to your question will abide in us. We have to come to terms with the realization that we live in a world we cannot control. As much as we want to control it psychologically, as much as we would love to control nature, we have to gain the humility to know if you choose to live in certain kinds of places there will be certain kinds of risks. We've got to take responsibility for that.

PETER LANDRES PRESENTATION -- ECOLOGICAL CONSIDERATIONS IN USING PRESCRIBED FIRE

Today. I'd like to talk about three ecological considerations in using prescribed fire: defining ecological goals; identifying ecological concerns; and last, examining some overarching questions that need to be asked about proposed uses of prescribed fire.

We heard the metaphor earlier in this Conference about the need for using prescribed fire and mechanical treatments to reduce fuels accumulated from fire exclusion so that we don't get our ecological "teeth" kicked in. This is a valuable perspective. This is also a limited perspective because fuel treatments and prescribed fire are intense manipulations that may pose long-term ecological risks.

Throughout this talk I'll drive towards a single bottom-line: we need to understand and weigh the potential benefits and impacts to both ecological and socio-economic values before we use prescribed fire. I'd like to go back to the story of King Solomon, raised in an earlier question-and-answer session, to illustrate this notion that with every action there are things that we gain and things that we lose. King Solomon wants to build his big temple and there are these large cedar groves, so the King says, "I need these big trees to build this temple." Yet his people say, "Hey, these cedar groves are beautiful and they are filled with wildlife. We don't want you to cut these trees down!" So the social scientists who advise King Solomon say "Well, if we improve our participatory processes and talk with the people about their concerns, we may still be able to cut these trees." So the social scientists and psychologists figure out ways to improve the political discourse between the King's administration and the people who were concerned about cutting the trees. Eventually, the people feel that they were involved in the decision-making process and the trees are cut to build King Solomon's temple. Today there are very few Cedars of Lebanon. The moral of this story is that we can improve deliberative discussions and allow people to feel good about the process, but what happens in the end? Perhaps we can improve the social acceptability of fuel treatments, but what are the ecological costs? What are the potential ecological implications we need to think and talk about before we take action?

Before talking about ecological considerations in using prescribed fire, I want to talk briefly about the ecology of fire. From an ecological perspective, fire simply is. What I mean by this is that fire is a fundamental transformer of ecological systems and is neither "good" nor "bad." There

are certainly negative consequences from fire when it threatens and destroys property or life, but whenever and wherever fire occurs, it will always play a large role in shaping biological systems.

Fire is very patchy in its intensity and in the types of impacts it has. Fire doesn't sweep across the landscape in a uniform manner. In some places the soil is scorched. In other places it is not. In some places the canopy is burned. In other places, not. Fire has many, many different effects on plants, wildlife, and the ecosystem, and many of these effects we are just now starting to appreciate. By killing trees, fire creates snags that wildlife use. In the short term, fire may kill isolated fish populations, but in the long term downed trees felled by fire provide organic input to streams and habitat for fish. Fire converts organic matter into inorganic nutrients that plants then can take up in their roots. Fire has many effects on an ecosystem. And as a professional ecologist, I'd suggest that we still don't know all of the short- and long-term effects of fire that life now depends on in fire-dependent ecosystems.

What is the problem when fire is excluded and fuels accumulate in fire-dependent ecosystems? Decades of fire exclusion have caused a variety of ecological impacts. We know that fire is a fundamental transformer of ecosystems that alters the composition, structural patterns, and distribution of vegetation. When we exclude fire, we allow certain plant species to grow in the forests that otherwise would have been taken out by fire. We know some, but not all of the ways that wildlife depends on vegetation, and when we alter the pattern of vegetation by excluding fire, we alter the distribution and abundance of wildlife. By excluding fire, we have set these landscapes on a different ecological pathway. In some ecosystem types, such as moist forests with infrequent but severe fires, we are within the realm of our historical understanding of fire regimes and fuel accumulations. In others, especially drier forests with frequent, low severity fires, we're generally outside the realm of that understanding, putting these ecosystems at risk.

We can reduce these accumulated fuels that pose both social and ecological risks using two primary methods: mechanical thinning and prescribed (or management-ignited) fire. For the purposes of this talk, I will not discuss a third way of reducing accumulated fuels – to let naturally occurring wildland fires burn.

Ecological Goals for Using Prescribed Fire

Prescribed fire is typically used to accomplish two different general goals. The first is to accomplish socio-economic goals, mainly to reduce hazardous fuels that pose an immediate risk to life and property. Everyone in this room already knows about problems in the wildland urban interface and the fuels that people have allowed to grow next to their homes. I won't talk further about hazard fuel reduction and this socio-economic goal. Instead, I'm going to concentrate on the second general goal for using prescribed fire, which is to accomplish ecological goals.

Prescribed fire can be used for two specific ecological objectives. While both objectives are related to one another, they are also different in their intended purpose, implementation, and outcomes. The first ecological objective is to restore natural fire regimes and the effects of natural fires on the ecosystem. For this objective, prescribed fire may be used to reduce fuels that have accumulated from fire exclusion. These may be dead fuels on the ground or live fuels like trees that serve as ladders to carry fire from the ground into the crowns of larger and typically older trees. For this restoration objective, prescribed fire is used to reduce accumulated fuels to the point where naturally-ignited fires will be allowed to burn, presumably with their

natural effect on the ecosystem. Typically, in western forests prescribed fire is used to accomplish restoration of high frequency, low severity fire regimes.

The second ecological objective for using prescribed fire is to maintain a natural fire frequency. In some situations, naturally-ignited fires are suppressed because of the risks these fires pose to life and property. In these situations, natural fire frequencies will only be maintained by prescribed fire. For example, in the Selway-Bitterroot Wilderness there are two distinct fire practices. In the central part of the Wilderness in Idaho, natural ignitions are allowed to burn if conditions are within prescription. On the eastern margin of the Wilderness adjacent to the communities in the Bitterroot Valley, however, most wilderness fires are suppressed because of the perceived risk that these fires will burn out of the Wilderness and threaten life and property in the community. We may never allow naturally ignited fires to burn in the east margin of the Selway-Bitterroot Wilderness because the risks to adjacent communities are simply too high.

In these high-risk areas, the primary use of prescribed fire would be to maintain low fuel accumulations that provide "defensible space" around valued property and allow fire suppression actions if needed. The secondary priority for using prescribed fire in these situations is to meet the ecological objective of maintaining the natural fire regime and the fire-dependent ecosystems that are valued by society.

Ecological Concerns in Using Prescribed Fire

There are two broad types of concerns associated with the use of prescribed fire for accomplishing either of these ecological objectives of restoration and maintenance: technical concerns and institutional concerns. I'll first talk about the technical concerns, and then the institutional.

There are three technical concerns for the use of prescribed fire. The first concern is that we often lack the quantity and quality of information we need on reference conditions to adequately judge the need for prescribed fire. In some cases, we have adequate information to decide whether prescribed fire is needed or not. But in many cases we have insufficient information and we make implicit or explicit assumptions about past fire regimes and their effects. Earlier we heard discussion about how difficult it is to define the word "natural." I want to reinforce this as a basic question when we talk about restoring or maintaining fire-adapted ecosystems. The definition of "natural," or of "reference conditions," defines the context and often the

management target, and if there is confusion about this target, we have little idea what we will accomplish with prescribed fire. For example, ponderosa Pine forests are generally understood to have frequent, low severity fires that prevent ground and ladder fuels from accumulating. But some recent research suggests that historically even in these ecosystems there were places with large fuel accumulations and severe fires. Which of these very different situations defines the "reference conditions" that will set the objectives for using prescribed fire?

Do we have sufficient information on the history of fire? The study of fire scars and cross-dating these scars to other trees can determine the exact years in which fires occurred. We can develop good information about the frequency of fires for a given area. The problem is that this type of understanding takes a lot of effort: cutting trees, sanding cores or "cookies," dating them, and developing a fire chronology. For some areas, we have wonderful data about the frequency and size of fires, but the information is limited to the area that was sampled. For most areas we don't have high quality information about the frequency, size, distribution, or severity of historical fires, and how these variables change over time and from one place to another. Extrapolating information on reference conditions derived from fire scars from a few sites may not be sufficient for the broad-scale application of prescribed fire.

What about weather? Prolonged drought, especially following wet years, tends to produce active fire seasons. Do we have historical information on prolonged drought? We can use tree rings to reconstruct some of this climate information, but do we know what the weather was locally? Local frontal storms produce the lightning and winds that often drive large fires. For most areas we do not have this type of weather information for past fires, limiting our knowledge of past fire behavior on which we develop current prescriptions for fire use.

What were the fuels like when historical fires burned? We can use modeling to infer how much fuel was available, which is a good beginning. We can also use historical vegetation maps to make inferences about fuels. The ecological objective is to use prescribed fire today to restore historic fuel conditions. But given our paucity of information on how past fires burned in historic fuels, we build layer upon layer of inference to use prescribed fire to restore historic fuel conditions, with little certainty about how effective we are.

What about native people? We have some information about where native people were burning, especially in places such as the Sierra Nevada in California. In other areas we don't have much knowledge about past burning practices of native peoples. For example, how often were native peoples burning in higher elevation areas? Again, the information is meager.

To summarize this first technical concern, we simply don't have the quantity or quality of information we would like to have about reference conditions for using prescribed fire, nor are we likely to ever have this information for all areas. As a result, we often end up extrapolating information from other areas, from models, and from opinions, and we don't really know the ecological effects of all these extrapolations and inferences.

My second technical concern is that we generally lack information on the direct and indirect effects of prescribed fire as a surrogate to maintain a natural fire regime and its effects. The idea of restoring and maintaining fire-dependent ecosystems is based on the presumption that prescribed fire is an effective surrogate for natural fire. How much do we know about this? I have two concerns here. The first is that natural fires, especially in the Northern Rocky fire-dependent ecosystems, tend to occur when the probability of control is low. In other words, the most active fires typically occur

in mid to late summer when frontal weather systems occur, we've had extended periods of drought, and fire-fighting resources are low. When will prescribed fire be used? Because of the substantial risks, prescribed fire will not be used in mid to late summer. Instead, it will most often be used when fuel moisture is higher and the probability of frontal systems is low. In other words, a prescribed fire will most likely be used when the probability of control is high. Does this change in timing and likely fire intensity make a difference ecologically? It appears that it does. Research in Australia on the effects of prescribed fire as a surrogate for natural fire strongly points to the conclusion that prescribed and natural fires have very different ecological effects if the intensity and timing of the fires are different.

We also lack of information on the indirect effects of prescribed fire. Does prescribed fire affect the establishment and growth of noxious and exotic weeds? What are the effects of prescribed fire on small mammals? We may be able to say that a prescribed fire met its objectives for reducing fuels, but what's the effect of this action on all the other things that comprise a forest ecosystem?

My third and last technical concern is the "one-size-fits-all" solution of using prescribed fire across a landscape. To illustrate this concern, let's again consider the Selway-Bitterroot Wilderness, covering 1.3 million acres. A map of fire regimes in this Wilderness shows the tremendous diversity of fire regimes in this wilderness. This diversity of fire regimes in the Selway-Bitterroot Wilderness is driven by diverse topography, which strongly influences vegetation, fuels, and fire behavior. The broad scale application of one or even a few different fuels and fire prescriptions across such a variable landscape can have potentially severe ecological consequences. Yet when there is strong public and political pressure for using prescribed fire to reduce fire risks to life and property, there is an equally strong potential for applying the limited information we have as broadly as possible. Applying one or even a few prescriptions across topographically and ecological diverse landscapes is the source for much of the concern about the use of prescribed fire.

I next want to address several institutional concerns with using prescribed fire, again from an ecological perspective. Chief among these concerns is a lack of clearly defined goals in using prescribed fire. Possible goals for the use of prescribed fire include: restore natural processes; restore a desired ecological condition, such as old-growth forests; restore a landscape mosaic of successional stages; maintain a relict fire-dependent plant community; or, produce forage for wildlife. These are just examples, but they illustrate the breadth of potential goals. What is crucial is that each goal may require a different approach, a different application of prescribed fire. Without clearly and explicitly defining the goals for using prescribed fire, the public cannot know or understand what the outcome of using prescribed fire is supposed to be.

Another institutional concern is the inequality of social values compared to ecological values, and the risks and benefits of using prescribed fire. Most people are risk averse regarding fire, and the ecological benefits of letting a fire burn rarely receive the same weight as the social benefits of suppressing fire. The danger that flames and smoke pose to life and property will always take priority over environmental philosophy and the long-term, sometimes subtle ecosystem functions that depend on fire. Exacerbating this inequality is the lack of formal agency processes for fairly and equitably evaluating the tradeoffs between social and ecological risks and benefits from using prescribed fire. Does the public, especially the conservation community, trust the agency to fairly evaluate and balance ecological and social risks, over both the short- and long-term? In my opinion, this trust is lacking, likely making efforts to use prescribed fire a difficult contest of wills that pits different community groups against one another with the agency in the middle.

A related institutional concern is our lack of understanding about how to apply prescribed fire in different management settings. For example, in areas adjacent to homes in the wildland-urban interface, there is little question about the need for using mechanical fuel treatments and prescribed fire. Wilderness, however, is politically and administratively a very different landscape, and wilderness managers wrestle with whether we should even consider the use of prescribed fire in wilderness. One of the fundamental values of wilderness is as a place that is "untrammeled" or unmanipulated and uncontrolled by people. We can use prescribed fire in wilderness, but the more important question is whether we should manipulate wilderness in this way, even for the goal of reducing fuels that have accumulated from decades of fire suppression. And do we go into wilderness and reduce fuels mechanically before we prescribed fire? These philosophical questions go to the heart of what wilderness is and remain unresolved.

The last institutional concern I want to discuss is a lack of humility. For decades agencies vigorously said "We need to stop fire!" Now the agencies are saying, with equal vigor, "We need to light fires!" But do we really know when and where prescribed fire must be used, or is most effective? Do we really understand the consequences of what we're doing? One of the best examples to illustrate this problem is the Swedish chemist who invented DDT. He received the Nobel Prize for his invention because it killed mosquitoes and saved thousands of lives from malaria. Only much later did we realize the profound negative ecological consequences of DDT. I'm concerned that we may be swinging the fire pendulum all the way from one side to the other, from complete exclusion to complete use of prescribed fire. I'm not arguing against the use of prescribed fire because I firmly believe that it can play a vital and important ecological and social role. What I am arguing for is that we use caution and humility, that we be clear about what we know and what we don't know, and strive to develop a process that fairly evaluates and weighs the social and ecological risks and benefits of prescribed fire.

Overarching Questions about Using Prescribed Fire

In closing, I'd like to offer four overarching questions that I think need to be asked, and answered, whenever and wherever prescribed fire is proposed. First, are the goals and objectives clearly stated, and if so, what are the potential short- and long-term ecological consequences? If the ecological consequences are likely to be severe, then much more caution and public discussion is warranted in using prescribed fire. Second, is there sufficient understanding about reference conditions and restoration actions? And is our understanding at the appropriate spatial and temporal scales? For example, a lot of fire research has been at the "stand level" and our knowledge is fairly robust about fire at this spatial scale, but we have much less understanding about landscape scale fire behavior and fire effects. Third, what are the benefits and risks of using prescribed fire versus not using prescribed fire? We have many choices and we need to be explicit about these choices and their likely outcomes. In some cases we may have a good understanding about the likely socio-economic benefits but poor understanding of the ecological risks. Such cases may be common, and I'd suggest that we need to be open and straight forward with the public about what we know and what we don't know. Fourth, what can we learn from the use of prescribed fire? Right now we have the opportunity to use prescribed fire as an experiment to improve our understanding about fire and its management. If we don't learn from our use of prescribed fire, we will have lost this wonderful opportunity to improve our understanding about how to maximize the benefits and minimize the risks of using prescribed fire.

DISCUSSION SESSION

- You've talked about mechanical treatments and prescribed fire and the concerns they raise about restoration and maintenance. I've heard of recent proposals about chemical treatments. I'm curious about their ecological effects. Where do chemical treatments come in with relationship to what you just told us? *Peter Landres responds*: The use of herbicides to reduce fine fuels is an issue I don't know much about, but the concerns I raised are the same with any type of fuel treatment. It doesn't matter if you're talking about the use of chemicals or any other treatment. Each type of treatment will have different ecological effects. With chemicals we might be very concerned about their impact on the soil fauna and flora. Will those chemicals have a long-lasting impact on native plants in the area? What are the indirect effects on small mammals? If you wipe out a whole bunch of plants in the area, then you wipe out the seed source for small mammals, as well as the little places small mammals and birds like to hide – underneath grass bunches, for example. What are the rippling affects on intermediate sized carnivores? *Follow-up question*: Aren't there problems that are specific to chemicals - people's perceptions of chemicals? *Peter Landres responds*: Absolutely. Chemicals have well known negative impacts on people and there's a large literature on toxicology, so people are knowledgeable and concerned about chemicals. As we start going down this chemical path to fuel treatment, it will be real interesting to see what happens with regard to social perceptions.

- You spoke of our tendency not to recognize indirect responses to interventions that seem to have been a good idea. Now we know, years later, that fire suppression created very different responses than we anticipated. How can we know what to do now? *Peter Landres responds*: I think the parallels between fire suppression and prescribed fire are really ironic. The question was already raised about whether prescribed fire will mess wilderness up even more than fire suppression already has. There are scientific components as well as ethical components to that question. There are many people who can accept that we messed up in the past, but from this point on, let's keep our hands off and accept the negative consequences of fire suppression. But there is another ethical view that says, "We messed up in the past, and it's our moral responsibility to do everything in our power to overcome the problems that we've caused." In my view, these discussions need to be based on the relative risks and benefits of acting versus not acting in each specific situation.

- Two highly related questions. Number one, why did you put the activities of native people under the category of "natural?" And number two, how do reference conditions, those that refer to a state of nature, relate to recent ecological theories that emphasize the flux of nature? *Peter Landres responds*: I put native peoples under the category of "natural" for the purpose of defining management goals and targets. We need to be explicit about what we are defining as "natural," and we are really defining social values. Do we choose to include native peoples' activities under "natural" or do we choose not to include these activities? I don't think it really matters whether the management community chooses to include or exclude the effects of native people in defining natural reference conditions. The crucial part is that managers be very clear and explicit about the values that drive what is included and excluded in the definition of "natural." To respond to your second point about the dynamic flux of nature, let me assure you that in my definition, reference conditions are absolutely not static conditions. Ecological systems are dynamic and constantly changing, adjusting, accommodating to what is going on every day. Every time I hear the phrase, "balance of nature," I cringe because this phrase conveys to society an imprecise, wrong notion that ecological systems strive towards and achieve some sort of "balance" or steady state. This is

a relevant discussion for the use of prescribed fire because some people claim or imply that ecological systems are now "out of balance" because of fire suppression, and that prescribed fire can bring them back into balance. That is an imprecise and incorrect ecological notion.

VINNIE CORRAO PRESENTATION

We are an independent, natural resource consulting firm with seventeen full-time personnel and another fifteen to twenty seasonal staff. We've been in business for more than seventeen years and in much of that time, we have been in fuels treatment management. Our company provides services to non-industrial, private and industry lands. I also want to introduce a staff member, Dennis Thomas, who has been in the fuels treatment business for thirty-one years. He handles our fuel treatment program that includes about 5,000 acres of prescribed fire each year and about 35,000 acres of hazard reduction in the urban interface.

We do 50 or more timber sales a year and the urban interface is really hitting us in the face. Fifteen years ago we didn't have very many homes on our timber sale areas. I would say on 75% of our timber sales now there's a cabin or a nice home on the property. We try to encourage those landowners to clean up around their houses, and we also try to encourage them to put a pond in. Ponds are very popular right now for wildlife, but also for fire suppression. Most people like to build their homes up on a hill, and there's just no water there. There's very poor access for fire equipment, so there's just no way to protect that home. So we push the ponds. We try to get the roads cleared so that if they do experience a lightning strike, there is access. These are some of the things that landowners may not be thinking about, so we put them in our management plans and our stewardship plans. We try to encourage landowners to think about these things so that when the real event happens, maybe they've done something. This season we spent a lot of time with wildfire, and even though most of us are aware of wildfire, after this summer the realization hit very hard that landowners were not thinking about wildfire most of the time.

Let me share a few stories from this summer about the importance of fuel treatments. The Maloney Creek Fire in the Salmon area eventually grew to 73,000 acres. It started with a lightening strike on one of our landowner's properties in the heat of the end of August. The state of Idaho's emergency equipment was totally exhausted and the Forest Service was already over- committed. So the landowner calls us! Of course, we have every truck out. They had been out for weeks. But the State of Idaho called and demanded that we put our trucks on this fire. When I got there, there was an old Cat and an old skidder trying to protect the home. We did save the home and within twenty minutes the fire burned up about 3,000 acres on the West Fork of Maloney Creek. The landowner is a National Tree Farm candidate, and he was also a smokejumper when he was young. He knew what could happen and you want to

talk about fear. During the fire he was incoherent and pretty unreliable, even though he was obviously aware of what was going on. It was interesting to see someone who's owned land for almost 35 years, and this was the first fire event he had ever witnessed on his property. He had 40 to 50 inch old-growth Yellow Pine, 175 feet tall. They were legacy trees. They were just beautiful. He had about 200 of them scattered through 160 acres, but then in the creek bottoms there were probably 40 tons to the acre of Grand fir that had toppled over. When I got there, he took me over the edge and he asks, "What are we going to do?" I mean this is 75% slope, real hot fuels, and eventually the fire came and took the whole 160 acres.

The interesting thing is to hear this fellow speak now. There was no way he was going to stop that fire from going through those 160 acres. In these cases the landowner is totally at the mercy of this whole operation - the state pulls in and out. Suddenly some Australian firefighters show up. One day the state brought in three Cats, put in half the lines, and then for some reason, they called the Cats off the job before they finished the lines – and the landowner got over there and said, "What are you doing? They're loading the Cats and they're taking them out!" Nobody told the landowner anything. Talk about communication! Here's this guy, losing $300,000 worth of timber and his home is threatened, and there is virtually no communication between the landowner and the operations on the fire. The Australians did a great job. At least they talked to him. They told him what they were going to do. They said they were going to put a line here. They were going to black-line it. This was what the intent was. He did say that his experience with the Australians was very good, only because they talked to him.

Another story is about the Burnt Flats Fire right behind Grangeville, and it was around 30,000 acres. It was pretty much a combination of State of Idaho land and Forest Service. We were called in toward the end of the fire to do the black-lining, and when we got there, the state forester and the head operations person were trying to decide where the black-line should go. The Forest Service operations person was looking at topography and the state's person was looking at resource protection, because the state had multiple acres of 15-year-old plantations. They could not agree on where to put the black line. The state person would argue, "Why do we have to burn through my plantation? It's already been burned. It's already a safety zone. Let's go around." I'll tell you they went around and around. We never did burn that night.

There are some real philosophical differences when you have interagency groups and different land managers. They have different priorities. There are even more differences when you start to deal with landowners in these areas of intermingled ownerships. And there are situations where landowners don't know what to expect, such as the Maloney Creek Fire, where there was a landowner just trying to hold on to what he had.

The landowners we work with want to have their forests look beautiful. What we've learned over the years is that if landowners are going to harvest, they don't want to take it all. If you took 25% of the stems, leaving the big trees, I would say 95% of the time it's okay with landowners. If you take 50% of the stems, and remember this is not silviculture, this is purely aesthetics, about half the folks would like it and half wouldn't. We very rarely ever thin more than 50% of the stems and most nonindustrial landowners today, who have not cut their timber since the peak of the market in the mid-90's, want to leave their big trees. They want to leave the big pines and larches, and in reality, these are pretty fire-resistant trees. In the end the landowners could come out pretty well.

A goal or vision the landowners share is they want their land cleaned up. They want their piles burned flat. They don't want any bones out there. They don't want any crumbs. They like their forests. They don't want "slash." We try to tell them about organic recycling and leaving the tops and the limbs and try to encourage them to keep some organic matter on the property. Most of my cutting is really to impede any kind of needle cast or needle fall – but most landowners want to have it cleaned up.

Finally, it's been apparent that prescribed fire scares landowners to death. There are some beautiful pine stands we would love to prescribe burn underneath, rather than pile it, but most landowners just can't handle it. Fear of fire is very powerful. So you do a combination of some fuel breaks, burn enough to get the hazard down and still try to maintain your decomposition. You don't want to clean it up, but most private landowners – I think we've only had two in our almost twenty years - really don't want to do prescribed fire on their ground. It's just too scary.

DISCUSSION SESSION:

- It seems to me that there needs to be a much broader application of prescribed fires. What do you see as the role of private industry – private contractors like yourself? There's going to be a big gap to fill between the agency's capability to do the work and the need to have other contractors do it. Do you think there is sufficient private capability? *Vinnie Corrao responds*: There are two big constraints. One is, you have to be fairly close to your operational area because when the fuels come into prescription or the conditions are right, there has to be a fairly rapid response time. We burn a lot in northern Idaho, but we don't come to Montana. The second constraint is in understanding what is appropriate out there. Certainly, if we're asked to burn an un-thinned stand with heavy fuels, there is potential for escape and a wildfire. You're not going to get Grand fir on the north slope to burn unless you're in 80 degrees and 20% relative humidity, and this is a wildfire condition. You would have to be pretty brave to light the match. So there's got to be some reasonableness there. I know there's a real reluctance regarding mechanical thinning, but if you're going to have prescribed fire you need to have control – unless you're going to enlarge the treatment area to a landscape basis, and if it burns over the next ridge, it's not an issue. We're not at that point now. Currently, we can deal with the low elevation pine types – these are pretty easy. When you

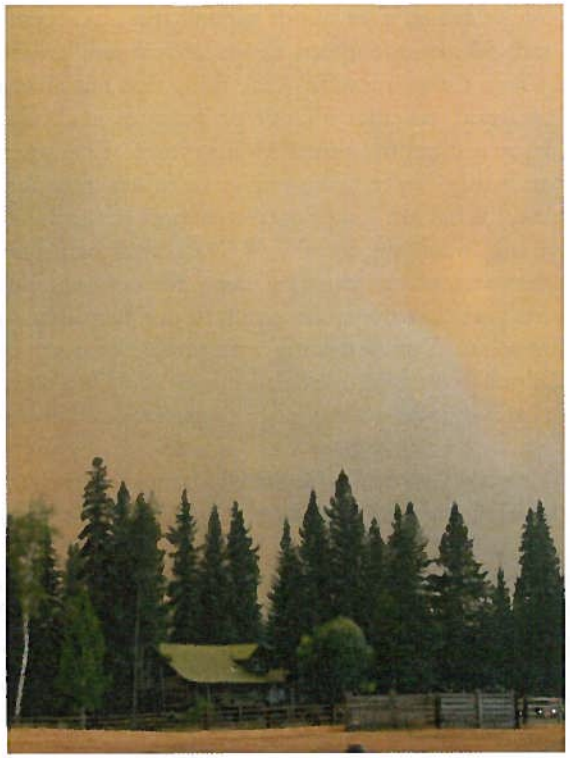
start talking about fir types and serious fuels, ladder fuels, and conditions that could really make you sweat, then we wouldn't want to deal with that.

- We've talked a lot about gaining trust in acceptability of fuels management. What's your opinion, having established trust with these individual landowners, about landowners' reluctance to accept fire on their property. Will this reluctance extend to National Forests? *Vinnie Carrao responds*: One thing that has always fascinated me with forest landowners is that you just don't walk in and sell them the program, whether it's our program or anybody's program. Some of our clients now are on their second or third harvest, but we've known them for almost twenty years. Even our industry clients, who at this point can just call us up and say, "Go burn when you guys are ready," have taken twelve or fifteen years of continued service to get them to that point. I had a landowner call me on Sunday and say, "What am I supposed to expect here? Is it going to burn the grass? Is it going to be a big pile? What's it going to look like? Is it going to kill any trees?" We've already sent him a letter and talked about all that, but they need to have a little bit of extra confidence that what we are doing is okay. It's not something that's going to come quickly. It's going to take years. I would guess it will be up to ten years before you're going to get the public saying, "Yeah. Go in and go do that!" You are starting at ground zero in the education process. You're dealing with people who are not accustomed to the resource, as most of the folks in this room are. I'm not talking about people who are not educated. One client is a retired brain surgeon. Their loyalties and feelings run deep. It could take ten years of good, sound, responsible service before you're going to get people to say, "Yeah. Go do this." That's what we found.

- How do you deal with liability issues? *Vinnie Corrao responds*: We have liability insurance – $2 to $5 million, depending on where we're working, in case it escapes. The timber companies will put us under their umbrella policy so that they're assuming some of the liability.

- It might be too soon to see, but have you noticed an increase in your clientele because of the intensity of this fire season? Are more people asking for help? *Vinnie Carrao responds*: No. There's more harvest in salvage, but that's all. I think it's going to be the same system that we have now for some time, but eventually there may be more attention to the type of work in which we've invested. Certainly, the Forest Service is uncomfortable with contractors. It'll take years, probably, before there's confidence that a firm like ours could work on federal lands. It's going to take time.

JERRY WILLIAMS PRESENTATION



It appears that we're on the threshold of a couple of new eras. One has to do with who we are, and the other one has to do with how we work. The Forest Service is a decentralized, functionally oriented organization, and each unit protects its discretionary authority. Imagine, in an environment like this, an institution embracing a common goal or common objective like ecosystem management. As we look over the threshold of a new era, we will be leaving behind some of the institutional encumbrances that we have so long embraced. We will begin looking at the world with one sheet of terms and perspectives.

The Forest Service is an organization that is largely based in the physical sciences, although we must possess many talents. We are administrators; we are budget analysts; we're biologists. However, we're entering an era where the social sciences need to be applied to our problems, and we're both prepared and equipped to step effectively into that arena. Some people in our organization believe that money is a limiting factor, or organizational depth is a limiting factor, or the number of firefighters is a limiting factor, or the number of engines is a limiting factor. Yet on closer examination, our limiting factor is how we reconcile all the competing demands on the land today. More specifically, how do we reconcile the social values and social perspectives that surround our activities?

We're in the midst right now, and have been for several years, of a process of diversifying our work force. Some of us think we're diversifying to better reflect the values of the public at large, and I think that's where we need to be. So who we are is changing, and we will continue to change with the upcoming wave of retirements. Yet this change is also bringing new values and skills to the agency, and more importantly, new energy and ideas.

I'd like to comment on the new era of how we work. We're not burning 10 or 15 or 20-acre clearcuts anymore. We're burning at landscape scales. We're burning at landscape scales that cover several operational periods in order to achieve objectives. Yet our burn plans, our prescription elements, and all of the things that guide our activities have changed very little. We're in a place where we're moving from an objective that would reduce fuels to an objective that would restore fire-adapted ecosystems. That's a subtle, but enormously important distinction. Fire that only reduces fuels might be a

biologist's worst nightmare, but if we couch it in terms of restoring ecosystems, it reaches more people and it means something deeper and something different.

This also brings us to the topic of risk. As an organization, the Forest Service tends to internalize risk. One of the ironies of the Cerro Grande incident in New Mexico is that the stated objective was to protect the facilities and the town in the vicinity of Los Alamos. But instead of doing it together, the Park Service did it alone, even though many of our papers agreed with the stated objective and many of our partners in the vicinity agreed as well. The difficulty was with how we as agencies differ in our operations. At landscape scales, when you're going alone, the risks are almost unbearable. If the project is worth doing, at landscape scales, in this environment with these partners, it's worth doing together. Maybe this ties together much of what we discussed today in terms of understanding the social environment in which we find ourselves.

It is a new era. I'm convinced of that. I've been talking to a lot of people inside and outside of the Forest Service, and the opportunity to pull together, much like what is happening in this conference, is with us. We need more of these kinds of discourses. This is the first time I can remember that a bunch of physical scientists, researchers, social scientists and folks from outside of the agency all came together to start to debate our common problems. Let's keep this up.

SMALL GROUP BREAK-OUT SESSIONS

SUMMARY OF DISCUSSIONS

QUESTION 1: WHAT DO WE KNOW ABOUT THE BENEFITS AND COSTS ASSOCIATED WITH FUEL TREATMENTS?

With approximately sixty five participants attending the conference, organizers formed four small discussion groups (identified by colors). Each group addressed the following three questions: What do we know about the benefits and costs associated with fuel treatments? Where on the landscape can we treat fuels? And what do we know about the preparedness of our institutions to treat fuels. Recorders summarized the major comments that surfaced in the discussion, and group leaders reported their conclusions to the assembled conference. The following text summarizes the findings of each of the small groups.

Blue Group

Initially this group made a distinction between what is known about the effects of fuel treatments verses what benefits and costs should be addressed in the future. The former approach is a descriptive task while the latter involves looking forward and anticipating emerging issues and challenges. This group chose to focus on what issues need attention.

Given this approach, the blue group identified three top priorities. First, there is a need for a better definition of specific costs and benefits associated with fuel treatments. A number of questions were raised on market and non-market costs and benefits and costs associated with environmental laws. Finally a discussion centered around an appropriate distribution of both the costs and the benefits associated with treating or not treating fuels.

Second, the benefits and costs of specific fuel treatments need to be understood in terms of their influence on ecological processes and ecological change. Part of understanding this process relates to the availability and development of tools that show the complex interactions of treatments. These tools might include multi-media learning systems and new or improved models. Efforts to trade off social costs and benefits with ecological costs and benefits will be assisted by a better understanding of natural fire regimes, interaction of fire effects across resource types, and a better understanding of the role of historic or indigenous use of fire.

Third, the group identified the need for more efficient means of technology transfer of research to practitioners in the field. Specifically the questions revolved around how to get research results on fire and fuel treatment effects out to practitioners in the field. A related issue concerned the role of the media in either assisting or hindering the transfer of information.

GREEN GROUP

The green group took a different approach to this exercise. They recorded items from all the three discussion questions and categorized them broadly. After this categorization they then ranked their identified categories as to importance.

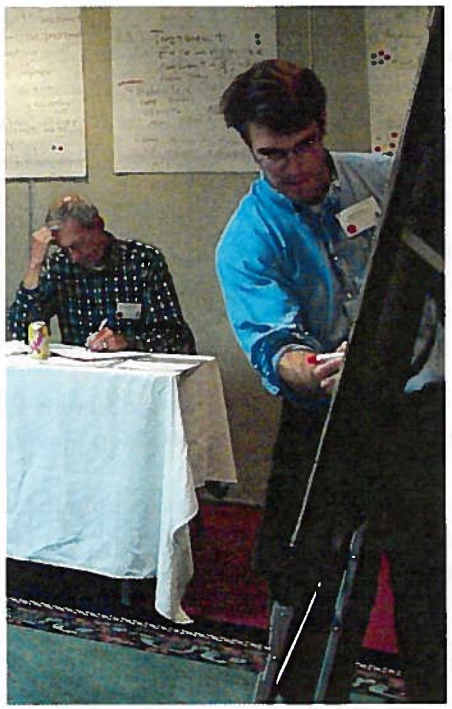
The group began by examining the usefulness of the terms "benefits" and "costs". The result of these discussions was to rephrase the question in terms of "risks" and "uncertainties". The comments of the group, then, are in response to a new question, namely: "what do we know about the risks and uncertainties associated with fuel treatments?"

Next, the comments of the group were grouped in one of five categories: (1) what do we know about risks and uncertainties? (2) What tools are available to assist in decisions making? (3) What organizational, structural or functional factors influence our views of risk and uncertainties? (4) How do we deal with issues of accountability for outcomes of fuel treatment actions? (5) How do we understand the public attitudes and expectations of fuel treatment programs?

In reviewing the rankings for comments on these major issues, the group identified questions of accountability and outcomes as the most important. Accountability for specific outcomes should be shared by a broad array of individuals and entities. Although consequences of decisions to treat or not treat fuels might be broadly felt, there is uncertainty regarding the share of accountability borne by agencies, homeowners, insurance companies, and land use planning boards. Related to the notion of accountability is the assessment of outcomes, or the success or failure of fuel treatments. Is there a means to identify which treatments achieved the goals and which did not? How does one measure a successful treatment? Are our criteria and perceptions such that negative consequences (or failures) are easier to measure?

A second priority of the green group related to the processes that agencies use to measure, report, communicate and understand risks and uncertainties. A set of questions within this category revolved around measures of risk and how they differ in a management versus a public context. The relative assessment of risk for an individual homeowner will likely differ from an agency's evaluation of risk. An agency's procedures and models of fuel treatment effectiveness will influence their evaluations of risk. How can fuel treatments be implemented in the context of variable perceptions

of risks and uncertainties? Is a fuel treatment program fundamentally at odds with the functioning of a risk-averse social and political structure like that found in the United States?



A third important category identified by this group involves an understanding of public attitudes and expectations regarding fuel treatments. These questions relate to varying levels of positive or negative attitudes toward fuel treatments and differing levels of knowledge of these programs. Specifically, this group asked what the public considers to be failures, and recognized that assessment of success or failure may be different for different factors (smoke, escape of fire, etc.). These public attitudes are likely to be influenced by different levels of knowledge of fuel treatment goals.

RED GROUP

Four major issues occupied the discussions of the red group regarding costs and benefits. The topics include: (1) public trust, (2) measurement of benefits and costs and (3) identification of responsibility for the costs, and (4) issues related to decision making. From the discussion within this group these four topics are highly interrelated.

In terms of public trust, the group identified that conflicting public perceptions of agency missions couple with institutional characteristics to create barriers for implementing fuel treatments. The primary objectives of fuel treatments are the protection of people's livelihood, their properties, and the value of resources over time. Public trust can be strengthened by greater clarity on the methods of measuring benefits and costs and the ways that those benefits and costs are distributed. Related to this is the need for clarity on who is responsible for the costs in the urban/wildland interface. Much of the fuel treatment acreage, for example, is located in large areas of private ownership in the wooded environment.

The decision-making process that identifies where and how treatments are applied is also an important element influencing the public trust. Within this process there is a need to communicate the level of uncertainty associated with fuel treatments. Technological changes, the dynamics of ecosystems, changes in social structure all combine to create a situation where outcome (benefits and costs) may be unclear or difficult to articulate.

YELLOW GROUP

This group focused on definitions of benefits and costs. The benefits and costs can relate to market and non-market values, large and small spatial scales, long or short temporal scales, and environmental/economic tradeoffs. Clearer definitions of costs and benefits may shift the burden for private resource protection over to the private landowners, particularly in the urban/wildland interface. Landowners in the interface must weigh the value of risk reduction against the associated costs (smoke, visibility, structure protection, etc.). There is also a need to evaluate actions and learn from them. As treatments are performed in one location, are there ways that we can generalize knowledge of consequences to other contexts? The lessons learned need to be communicated in a way that is relevant to local communities. Related to this is an evaluation of the type of information that is helpful in assessing benefits and costs associated with actions, as well as inaction in the treatment of fuels.

QUESTION 2: WHERE ON THE LANDSCAPE CAN WE TREAT FUELS?

BLUE GROUP

The blue group first restated the question as "Where on the landscape should we treat fuels and why?" The inclusion of an evaluative element in this question reflected the group's perspective that the locale for treating fuels will be related to the way one perceives risks. Is the goal of fuel treatment to protect life and property or to achieve ecological outcomes and management objectives? The answer to this question will have an influence on the location one chooses for fuel treatment activities.

Following this line of reasoning the group assumed that the protection of the human landscape would remain a priority. Thus, they could answer the question directly – fuels should be treated in the wildland/urban interface. This also leads to a management need to develop practical guidelines for evaluating the risks to life and property in the interface areas.

Some members of the group maintained that treatment should also be aimed at restoring ecological process and the natural effects of fire. In this instance the location of treatments may have more to do with the historic role of fire rather than the wildland/urban interface areas. This underscores a second management need to evaluate fuel treatments from an ecological perspective and assess conditions in light of historic variability.

RED GROUP

The red group addressed the question of where fuels should be treated by establishing priorities. The prioritization had two elements. First was the need for a system that categorized the types of landscape that required fuel treatments. A second element is to find ways that express to the public what the historic fire cycles were in those areas. The group felt that research exists to help with the categorization decision but the results have not been made available to the public or management. Setting priorities for fuel treatments would involves several parameters: assessments of ecosystem health; maintenance of ecosystem processes; public trust of the agencies; and integration of treatments with local planning efforts.

YELLOW GROUP

The yellow group considered that an answer to the question would include an assessment of treatment feasibility, yet the group proceeded to assume that treatments could be applied almost anywhere. More importantly, however, is the process of evaluating the underlying assumptions that influence the decision to locate fuel treatment. The group focused on locations not in the urban/wildland interface but on the ecological level. Criteria for locating treatments take into account issues such as potential loss of unique features, restoration of historic variability, and replacing fire in higher elevations. There has been a lot of rhetoric about the need for treatments in diverse areas of ecologic concern, and there is the technologic capacity, but there is currently a lack of will.

Although the group identified places other than the interface areas that should receive treatments, they recognized that the urban interface may be a necessary testing ground to develop sufficient political will for the intentional application of fire. In this area location decisions would focus on areas with a high probability of success and high personal property value.

QUESTION 3: WHAT DO WE KNOW ABOUT THE PREPAREDNESS OF OUR INSTITUTIONS TO TREAT FUELS?

BLUE GROUP

For this group the issue of institutional preparedness, is overshadowed by the institutional barriers to implementing those treatments. The scale at which fuel treatments are required, and those suggested by models, would place a large requirement on agencies for staffing and resources. Thus, the availability of resource support for treatments within the agencies is a barrier to implementation of projects. In addition to the lack of resources, agencies lack institutional capacity to treat fuels. Experience and knowledge are primary shortcomings, but there is also a need for a sustained, well-populated work force to implement fuel treatment programs.

RED GROUP

Public trust is the central element influencing institutional preparedness to treat fuels. Perceptions of past performance of institutions influence this, as do nebulous expressions of objectives and agendas within the institutions. The institutional ability to implement treatments also depends on the adequacy by which information is transmitted to the public. This information needs to be available and appropriate for both the pre- and post-fire context. Moreover, the information will relate to expression of the costs and benefits associated with the treatments themselves.

YELLOW GROUP

The yellow group identified macro-level political issues as primary institutional barriers. An overwhelming priority is the need to reconcile conflicting legal mandates to protect air, water, threatened and endangered species, and multiple use-sustained yield. Compounding the legal confusion is the lack of interagency integration on many of these issues. Intra-agency integration is also needed between fire staff and the timber, wildlife, and recreation programs.

Another major institutional issue relates to the insurance industry. There is a need to get the insurance industry involved in supporting fuel treatments. More aggressive programs will be necessary to build societal support for managing fuels and the private sector could have valuable role in distributing information. Both the task of reconciling conflicting mandates and broadening public support for actions could increase the range of management options for fuel treatments. To support this effort, the yellow group highlighted the need for increased training in social sciences among land management agency staff.

FIELD TRIP

COMMENTARY BY PRIVATE LANDOWNERS

LARRY CAMPBELL, RYE CREEK

About August 3rd the Forest Service fire officer walked up the draw to my place to assess the flammability. He told me what I already knew, "We don't want to bring a pump or truck in here!" I told him I built my house back up here, and I didn't expect his guys to bail me out. I'd sure appreciate any help, but I don't expect it. I didn't want the Forest Service jeopardizing either equipment or people. So he told me I wouldn't be evacuated right now, because I'd be able to see the fire coming. At that time they were forcing other people to leave, which was bad psychology. They backed off of that after awhile because some people didn't want to leave. I told them that I'd go back in, even if I had to go back in over land. I'm going back in! You can help me out a lot if you just let me accept responsibility for myself.

I was in denial about two or three days just trying to get a bead on where the heck the fire was. I'd climb up the hill and look back over there and think, "Okay, the prevailing wind will take that on over to Missoula. I'm okay." After a few days, the denial started eroding away, and I started to work, just fiddling around. I had my bucket of water and Pulaski, and I'm ready to defend my home. Then the fire officer showed up and he says, "Larry, you know what that roaring sound is?" It's like, oh jeez, that's the fire! I'd been expecting this slurry bomber to come over the ridge -- and there's no slurry bomber. The fire officer says, "Yeah, that's the fire and you may not be thinking about it now, but you listen to that for awhile and you'll be thinking about it." He was right! The noise was the most nerve-wracking thing. It kept roaring and then embers – big stuff – started raining out of the sky.

I got help from some friends. After several hours Forest Service fire lookouts came and helped. One had a lot of experience with fires and he watched at night. This thing is roaring downhill and he said, "I've never seen fire move downhill like that." It was starting to really cook and make its own weather and draw fire into the gulch where I live. At that point it was evident my denial was over. Man, that fire is coming through here! It's no longer just, "Grab the hose!" I'm starting to take a look around and thinking if anything has any meaning to it I'd better get it out. So the next day I

put out the call and ten friends show up and it was great. Loggers showed up. I got a "Pro-Grizzly" bumper sticker on my truck, and a guy with a "No Grizzly" bumper sticker is helping me. Everybody was pretty well pitching in. The Bitterroot Hotshots came through and dug a fire line on up the draw a little ways. The Frenchtown Fire Department showed up and set up a pump in Rye Creek and got sprinklers.

There's a funny part to this story. They had just announced if anyone had stuff they didn't want to get wet, get it in under cover. They were going to test the sprinklers out. Just then, it started raining. You couldn't tell if it was cloudy because it was so smokey. And we thought, "What a sprinkler system!" It rained for ten or fifteen minutes, quite hard with very big drops. It was really localized rain, but it laid that fire down and it never did roar again. Then it was just a slow squeeze, and for probably another four or five days the fire backed into the prevailing wind. I just kept hoping it would back into the fire lines, which it did.

I felt like the firefighters gave a lot of attention to this area. There were at least a dozen pumper trucks up here. They all left on August 6th when it became apparent that we'd better just get out. It was a lonely feeling, let me tell you. I was up on the hill trying to get a bead on where the fire was, and there goes the last of all the pumper trucks. I don't blame them. It was ridiculous at that point; whatever was going to happen was going to happen. I think there were thirteen homes that burned that day between the North Fork and here.

I've got to say that keeping us informed was really important. They'd come through and say, "Okay, we've got a crew over here and a crew over here and we're doing this." Just knowing that they were coming that way helped. My information needed to be real localized. I'd go out in the road and flag down the first green truck I saw. In the mornings it was so smoky you couldn't see anything. They'd tell me, "The fire's just past the road up here, and we're worried about it coming back down on this slope." So that was very helpful for me, to get real localized information on where the fire was because the smoke was so thick you couldn't tell. Then I'd walk out and see for myself which column was advancing more quickly. I tended to limit my information to what I needed to know because it was enough of an emotional load. I finally did come out from under my own problems and realize that there are a lot of communities in this valley going through the same thing.

MARSHALL BLOOM, BLODGETT CANYON

This is a real complicated issue. As I told you, I'm a scientist, and I'm a landowner here. I'm also active in fisheries issues around the state, particularly "Trout Unlimited" and whirling disease, and I have a pretty broad view of biological issues. My hobby is conservation. I ended up not too far from the fire that made its run on the first couple days of August. This period of time in the Bitterroot, from the middle of July to about the first of September, was very, very dramatic. It was real smoky a lot of the time. I work in the town of Hamilton. Visibility was about five or six blocks for sometimes three or four days at a time. People got a little bit edgy. It was a little bit bizarre. It was like being in a werewolf movie. In the fog you never knew when the werewolf was going to jump out from behind a building and bite you.

With the infra-red mapping we really had up-to-date and sophisticated information that was available to anybody who wanted to go and get it. I have to say that the effort the folks in the Forest Service at the information office put out was far beyond anything anybody would have anticipated.

Certainly, the quality of the information was light-years better than what we had back in 1994. They deserve a lot of credit for quelling any community panic that might have developed.

I think it's fair to realize that had the winds developed here in western Montana as they did back in the big burn of 1910, where the wind blew 70 mph for three days, the fire could have come into the towns of Hamilton and Darby. Another thing we have to recognize is how few people were really affected by this. If you compare it to something like the floods on the Missouri River or an earthquake in San Francisco, we're talking about a very small number of people that were impacted directly. I think we have to keep that in mind.

The ancients talked about four elements: earth, wind, fire and water. Well, if you build your house on the San Andreas Fault, you might expect at some time in the futures there's going to be an earthquake. If you build your house on the Mississippi River upstream from St. Louis, once every hundred years or so, there's going to be a big flood. If you live where there are tornadoes, you might end up in the Land of Oz! If you build your house in the trees or you live in the woods, you've got to expect that maybe someday you're going to deal with fire.

The fire management policies in the last close-to-a-hundred years have had a major impact on the role of fire in our native ecosystems. This protection mentality is likely a consequence of the European tradition, which informed much of the early firefighting philosophy in the United States. Whatever the cause, fire was excluded from the western United States for close to a hundred years. That's a debt we're going to have to retire in one way or another.

A big picture thing we have to look at in terms of forest management is for many years policies were driven by timber. Right or wrong, this was the policy in the driver's seat. As a consequence, wildlife issues, fisheries issues, plant issues and historical issues were all subordinated to timber. The fisheries people spent all their time trying to make the timber sales meet NEPA's criteria and other relevant laws to protect wildlife and fish.

We also have to recognize that fire is another native species in the Rocky Mountains. Fire has always been here. These ecosystems are shaped by fire. Our fish, our wildlife, and our plant life evolved in a regime that included drought, fire, and flood. I know some people talk about what's beyond the range of normal variability. We want to try to bring fires back within their normal variability. I think it's foolish to think that fires of the scale that we had this year are really beyond what was at some level normal. The fires of 1910, which burned a lot more area and a lot hotter than these fires did happened before Europeans had an opportunity to try to impose their philosophy on the land and on the fires. So that's the preface before I start telling you about some of the things policy makers and landowners and biologists need to address.

You don't need to be a genius to see that there is going to be a ton of money poured into fire suppression efforts over the next twenty or so years. We have to be extremely careful that we recognize fire as but one component in this big ecosystem. We can't deal with fire, even in the urban wildland interface, without taking into account that we have streams that run through here, we have birds, and we have woodpeckers that live in burned ecosystems like this. When we talk about fires, we have to make sure the fisheries and the wildlife and the plants get equal attention in that process. We're talking about hundreds of millions of dollars, so we want to make sure all of that doesn't go into what is euphemistically referred to as "vegetative management."

What do I think we should do? Certainly, it's appropriate to enter into a fuels reduction program in some of these areas. Where are those areas? You're standing in one of them right now. The urban-wildland interface has a fluid definition. It's basically that little old log cabin and the homes in the woods. It's appropriate to deal with fuels management, fuels reduction in these areas because people live there. You can debate the wisdom of building a house in a wooded environment like this, but we also have to recognize that those folks didn't do anything illegal by building there. The county governments, the state governments and the federal governments didn't tell those folks, "Hey look, this is too dangerous. You shouldn't build your house there." They didn't tell people on the mudbank overlooking Santa Monica in Los Angeles either. Our social structure allows us to do those things.

The urban wildland interface is one place where we need to do fuels reduction. The fire we're standing in the middle of now was about 10,000 acres. We could have a fire like this, every year for ten years, up and down the Bitterroot Valley and never burn in the same place twice. There is a generation of fuels reduction that can be done in the urban-wildland interface without ever having to deal with the issues of cutting timber in roadless areas or wilderness areas or riparian areas. The focus needs to be on this urban wildland interface.

A lot of what burned, and a lot of the urban-wildland interface on the mountainside, isn't really federal property. It's private property. Some of it is state property – school lands and things like that. So another issue is: how are we federal taxpayers going to make sure that our money, if it is to be expended on private land, is used wisely? If we're going to do fuels reduction in the urban-wildland interface, there has to be some way to make sure that timber sales and logging operations are done so that the watersheds, the fisheries, and all the other forest amenities are respected.

There's another very important reason why we have to do fuels reductions, and that's to save people's lives. When somebody's got a house in the woods and there's a fire there, it's hard to say, "I'm sorry, we're not going to come to your place!" Our society just isn't going to let us make those kinds of decisions. We have to ensure people who live here can survive, and that the firefighters are safe. I know the Forest Supervisor who had the obligation and the duty to take families of fourteen firefighters up on the site of the Storm King fire to show the mothers and the brothers and the girlfriends and the boyfriends where their loved ones and friends had died. When you hear him talk about it, it's very, very personal. Jack Ward Thomas, who was Chief of the Forest Service in 1994, had to deal with those fourteen families, and he had to deal with another twenty families. There were thirty-four wildland firefighters who were killed that year. So, another reason we need to do pro-active fuels reduction is so Forest Service folks don't have to make that nighttime call at somebody's door and say, "I've got some bad news for you."

The smoke was pretty bad here this summer. It's one of those things where we're either going to pay it all at once, in a big bunch of smoke, or we have the opportunity to do it in smaller increments with a fuels reduction program. The Bitterroot National Forest has been active in trying to do that kind of fuels reduction. When they first started talking about fuels reduction, I remember telling this friend of mine, "Man, if you think you got trouble selling people on clearcuts, wait until you start trying to sell them on forest fires!" But, amazingly, in the Bitterroot Valley this summer, the people you ran into on the streets said, "Well, you know that stuff was gonna burn." There is recognition by the population in the Bitterroot that forest fires are going to be a natural part of the system. Moreover, they are going to be something we will have to put up with. It was impressive to me how many people had already heard that message. It's a good idea to go ahead and continue those programs and to try to expand them. But again, it's crucial that we stick to the urban-wildland interface. That's the place where there's going to be the least controversy about doing these kinds of projects.

I've got one more story I want to tell you. There was a fire historian who was involved in surveys after the Canyon Fire in the Lincoln Scapegoat Wilderness in 1988. You know the way the Forest Service is, they pick a plot of about two or three acres, and based on what happens there, they decide what's going to happen in the entire universe! They had a study plot there and they went back the first year and there wasn't very much there. They went back the next year and there were fifty-six individual plants in this one test plot called, "Nell's Geranium." The plant had never been described in that part of the country before. The next year they went back and there were about a half a dozen of these geranium plants. The next year they found none. So this was a plant, the seeds of which had lain dormant in the ground since the last time a fire had gone through. The fire came through that part of the Lincoln Scapegoat Wilderness and germinated those seeds. The plant came up for two years, did its thing, spread its seeds and now it will lie there again until another fire goes through. That's what I mean when I say we really have to consider fire as another native species, a key component of the Rocky Mountain area.

RALPH LUTHER, BLODGETT CANYON

You can see what happened here: the fire came across from Blodgett Creek, across the face and hit Mill Creek. They tried to stop it at Mill Creek, but they didn't succeed. Once it came across and the wind came up, the fire took about twenty minutes to come from Mill Creek down across to our house, although our house is out in the open and not in danger. My ex-son-in-law lives in the log house and he nearly lost that. The fire came up behind their house and burned the electric wire that ran his irrigation pump, which was running his sprinkler. A helicopter came across, saw that he was in trouble, saw him waving, and they dumped a little water on the fire and put it out, saving his garage. The helicopters did a fantastic job after the fire got down that way.

The Forest Service also did a very good job on rehab all the way through. There were fire trails cut back and forth through my place, and they've come in and rehabbed the whole lot. They're doing a good job at it.

Almost all of this timber that we see around us has to come out. I'm working with a forester who believes if you took a picture of this after they get through logging, and then take a picture up where the Forest Service is not doing anything, that this will regenerate much faster than anything left untouched. So it will be kind of nice, we believe, if the Forest Service could do a little bit of work up in the forest and reduce the fuel that is still standing.

I've always been very aware of fuel. I was doing quite a bit of thinning off over in this area. It doesn't look like it now because it burned pretty hot over there. In fact, my neighbors next door have thinned – drastically thinned – and the fire went right through there and took out two houses. It was quite a ways from my fence, and it was really thinned heavily, yet it took out two houses! So, it's hard to tell whether thinning would do that much good in some cases. If you've got a big fire ball coming through, it's going to take things out, regardless. If the fire is burning slowly, which we hoped it would - but in this case it didn't - the fire would stop and travel on the ground if it was thinned adequately.

DISCUSSION SESSION

- Ralph, what would you like done to prevent something like this from happening in the future? *Ralph Luther answers*: What would I like done? I'd like to see the Forest Service manage the forest like they should. What they should do is keep the forest healthy. They could do their prescribed burns, but prior to doing their prescribed burns, they could clean out some of the timber, thin it out, especially along the interface. Then they could do the prescribed burns. That's the only way the Forest Service will ever keep fires from coming down into private property.

- How are you dealing with the cost of cleaning all of this up? Is there enough value in the wood to offset that? *Ralph Luther answers*: I'm getting about $140 per thousand board feet for some of my timber. That's my net after the logger gets his, which is the big share. Some of the timber, if it's got any blue stain in it, is costing me about $120 just to haul and get rid of it. I don't want that, so we're trying to do this really fast before the Ips beetles carrying the blue stain fungus come in. There are some Ips beetles starting at the bottom of this bigger tree right over here. We have a lot of Ips in this area getting into the trees very rapidly. They like to follow a fire.

- I understand that in these kinds of areas we should expect more woodpeckers. There's some kind of a woodpecker that moves into these burned areas soon after a fire. *Marshall Bloom answers:* Yes, that's right, the Back-back woodpecker. This is going to be a real interesting place to live for the next fifteen or twenty years, to watch how these ecosystems regenerate, to see the new succession of plants, and so forth, and to me it's part of living out here. It's a shame when it has to do so much damage to somebody's private land like Ralph's land here, but we now know that those are things we can deal with.

- After this recent fire event the town of Pinesdale came to the agency and proposed a fuels treatment project just to the north of us in the Sheepman Creek Drainage. They're really interested in a collaborative type event where they would design their treatments based on Forest Service prescriptions, and based on what we want to do on our side of the property. There are some issues involved with this project. It's the municipal watershed for the town of Pinesdale. The wilderness boundary comes fairly close. This raises the question, realistically, of what's the definition of the urban interface? In that particular area it's probably the wilderness boundary out where the woodland area ends towards the valley floor. It's also one of those areas that is proposed as roadless. It's going to be interesting to see what type of proposed action we come up with in that particular area to deal with the issue.

- When we ran meetings about the fires we heard a lot about the behavior of neighbors. Someone would say, "Well, you know I've done a really good job on *my* place, but my neighbor across the road, man, his place is a rat's nest of dead trees!" This is a big problem. Where there's fuel reduction needed in the urban interface, how are you going to deal with people who don't want to cooperate? I mean "zoning" is a dirty word in Montana, and especially in the Bitterroot Valley. These are issues which we, as a local community, are going to have to deal with. It's not fair to put all the blame on the Forest Service. Another thing we have to remember is fire is ready to burn again within four or five years. There's enough fuel in the forbs and shrubs. You don't just treat the urban wildland interface and forget about it for another hundred years. If you really want to make a difference, you treat it once and then it becomes an ongoing process, just like mowing your grass.

- In the Bitterroot Valley I know that some of the homeowners have gotten together and have approached people in the Forest Service for fire protection technicians. They've said, "Hey look, our neighborhood is in the woods and we as homeowners, not as

an association, but as a group of residents, would like to work with you to try to reduce the potential fire problem in our neighborhood." For the Bitterroot Valley that is an incredible thing.

- Knowing what the smoke looked like this summer, how much smoke do you think people in the valley can tolerate on a regular basis, like under a large fuel treatment program? *Ralph Luther answers*: That's very difficult to answer because some people have allergies to smoke. Some people have bad lungs and smoke really affects them. Many people had to leave the valley this summer because of the smoke from the fires, which was a lot worse than a prescribed burn would produce. But I hear a lot of complaints about prescribed burning also. How do you deal with that? I don't know how you deal with that, except that you hope the wind comes up and blows it away, which it usually doesn't! Wait 'til I burn my brush out here. Watch my neighbors!

FINAL DISCUSSIONS

LAST DAY OF CONFERENCE

DAVE CLEAVES PRESENTATION

I would like to talk about where social science and more importantly, social scientists, will enter into the national research and applications agenda coming out of the National Fire Conference. I want to give you my perspective as a national program leader in fire research. In the Washington Office there are two of us: Sue Connor, who does the fire ecology side and myself. I do the fire system side, which includes the social science and management science predictive models. What I see as the number one role of social science and social scientists is to help reframe the problems. You are "people people", surrounded by people who are basically fire and fuels people. You understand, a little bit better than we do, what makes people tick and what makes systems people work. You can help us reframe the problems so that those problems can be solved and those opportunities captured.

We took a little drive yesterday through a black forest. Is this a fuels problem? Is this a people problem? This is a fire loss problem and only partially, a fuels problem. Why did this happen? Did it happen because the fuels had accumulated beyond where we thought they should be? Did it happen because people are living in harm's way and made those choices themselves? Did it happen because we have done such a good job of fire suppression that we created more of a hazard than a lot of those people could tolerate? There are a many issues entwined in defining these problems, and the social science component of the problem has not been well articulated. You, as social scientists, have to enter into this conversation from your unique

perspectives and worldviews to help us define problems that can be solved. If you leave us to our own designs, we are going to go out and burn acres. We are going to go out and treat fuels, because it's a fuels problem. So the principal contribution that social scientists can make is to help us refine and define the problem.

I receive several views of social science from the users - from fire managers and from decision makers. One view is that we don't have much use for social science because it's too fuzzy. Another view is that social science is continual rediscovery of common sense, and since there's nothing much we can do about changing human behavior, why bother? So, there's an uphill struggle with some members of the fire management community to use social science knowledge. It's very difficult to see sometimes how it can be used.

Now there's another view, an almost extreme view, which says we have learned as much as we are going to learn about the physical side of fire. We don't need to learn any more about fire behavior. I take great issue with this, but the objective of this view is to concentrate only on the people problems. There are two variants to this. The first is that we need to know what makes people work so that we can sell them on what we know needs to be done. This is the propaganda approach. We know that we have to treat three million acres a year, but the darned people get in the way of our being able to do it. If we could just turn them around, if we could just mold their minds, we could go about our business. Social science will help us understand how we can get to them. The other variant is the one that Steve Daniels articulated yesterday, which is the collaborative approach. We try to understand where people are coming from and try to engage them in a process in which they actually help you define and frame the alternatives. That's the one I think most of us prefer.

Let me share my own views on social science research and the development of research priorities. First, we should be developing and testing strategies to engage the public that can be replicated. There are many successful examples of engaging the public in developing fuels treatment and other programs. These are almost viewed as idiosyncratic. It's difficult to say why certain programs work in certain areas and why programs in other areas don't work. Is it a matter of the personality of the administrator, or the personalities of the people involved? What makes a good program work? What are its elements? How can we take something from one area and replicate it in another? Social science can give us models so we may understand what works and what doesn't.

We need to develop better ways for stakeholders, administrators, and fire managers to express their values. It's not enough to admit people have different values. This is the big complaint I hear from the fire mangers. The only thing social scientists do is tell them people are different from one another. When a fire manager has to make trade-off decisions on prescribed burning alternatives, there has to be some clear measure of how values are going to be satisfied among the alternatives. How would I recognize achieving those values? I have to take those values and translate them into some kind of recognizable measurement, or I can't make decisions. The translation process is one that social scientists can help us develop.

Social scientists can help us articulate different mental models of fire phenomena and the fire environment. There are tremendously different views of what makes systems work and how fire works. I was here in Montana over the summer with Jack Cohen. He's done a tremendous amount of work on how houses ignite from wildfire. Jack talked to members of rural fire departments in the field about how fires start around the house, how fire brand blizzards would start fires in litter around the edges of houses, and yet he could not get the volunteer fire department to get their heads out of the

trees. They were thinking crown fire; they were thinking about the fire marching across the landscape; they saw houses burning from the trees down, not from fire brand blizzards from the litter on the ground. Jack had to almost physically push their heads to the ground, like you train a dog. The firefighters' mental model differed largely from Jack's mental model of how fire works. Thankfully, there was a communication process going on. We need this communication process, and we need to know about people's understanding of fire

The fourth area we need to look at is organizational culture. Fire management is a culture within a culture. The fire management culture has been punctured. It's spilling out into the bigger, Forest Service culture because we are starting to treat fuels. We're lighting fires on purpose. We're thinning stands. We're taking a proactive management approach in order to make changes in the environment, and we have to do that in the context of NEPA. Whether we like NEPA or not, it lays open all our decision making processes for the world to see. Fire people have not had to do this in the past. They are used to coming in, making decisions, cleaning up, and going home. That's been a positive experience. Now they're into more of a cold-prickly experience, where the processes leading up to their choices are under a great deal more scrutiny. How do we understand how these cultures are being transformed and mixed within the organization? Research in this area is not easy because few organizations like to sponsor self-studies. It's always easier to study somebody else. So, these four areas are where social science can help us develop insights.

I'd like to change gears for a moment and talk about research capacity. I can be blunt about this: we need dollars for research capacity. We've got our research scientists and social scientists all out chasing dollars. Forest Service scientists are competing with university scientists, whom they're really supposed to be collaborating with, to obtain small buckets of soft dollars. Those small buckets of soft dollars are driving research priorities, which are not in any way organized. We need a focused approach, developing research capacity and ganging up on these problems. Our definition of fire research is not the traditional definition of fire research. The National Fire Plan allowed us to do this. The National Fire Plan looks at the fire problem as not just a fire management problem, but also as a rehabilitation/recovery problem and the community as a people problem. The plan has a much more robust view of the larger issues. We think that's very positive and is what social scientists are working for.

ALAN WATSON PRESENTATION

I would like to describe the emerging regional research program of the Forest Service's Rocky Mountain Research Station, and compare it to some of the comments and conclusions that have come out of the small group sessions in this conference. I've distributed a brief handout that looks at this comparison (Table 1).

The Rocky Mountain Research Station represents many states in this part of the country. It includes the unit in which I work, the Aldo Leopold Wilderness Research Institute. We're an interdisciplinary group of scientists, and you've heard from several of us in the conference, including our ecologist, Peter Landres. What I've done in this handout is to look at what happened in the proposals we have been receiving from other researchers and what came forth from this conference.

First of all, I notice among the proposals received by the Research Station, the majority are science proposals. This is different than many ideas that have emerged from this conference, which are mostly issues and administrative studies. On the other hand, there is a lot of overlap of ideas. Both the science proposals and the suggestions from this conference focus on the wildland/urban interface. If we look at this comparison we see there are several issues in the science proposals that relate to the factors that influence acceptability. There are some unique ideas: the closure of some public lands to reduce fire danger, for one. How acceptable is an idea like this? When this conference looked at this same area, the question was framed quite differently, more broadly, in my view. We talked about the benefits and costs of fuel treatments. Folded into this is also the acceptance of the decision-making process. The acceptability of the decision making process may not focus on the acceptability of specific things. We see the participants at this workshop adopting more of a systems approach, thinking about how we are doing things as well as what we are doing.

It may be interesting to think about some organizational and institutional issues. Are they really science questions? We can talk about the demographics of an organization. Maybe there are research questions about how demographic characteristics influence attitudes and how the population may be divided into different interest groups.

I won't go through each of these items, but I will highlight a few for later consideration. One of the problems we have been discussing is about citizen understanding of risks. There may be a different perception of risk between citizens and agency personnel, but we don't know much about this. We also don't know how these risk perceptions relate to those who live in or near the urban interface. There may be effects based on someone's location and the overall settlement pattern.

The item where we ask about demonstration areas and how research results get to the ground recalls an earlier discussion of how information alone is rarely sufficient for the adoption of new behaviors. Collaboration and community stewardship are some of the new terms we hear about. These more interactive, integrated approaches will influence how agencies think about issues.

Some of the items in the Research Station column relate to ideas we didn't hear much about in the small groups in this conference. For example, a scientist recommended we review and integrate the hazard and disaster literature into our research agenda. I don't think we've put enough emphasis on this. We can learn a lot from the research efforts conducted in other disaster situations. In this same column, we haven't looked carefully the last few days at the genesis and change that occurred in prior fire policies. Our policy position in various organizations has changed over time, and this might be a valuable priority for research. We had a couple suggestions from scientists dealing with the factors influencing house and structure ignitions during wildfires. I know of at least one proposal of this nature that has gone forward for funding.

If we look in the column where priorities emerged from this conference that were not identified in other submissions to the Rocky Mountain Station, I find it interesting how they focus on organizational and institutional issues. I was encouraged to see this, because it's important to look at the agency employees' understanding of the purpose of fuel treatments. Is the agency together internally? This clarity, of course, also extends to the agency mission. When someone walks in the door to talk to people in the agency do they hear something different from the fire people than from others in the agency?

Bruce Shindler commented about the importance of paying attention to all contextual aspects. I'd also like to emphasize the need for a more comprehensive, holistic evaluation of forest conditions. If I have a major conclusion from this conference, its simply this: we need a functional model to consider fuel treatments in an ecological, economic, and social context, and these considerations would occur simultaneously, not separately. Social acceptability isn't the first focus. It's not even the primary focus. We need a conceptual model to consider fuel treatments in these multiple contexts simultaneously. I can listen to what Peter Landres says about ecological values and I understand and appreciate these values. I want to incorporate them and deal with them. Social science research is not standing over here by itself somewhere. We're fortunate this conference has drawn together ecologists, fire managers, and citizens as well as social scientists. We have to move toward that integrative model.

AMANDA KAPLAN PRESENTATION

I'm involved in a project called "The Interagency Social Science Plan to Assist Federal Fire Management." That's quite a mouthful, so we talk about it as the Human Dimensions of Fire Project. Dave Cleaves set this up nicely, talking about the role of social science research. The purpose of this project is to articulate social science questions that need to be addressed, and to develop an interagency social science plan for the human dimensions of fire. The National Park Service is doing the work under a cooperative agreement with the Cooperative Parks Studies Unit at the University of Idaho under the direction of Gary Machlis. Although the Park Service is doing work, the project is interagency in nature and it also includes the Forest Service, Bureau of Land Management, Bureau of Indian Affairs, and Fish & Wildlife Service.

The goal of the plan is to assist fire and resource managers in three different ways: First, it will describe the rationale and benefits of social science research. Perhaps a lot of fire mangers think that social science is fuzzy, so we hope to address some of those concerns through this project. Second, it will outline a multi-year research agenda. Similar to this conference, our goal is not to conduct the research, but to identify key questions that could be pursued by more in-depth social science research. Third, we will be recommending strategies agencies can utilize to implement needed social science actions. The plan will deal with many social science issues, including, but not limited to: demographic changes; settlement patterns in the west; the psychology of fire; organizational culture issues; and regional economic impacts from fire management and fire suppression.

In terms of methods there are three key foundations for developing this plan. The first is a review of existing social science literature on the human dimensions of fire. The annotated bibliography by Yoshi Kumagai that was distributed to this conference looks extremely thorough and very useful. We will be using that. The second is an analysis of social science needs as expressed in the existing laws, regulations and policies of participating agencies. We recognize that several laws require us to consider the social and economic impacts of fire as well as the ecological impacts. Third, and most critically, is a needs assessment based on input from representatives of the social science community, fire and resource managers of participating agencies, and representatives from local and state governments, civic organizations and non-government organizations.

We anticipate the final plan will be completed in July of 2001. It will include a research agenda for the future that will describe its benefits to both agencies and the public. It will also include basic recommendations on the activities that need to be undertaken to accomplish goals and ensure the research results are integrated into decision-making processes. The recommendations will be prioritized, but it will be up to agency administrators to

develop their own individual or cooperative action plans to implement those recommendations. The project is not specifically telling the agencies what to do, but it is recommending strategies that will help them guide the future of social science and fire management.

MATT CARROLL PRESENTATION

Dave Cleaves did an excellent job at laying out the job social science has to do in this arena and the other speakers have given us some really good details about how that might take place. I would like to build on Dave's first point concerning the issue of framing. I would submit that the fundamental issue surrounding fuels management is legitimacy. Symptomatic of the crisis of legitimacy is the fluidity of the management of the federal estate. For example, we don't know who will be the National Social Scientist for the Park Service after the next election.

What science can give us is the best estimate of cause and effect relationships. We take our best guesses of these relationships and blend them into policy-making processes that proceed on public lands. Social scientists have an important role in fostering this dialogue. A lot of our discussion is focused on the question of acceptability. Acceptability is not something that we are going to be able to define in a narrow, technocratic sense. We're never going to come up with a magic bullet that says, "If we do this, we'll achieve acceptability in land management decisions about fire." There has to be a productive, public dialogue and discussion that defines the issues. That discussion has to include the very best information we have from biophysical, scientific enterprises. If this public discussion is not successful, then legitimacy cannot be achieved and we will be in even more difficulty than we are now.

The ideas that Steve Daniels brought to light are very important for us. We need a public discourse that relates to what's really happening on the ground. If we retreat to the science focus, without the intermediate step of public discussion, then we're right back to the Bitterroot controversy of twenty-five years ago. Science told us to build those terraces. Those terraces are probably still justifiable in a certain scientific perspective, but the public didn't like them, and we didn't initiate a discussion with the public about how the forest would be managed. The fundamental role of social science is to foster that public discussion. It's going to have to happen at the community level, and it's also going to have to happen at the national level. If we're successful doing that, it will give us the legitimacy to move forward. It won't be easy. It's going to be messy and it will be ongoing.

RON WAKIMOTO PRESENTATION

I want to reinforce is the idea of examining the employees of the Forest Service and the fire suppression community. It's not just up to social scientists to try to get a handle on this community, because the public is trying to get a handle on them too. Put simply, I don't think we pay enough attention to the work force.

I attended a regional meeting two years ago of all the fire teams in Region 1. When I walked into the room, I was startled, because I knew almost every person in the room. This isn't going to last. There will be a change in this age-class structure in fire management. It's getting older and older, and

there is little incentive for students to want to be in fire positions. Taking the time to be on a fire team is a real life commitment. Our lifestyles change. People's values change. New employees would rather be home with the kids, doing things with the kids in the summer, rather than go on fire. They might make a lot of money, but is it worth it if they're not going to be there for their kid's birthday?

Scientists on a college campus do research and teach students. One of the advantages of our position is that we bring this research to the classroom. Every student in our program acquires some appreciation of the importance of fire in his or her own discipline. Whatever "hat" they choose to wear, students still need to learn about fire, and they have to wear a wide array of hats. At our summer camp, we introduce students to this wide array of issues. One day where we were looking at scenic beauty estimations. A student sat down after dinner, slammed his books down in front of me, and said, "Why am I doing this? I came here to learn about trees! I don't want to deal with this!" I sat there and talked with him for a while. We talked about this "popping of bubbles." The role of the forester and the roles of resource professionals have changed. Unfortunately, that fellow only lasted a few semesters because what he was learning was not what he wanted to do. Even people who come to forestry schools are not sure what resource professionals are about.

Years ago, I worked on a study with the fire manager of Kings Canyon National Park on fire managers and their attitudes and beliefs about research. In this conference we have been talking about taking social science and other types of fire research and applying it to the field. But what we found in this study was that most fire managers could care less about research. They never had a scientist working with them on-site; they knew what they were doing, and they never worried about what was happening with their job. In fact, if someone tried to work with them without the right colored green shirt, they wouldn't even pay attention to what they had to say. So, this organizational trust, this dynamic of "who do you trust" as a lot to do with what we need to understand.

John Krebs and I were talking over coffee about the people who interpret what we're trying to do. These are the people on the Ranger Districts. They are in the entry-level positions and the early career staff. They deal with people every day. You have to have everybody skilled in the process of dealing with people. As educators, we try to teach this, and we want the best, most interested people to take part in this profession. But when entry-level positions are more specialized, what happens is you can only get work with through a more specialized knowledge base. Perhaps the need is for a more general education covering our overall function in the profession. Specialization creates problems when I deal with students, and I think it will lead to a big problem within the agency.

There was a study funded by the National Wildfire Working Group asking what courses should be included in a fire management curriculum. I reflected on that, because students come to Montana from all over the world to study fire. They open up our course catalogue and they see only two or three courses described as, "fire management." When students come to me with this concern, I respond that this is an academic institution, and what counts in an academic institution is a host of things: small group communications, sociology, personnel management, as well as technical information. But fire people say, "No, you're going to need your fire courses, 390 and 490," and these are what count to them. The academic institution does not offer exactly what fire people want to hear.

For someone like myself, more of a biophysical scientist, I've appreciated the effort everyone has put into this conference to understand the social issues surrounding fire and fuels management. This is the time to emphasize the need to look at the agencies, because the people within the agencies are the ones who will communicate the purposes and the benefits of fire. They guard the trust, and they will be a necessary part of the national dialogue.

BRUCE SHINDLER PRESENTATION

If we review a primary question of this conference, which is, "What do we want to know?" I think we can break this question down into three categories: must know, need to know, and what's just simply nice to know?" The reason I put things in this perspective is that I think we need to focus our research efforts. On the whole, our social science research has been largely cross-sectional, opportunistic, and spanned all three of these categories. The time has come for us as a group to prioritize our efforts and target questions in the must know category. We have limited resources, including funding and available scientists, and we must do a better job of making substantive contributions to the field of wildland fire research. This will require us to work more cooperatively with biological scientists and design projects that are more integrative in nature.

The second point I want to address is the means by which social science may contribute. While many of us recognize the need to focus our collective attention, it seems there are a lot of parallel efforts going on. The USGS is hosting a workshop next month, there's the interagency study getting off the ground, and the Park Service is hosting a session in an upcoming conference in San Diego. We have a lot of ideas floating about, but I'm concerned that we seem to always want to start from "square one." For instance, we already know that people don't want fire in their backyards. They don't want smoke. They don't want mudslides. We know a lot of those basic kinds of things. With everything we have accomplished over the last ten years, we really need to take stock of what we do know and set some priorities about how we can best contribute from this point forward. For example, Matt Carroll laid out a provisional research agenda yesterday with some very good ideas. As I was listening, I wondered how we might focus our efforts together rather diluting our efforts individually. We really need to move on to questions about taking what we know and designing research that will we make a difference at the next level.

In reflecting on what I've heard, I'd suggest three basic approaches. One of them revolves around institutional concerns. The real question for the Forest Service involves the steps to formulate a central, well-articulated goal for the agency. Where's the leadership to do that? How can people

understand what the big goal is and then go out and do something about it? This approach also must address citizen-agency interactions. For example, we need to develop guidelines for engaging the public in discussions about trade-offs and choices. That's where we need to go as soon as possible.

A second approach is the evaluation of educational and outreach programs. We need to understand which programs are most effective. This will not only lead to a better public understanding of the issues of forest health and fuels management, but also better relationships between citizens and agencies.

The third area is risk. We talk a lot about costs and benefits, but we really need to attack the risk problem. For example, what are risk factors from the agency's and the public's point of view? If we develop a multi-partner process for assessing risk on identifiable landscapes, places people can actually see conditions and practices unfold on the ground, we may make some real progress. This will also mean taking monitoring and evaluation seriously. We talk about the need to do these activities, but our follow up is pretty lousy. We need to figure out how we can implement an effective monitoring and evaluation program and develop some institutional memory about what we've learned. Essentially, have the fuel treatments we've been implementing work? Do they make a difference, both ecologically and from a public perspective? In the end, we'll need to articulate what we learn and share it with the public to reach long-term agreements.

DISCUSSION SESSION

- It would be very helpful for social scientists to draw on what they already understand about social dynamics. This would help agencies figure out how to stay engaged with the public. Everybody's busy and everybody's tired. So, in repeated public meetings, we have a declining number of participants. Social science could help us figure out how to keep people engaged and also how to use people more effectively. Without glossing over the need for thoroughness, public participation feels real inefficient. We can't afford this inefficiency. We need to design processes that allow people to use their time well.

- I'm a landowner. I'm John Q. Public. I think the public, especially in the Bitterroot where I live, is waiting for someone to come up and say, "Let's talk." How long is it going to take you guys to get down to talking to me and doing something? When is your research going to be over? As soon as people can't see the smoke anymore, there's not a problem. So, I want somebody to start talking with us in the Bitterroot so that we can work on a model that gets something done. *Matt Carroll responds*: Yes, the model that often emerges is one where we do our social science, and then, sometime later, there's public involvement. This is exactly what I'm not talking about. It's nothing. The social scientists ought to do a lot more up front.

- The term "acceptability" invokes the impression of a hierarchal process. It's the notion that the agencies are going to do something and then request acceptability on the part of the people. It seems to me that acceptability is not where we should be going. We should

seek to understand how we make decisions according to our values. Fuel treatment is a tool to provide something, or to do something within the natural system. If something conflicts with the natural system, then it's quite simply not acceptable.

- If acceptability means a dialogue with the stakeholders, including the scientists who understand cause and effect relationships in the biophysical sense, then acceptability is different. It is something that emerges from the discussion. If you accept a technocratic definition of acceptability, then it's a lost hope.

- One mistake that scientists make dealing with the public is they present more certainty than really exists. When predictions don't come true, there's a problem.

- Communities are motivated right now, and not just in the Bitterroot. There are other places where things happened and people felt that things didn't go as they should. Those communities are not waiting for research to occur. They're going to move forward and get things done, whether it's teaching about fire-wise communities or whatever it happens to be. Since a lot of things will happen on the ground, it may be that the research agenda should be developed locally. Perhaps it's my view of participatory research, but if you want to have relevancy in the community, you will need to involve the community in developing the research questions, in doing some of the work, and in examining the conclusions. This is far different than developing a research agenda and then providing the information to the local community. We need to look at different ways to do research. We need a lot more researchers in the communities working hand-in-hand with local folks.

- I want to reinforce what Ron Wakimoto talked about in terms of knowing our work force. We need to know what people we have available. We also need to know the goals we are trying to achieve before we hire new people. We need to know what we are expecting to do in the future, what the public is expecting of us as an agency, and what the laws require. We need to go out and find the people who can answer these questions for us. Otherwise, we are doomed. *Ron Wakimoto responds*: I agree with you. There's been an image that agencies hire people who can go talk to trees, but can't talk to people. In the recent fire in the Bitterroot, I talked with the operations chief. He said, "Boy, I love to come out to these fires because it's the only time I feel like I fulfill what I'm supposed to do. The rest of the time on the District, I never get anything done."

- I'm on a fire team where the average age is probably 50 years old. The youngster is 41. The operations chief Ron talked about probably took 15 years to get to that level. Talk about even-aged management! Personnel management in the Forest Service has a tremendous gap to fill. *Ron Wakimoto responds*: Let me ask you, what does it take to rebuild that? Let's say you had the money to bring in new people and create a new age class? *Commenter responds*: It's hard to be involved in this culture if the payoffs aren't there. The Forest Service is not the employer of choice some people think we are. When we have a guy working 78 days on fires in one summer, someone at home is asking him, "How about your job here?" The incentives are just not there. The culture has to change. There have to be reasons for people to get into this.

- When we ask about the work force of the future, we also need to consider the types of problems we will see. We are looking at a whole new world of problems. Compared to the past, when all the 40 and 50 something fire managers cut their teeth, things are much different. It used to be a system with a great deal of predictability. Even the bad years weren't that bad. All of a sudden, since about 1980, things have really changed. We've entered into an era of unpredictability when it comes to these events. Look at 1988, 1994, 1997, and 2000. These spikes of big fires are not occurring everywhere, but where they are occurring, we should be moving right in, not only for suppression, but for follow-up. After a major event the degree of salience is high with the public. It's time to solve problems. It irks me and it irks the residents when the answer to their question is "more research." They hate that. They want help solving their problems. You're talking about knowledge issues, not research issues. Not only is the work force changing, but the problems that the new work force will face are changing. We need to figure these things out with people who know something about people systems.

- I've observed that we have two things compounding our problem. First, the federal government has an increasing number of regulations. Those who work for the federal government know an increasing amount of time is spent filling out forms, taking training, and responding to the regulations. Second, we have experienced a decrease in the federal work force. It's the smallest it's been since the Kennedy administration. Forest Service research has one half of the scientists it had 15 years ago. There are more requirements being imposed on a smaller number of people. This presents a problem now as well as down the road.

- The gap is that we have not organized research to deliver knowledge. We've organized research to do research, and that's wrong. We expect one of our researchers will win the Nobel Prize. But what I care about is this: Can he or she help solve problems? We need to reorganize research. Can we reward people that are going down the road to Hamilton to work with folks who are crying out to be heard? We need some researchers at home, but we need social scientists and other researchers on the ground to bring us that different perspective.

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE INQUIRIES

CHARACTERISTICS OF RESIDENTS IN THE URBAN/WILDLAND INTERFACE

Conference participants repeatedly emphasized the urban/wildland interface as a priority in addressing risks associated with fuels in the forest environment. There appears to be little agreement as to the boundary of the "interface" area, and subsequently, scarce knowledge of the people who reside there. People who have property adjacent to public lands may feel more directly affected than others by any treatments or lack thereof, yet the side effects of interventions such as prescribed fires (smoke) or mechanical thinning (trucks on roads) may extend well beyond an immediate adjacency to treatment areas. A landowner speaking to the conference indicated that even though very few people were directly impacted by the fire season of 2000, the entire region was affected by the smoke and uncertainty. The reach of impacts from fuel treatments is unknown.

POTENTIAL RESEARCH OR ADMINISTRATIVE STUDY QUESTIONS:

- What characterizes the urban/wildland interface?
- What are the characteristics of the residents of the urban/wildland interface? Do these residents have different demographic or attitudinal profiles than urban residents or residents of other rural areas?
- What are the dynamics of population change in the urban/wildland interface? Are there locations that are under greater population pressures than other locations? What are the characteristics of these locations?
- To what degree does the urban/wildland interface coincide with areas in need of ecological restoration?

RISK ASSESSMENT

Fuel treatments can be initiated for several goals (for example, prescribed fire can be applied strictly for ecological restoration and maintenance), but hazard fuel reduction remains a commonly stated priority. Yet there is little clarity of the significance of risk factors from both the agency and

public point of view. A succinct categorization of risk factors to allow greater public understanding would diminish much of the confusion regarding the social acceptability of alternative fuel treatments.

Problems in risk categorization arise, however, since natural systems are highly dynamic and subject to infrequent but extreme events. There are tremendous areas of National Forests in the West where large-scale, high-intensity fires occur under natural conditions, and in these and many other locations, it is infeasible to treat fuels. Public agencies will need to be careful in producing messages that indicate that by treating fuels, risks to fire will not only be reduced but eliminated. The current message transmitted from multiple agency sources may be woefully simplistic, creating unrealistic public expectations. As one observer commented, "Our message is that fire suppression has created these huge fuel build-ups and now we have to go in and clean up these messes. Then we won't have to worry about fire! There are lots of agency publications about the Ponderosa pine forests and all we have to do is go back to the way it was. We have over generalized, and that could be because we didn't know spatial variability before...But the way we have communicated information has led to inaccuracies. Even those areas that are treated extensively can burn. Even if you do everything you can, there will still be ignitions in this forest." During the conference field trip, participants heard about a location where a landowner had conducted extensive thinning operations, but a wildfire passed through the forest and the landowner's house was burned.

Explanations about cause/effect relationships are a fundamental contribution of science. Yet the unpredictability of fire events reduces the capability of agencies or scientists to offer assurances about risk reduction. Considering the oft-stated interests among community members, planners, policy makers, and social scientists to incorporate people into the research process, it may not even be desirable to extend assurances of protection to a nervous population from a disengaged, expert perspective.

POTENTIAL RESEARCH OR ADMINISTRATIVE STUDY QUESTIONS:

- What is a multiple-partner process for assessing risks on identifiable landscapes, such as watersheds or other community-defined areas?
- How effective are fuel treatments in meeting risk reduction objectives and what are the indicators to evaluate success or failure?
- What are the processes to measure, report, communicate, and understand risk and uncertainty?
- Who assumes the short-term risk and responsibility for applying fuel treatments, such as an escaped prescribed fire? Who assumes the long-term risk and responsibilities, such as ineffective treatments, given the uncertainty of wildfires?

CLARITY ON FOREST MANAGEMENT OBJECTIVES

The introduction of fuel management presupposes a rethinking of the objectives of forest management. The current confusion over the definition of forest health points to the need for thoughtful consideration of the purposes of public forests and the beneficiaries of management. We must ask, healthy forests for whom and for what? At present field managers can't explain management objectives, and it hampers the implementation of projects before, during, or after wildfire events. Debates on whether or not the agency should suppress certain fires will continue. An agency fish biologist commented, "I feel like an employee without an idea of what I'm supposed to do."

Even in situations where there are apparent management needs, such as reducing heavy fuel loads in the urban/forest interface, it still remains difficult to accomplish work. The dramatic analytical needs that have become the norm for NEPA compliance are a major barrier to swift, flexible operations. A District Ranger commented on the approach he would take, "It is apparent to me how I would prefer to use any new resources available to treat fuels - to hire other wildlife biologists, fish biologists, and NEPA specialists to finish EIS's (Environmental Impact Statements)."

POTENTIAL RESEARCH OR ADMINISTRATIVE STUDY QUESTIONS:

- What is needed to formulate and transmit well-articulated goals concerning forest and fire management throughout the ranks of the agencies?
- How effective are different types of decision tools, such as NEPA documentation, simulations, or visualizations?
- What are the primary barriers to implementing a fuel management program?

CONSEQUENCES AND TRADEOFFS

The effects of smaller-scale fuel treatments are being evaluated in many locations, but larger scale impacts are difficult to predict. Fuels may be treated to achieve the greatest level of accomplishment (perhaps measured in acres) at the lowest cost, but these fuels may not occur in the areas of greatest risk. Some objectives may have to be prioritized over others, and all treatment activities must be reconciled with other goals, such as maintaining species habitats, air quality, water quality, and producing commodities. Fuel treatments also raise the potential to create unintentional or unanticipated impacts, complicated by procedures to light prescribed fires in "off-season" burning windows to reduce risks of escape.

The conference did not examine the differential impacts of smoke on the human population. It is recognized than citizens with lung diseases or other respiratory problems are more vulnerable than others to exposures of smoke. Related to the issue of scale is the amount and type of smoke that

would be produced by an energetic fuel management program, and how this level of smoke would compare to the more stochastic but more intense smoke that would result from wildfires.

POTENTIAL RESEARCH OR ADMINISTRATIVE STUDY QUESTIONS:

- How are the differential tolerances of smoke distributed among the population?
- What alternative solutions are available to reduce the negative effects of periodic smoke events?
- What influences, such as naturalness or intended commercial benefits, affect the acceptability of smoke?
- How do we evaluate the cost of fuel treatments compared to the environmental consequences of not implementing the treatment?
- How are the benefits of fuel treatments reconciled with the costs?
- What are the cultural conditions affecting public attitudes about fuel treatments?

CITIZEN/MANAGEMENT INTERACTIONS

The subtext for the conference was the changing relationship between citizens and land management agencies. Conference participants suggested placing interdisciplinary teams across National Forests so that well-trained individuals could go into communities during and immediately after a fire to address salient community issues. These team members develop a level of trust that will allow effective rehabilitation and restoration responses. A joint community/agency research and management agenda for fuels could be a model for ongoing cooperation over the long term.

The methods to incorporate citizen concerns and expectations remain unclear. Knowledge and experience about forest or fuel conditions do not only reside within agencies. One conference participant observed that there is "more knowledge about fire outside in the communities than you have in the agency…the outside knows more about what the inside should be doing than the inside." The challenge for social science research is to offer insight as to where this knowledge resides. If this knowledge is to be utilized, it must be found, evaluated, and made explicit.

The public and the agencies are trapped in a web of misunderstandings about the management of fire and fuels. The social science contribution to clarifying differing expectations could be profound. A Forest Service scientist reflected on this, saying, "We in the agency understand the public one way, and the public understands us one way. Have we come to terms of what to expect of each other? What can we as an agency give? We can't be everything to everyone."

Citizen participants at the workshop expressed doubts about the agency's capacity to engage people at the community level. There are very few staff members with either the training or the time to commit to the development of greater understanding. In addition, the agency's responsibilities and its performance cannot be segregated from its past. As one resident of the Bitterroot Valley observed, "People are skeptical...There's a lot of trust involved, like this poster of pre-settlement conditions of open Ponderosa pine with a pile of stacked logs in the background." Benefits from incorporating community-level expectations and knowledge imply substantial costs, in terms of personnel, time, and the span of control of agency plans.

POTENTIAL RESEARCH OR ADMINISTRATIVE STUDY QUESTIONS:

- How can agency capacity be built for citizen-based planning and decision-making?
- How can the research process, especially the formulation of research questions, be changed to adequately reflect citizen concerns?
- What outreach programs are most effective in generating a broad understanding of forest and fire management issues?
- What investments are necessary to engage specific populations (residents, visitors, business owners) in conversations about objectives and consequences of fuel treatment programs?
- How effective are team approaches in supporting community rehabilitation and restoration?

RESPONSIBILITY FOR FIRE PROTECTION OF PRIVATE LAND INFRASTRUCTURE

A consistent and ongoing protection of private homes and other structures from wildfire may be unrealistic. One conference observer characterized the protection of private structures as enabling an addictive relationship between urban interface residents and fire protection organizations, "What we have is residents gladly giving up responsibility and agencies gladly taking responsibility, whether or not that responsibility can be met." There have been frequent mentions of insurance companies taking a larger share of responsibility. Still, wild fire related losses are but a small proportion of residential claims. With major federal agencies protecting private investments from wildfire damage through virtually unlimited public spending, one conference participant sarcastically stated, "which part of this don't we understand about getting the insurance companies involved?"

On the other hand, agency actions that protect private investments are bound to other powerful political and institutional incentives. One conference participant provided an impassioned description of the "social contract" between Western residents and the Forest Service related to fire protection. After the 1910 fires and the deaths of hundreds of citizens, the Forest Service's mission to extinguish fires was explicitly driven by a purpose to protect residents' lives and property. The message of the Forest Service to the public was an invitation to partnership, "Only you can prevent forest fires." But once fires occurred, the agency took pride in suppressing them. As an agency scientist observed, "We did a great job. You

wanted us to put out the fires, so we went out and put out the fires…Socially, the agency cannot afford not to respond. I can see it now. It's the best example of how we can see society telling the agency, 'Hey, it's not acceptable to lose these homes. We are giving you an extra billion dollars to do something about this.' The social contract that we entered into in 1910 has not changed. People are still expecting us, as an agency, to protect them, whether they take responsibility or not."

When agencies comply with this social contract, taking a large measure of responsibility for protecting private investments, it is unknown whether people will take adequate steps to reduce risks their own. One conference participant expressed frustration at the conundrum the relationship has created, for people build homes in the urban interface, and yet are not regulated to ensure defensible space and on-site suppression capabilities, "If the agencies are responsible for the residents' actions, but the agencies cannot tell residents what to do, it's like having a perpetual teenager."

The agency also receives enormous internal benefits from their recognized abilities to put out fires. In the same rural areas where there have been frequent public outcries about Forest Service mismanagement of resources, residents and schoolchildren put out hand-painted signs of gratitude to firefighters. Staff members in fire camps comment on the uncomfortable transformation that occurs on their return to the home office, where they will turn from heroes to goats. From the point of view of the institution, the problems associated with nearly a century of fire suppression may be minor compared to the problems associated with letting fires run wild.

POTENTIAL RESEARCH OR ADMINISTRATIVE STUDY QUESTIONS:

- How can a strategy be developed to share the burden of resource protection with citizens?
- What steps need to be taken to implement an effective fuel management monitoring and evaluation program?
- Under what conditions have agencies shared responsibilities for managing fuel treatments with partners?
- How do we share risks with others and how are uncertainties allocated among parties?

INSTITUTIONAL CHANGE

Conference participants frequently recognized the influence of institutional norms and behaviors on social acceptability. Not only do issues of process play decisive roles, but also the legal, regulatory, and budgetary infrastructures that compel and constrain agency actions. One of the social scientists at the meeting summed up his conclusion succinctly, "I can't see why there's so much debate on the source of the problem. This is an organizational, institutional problem. The cry here is, 'Save us from ourselves.' What is needed is a well articulated set of goals and objectives within the organization about how we are going to deal with the forest." Social demands and responses to agency actions will remain multi-dimensional,

guided not by specific events but by the manner in which forest management decisions are generated and manifest. Social science will continue to play a key role in the identification of interests and the evaluation of processes to guide actions.

In the current administrative structure, both social science and fuels management research are commonly viewed as supplements to management operations. An alternative institutional arrangement can be imagined that would emphasize learning within operational procedures. This would present a different role for researchers, who would find themselves integrated into the planning and evaluation of actions. Applications of fuel management treatments would be a part of a larger process of jointly conceived management, where the design, implementation, and evaluation of treatments gain legitimacy through shared ownership. When the agency and the public learn the implications of this joint management, then the issue of acceptability will cease be a subject/object relationship where the agency decides and the public responds. This new role for researchers will require institutional rewards to those whose efforts are redirected from more traditional investigations. An assessment of the institutional change needed to apply researchers' skills in new ways is sorely lacking. It would require explicit descriptions of new career paths as well as the training necessary for researchers to perform effectively in community settings.

The composition of the agency has changed over the past two decades. There are greater numbers of biologists, wildlife managers, hydrologists, and other resource management specialists. Concurrently, through budget changes, retirements, and attrition, there has been a diminishment in some of the very skills that are valuable in treating forest fuels. The coming wave of retirements may make forest and fuel management skills even more scarce, yet there are few quantitative summaries that identify the needed recruitment to fill the gaps. In addition, there are no comprehensive assessments of workforce demands for social scientists and communication specialists that will be vital to public deliberations over steps to develop, test, and eventually institutionalize new management approaches to fire. The agency needs to examine its balance of technical expertise, ensuring that new professionals are not just technicians, but politically capable participants in community-based planning for resource management.

POTENTIAL RESEARCH OR ADMINISTRATIVE STUDY QUESTIONS:

- What attributes of agency culture affective the implementation of fuel management strategies?
- What is the current institutional capacity to address fire and fuel management, such as levels of skill and operational capabilities?
- What psychological, economic, and institutional benefits accrue to agencies by putting out wildfires compared to treating fuels?
- What has been the level of change, by skill category, in Forest Service staffing with responsibilities for fire management?
- To what degree can technology replace personnel in a fire management agency?
- What are the attitudes of entry-level personnel in the Forest Service regarding careers in fire management?
- What are the attitudinal and behavioral characteristics of the fire subculture within the Forest Service?

TABLE OF RESEARCH PROPOSALS

Table 1: Comparison of research topics: Proposals received by the Rocky Mountain Research Station (RMRS) and priorities of small groups within the conference.

Proposals to RMRS	***Priorities of Fuels Conference***
Understand factors that influence acceptability • Prescribed vs. wildland fires • Closure of public lands to reduce fire danger • Influence of media coverage • Understanding ecological role of fire	How do we talk about the benefits and costs of fuel treatments? • To people • To particular ecosystems • Measurement of success • Effectiveness of treatments • Drivers of willingness to accept fire • Acceptance of the decision process
How does knowledge and attitudes vary by subpopulations of the United States • Urban/rural • Regional • Race, class, gender • Public trust	What factors most influence public trust and how does trust influence response to fuel treatments? • Erosion of support for decisions with an erosion of trust
How does acceptability of treatments vary by public purpose of lands?	How will the public respond to different treatments in different land classifications?
What are the social and economic effects and the tradeoffs of treatment alternatives? • Restoration options • Rehabilitation options	How do we understand tradeoffs, both environmental and economic? What are the economic and redistribution effects of alternative treatments?
How do changes in rural settlement patterns relate to risks? • Trends in settlement • Methods of communicating information on potential risks	Private landowner perception of risk is not well understood (if citizens do not understand risks, they may prefer not to obligate children and grandchildren

Table 1 (Continued): Comparison of research topics: Proposals received by the Rocky Mountain Research Station (RMRS) and priorities of small groups within the conference.

Proposals to RMRS	***Priorities of Fuels Conference***
What are the historic and contemporary uses and needs of indigenous and traditional peoples for fire management?	Unique/irreplaceable plant communities and cultural sites
Determine the effect of exposure to demonstration sites on perceived desirable effects of fuel treatments	Means to get research results to the people on the ground • How to explain lessons learned • Information alone is rarely sufficient
Administrative study to test effectiveness of collaborative learning to accomplish restoration objectives	Means to build capacity for community-based stewardship
Review, integration, and synthesis of hazard and disaster literature	
Determine how policy positions of various groups and organizations have changed over time regarding fuel treatment	
Methods to understand factors that influence home ignitions during wildfires	
Develop a spatial model that depicts wildfire spread into residential development and resulting home destruction based on home ignition characteristics	
	What is the level of understanding of agency employees of the purpose of fuel treatments?
	How are priorities set within agencies for fuel treatments? Clarity of fire management mission.
	What are the institutional barriers and incentives to treat fuels? How do institutional constraints affect implementation of fuel treatments?
	Ecological based models that show complex interactions of treatments
	Reconciliation of conflicting legal mandates

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