

AN ABSTRACT OF THE THESIS OF

Eric Lee Toman for the degree of Master of Science in Forest Resources
presented on May 29, 2002.

Title: Citizen Perspectives on Hazardous Fuel Reduction in the Blue Mountains:
Findings and Implications from Panel Research.

Abstract approved _____ Signature redacted for privacy.
Bruce A. Shindler

Forests in the Blue Mountains region of eastern Oregon and Washington are facing a large-scale forest health crisis. Poor forest conditions have greatly increased the risk of catastrophic wildfire. Resource managers in the Wallowa-Whitman, Umatilla, and Malheur National Forests are utilizing prescribed fire and mechanized thinning treatments to reduce hazardous fuel loads and restore forest health. While it is generally recognized that social data must be included in resource management decisions there is still a lack of knowledge about public responses to forest conditions and forest practices. In particular, although considerable research has focused on the biological effects of hazardous fuel reduction techniques relatively few studies have addressed public acceptance of these practices. Fuel reduction projects and information programs within the Blue Mountains region provide an opportunity to examine citizen perspectives on the legitimacy of these practices and the effectiveness of informational messages.

This report presents a summary of research conducted in 2000/2001 in Blue Mountain communities. This current study replicates research conducted in 1996 (Shindler and Reed 1996), by resurveying the same individuals about the same forest conditions and management practices, while also including a new line of inquiry to examine more recent concerns expressed by forest managers (e.g., smoke, agency outreach programs, and citizen-agency interactions). This type of longitudinal research is particularly useful because it allows the identification of shifts in public attitudes and behaviors and recognition of the factors that influence individual actions.

The study used a mail questionnaire to elicit responses from panel members. Panel members consisted of respondents to Shindler and Reed's 1996 survey of Blue Mountain residents. The questionnaire focused on general perceptions of forest conditions and forest management, knowledge of prescribed fire and mechanized thinning treatments, the usefulness of general information sources and specific Forest Service outreach programs, public attitudes prescribed fire and mechanized thinning, and preferences for public involvement in forest management decisions.

Several key findings emerge from the data. First, although respondents are supportive of both prescribed fire and thinning practices, support is much greater for mechanized thinning treatments. Second, respondents are generally knowledgeable about prescribed fire and thinning effects; however, some misperceptions exist with key treatment objectives. Third, citizens find

interactive educational programs (e.g., personal conversations, guided field trips, school education programs) more useful than uni-directional programs (e.g., newsletters, brochures, environmental impact statements). Fourth, while attitudes toward the use of prescribed fire and mechanized thinning remained relatively constant throughout the study period, findings indicate a declining relationship between the Forest Service and Blue Mountain residents.

These findings suggest three strategies essential to continued public support of fuel reduction practices. First, capitalize on existing public knowledge and support. Data indicate an existing base of well-informed, supportive stakeholders that could be a central asset in building future management programs. Second, focus on relations with citizens. Findings suggest that filtering out national issues to focus on local problems and increasing opportunities for meaningful citizen involvement in fire management planning will be particularly useful to improving citizen-agency relations. Third, develop a comprehensive communication strategy. As suggested by this study, a successful strategy will not only consist of information provision but will also focus on the process of how people come to understand forest conditions and support policies.

©Copyright by Eric Lee Toman
May 29, 2002
All Rights Reserved

CITIZEN PERSPECTIVES ON HAZARDOUS FUEL REDUCTION IN THE
BLUE MOUNTAINS: FINDINGS AND IMPLICATIONS FROM PANEL
RESEARCH

by
Eric Lee Toman

A THESIS
submitted to
Oregon State University

in partial fulfillment of
the requirements for the
degree of

Master of Science

Presented May 29, 2002
Commencement June 2003

ACKNOWLEDGMENTS

It is said that it takes a village to raise a child and I think the same can be said of the journey involved in completing research. In many ways this research and my graduate experience have been shaped by the many talented individuals that I have had the privilege to interact with throughout this journey. First, I would like to thank my major professor, Bruce Shindler, for providing the opportunity to conduct this research and his guidance along the way. Bruce has been a wonderful mentor, always willing to give the necessary direction but mindful to let me develop my own abilities and help me make this research my own.

My other committee members—Denise Lach, John Tappeiner, and Jay Pscheidt—offered invaluable advice and support. I greatly benefited from their ability to challenge me to see things from a different perspective. I have also been privileged to work alongside many talented graduate students and am appreciative of the friendship and inspiration they provided. I am grateful to my wonderful family that has always supported me and helped me to reach for my goals. Finally, I want to thank my wonderful wife, Elizabeth. I am forever indebted to her for her understanding, friendship, and unwavering support.

This research was supported by the U.S. Forest Service, Pacific Northwest Region, Fire and Aviation Management. Additional support was provided by Mary McDonald and Saubert Fellowships from the OSU College of Forestry.

TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION	1
STUDY SETTING	3
OBJECTIVES	4
LITERATURE REVIEW	5
SOCIAL ACCEPTABILITY	5
PRESCRIBED FIRE	8
MECHANIZED THINNING	11
PUBLIC INVOLVEMENT	14
KNOWLEDGE	17
ENVIRONMENTAL EDUCATION	19
TRUST	23
METHODS	25
RESEARCH DESIGN	26
DATA COLLECTION	26
DATA ANALYSIS	27
FINDINGS	28
PARTICIPANT PROFILE, KNOWLEDGE AND INFORMATION SOURCES	28
Respondent Characteristics	28
Policy Orientations	30
Influences of Cerro Grande Fire	31
Public Awareness	33
Public Knowledge	33
Information Sources	35
Forest Health Conditions	42

TABLE OF CONTENTS (Continued)

	<u>Page</u>
PUBLIC ATTITUDES ABOUT PRESCRIBED FIRE AND MECHANIZED THINNING	44
Prescribed Fire	44
Concerns About Effects Of Prescribed Fire	48
Public Assessments Of Smoke	49
Smoke Tolerance Levels	51
Mechanized Thinning	53
Treatment Preferences	55
CITIZEN-AGENCY INTERACTIONS	58
Citizen Participation	58
Citizen Assessments of Interactions	60
SOCIODEMOGRAPHIC CHARACTERISTICS AS INFLUENCES ON ATTITUDES AND KNOWLEDGE	63
Prescribed Fire	65
Mechanized Thinning	66
Knowledge	67
DISCUSSION	69
CHANGES IN PUBLIC ATTITUDES: 1996-2000	69
PARTICIPANT AWARENESS AND KNOWLEDGE OF CONDITIONS	71
INFORMATION SOURCES AND THE EFFECTIVENESS OF DELIVERY SYSTEMS	74
Interactive Programs	77
Uni-directional Programs	80
ATTITUDES AND SUPPORT FOR FUEL REDUCTION PRACTICES	82
CITIZEN-AGENCY INTERACTIONS	85

TABLE OF CONTENTS (Continued)

	<u>Page</u>
CONCLUSION	88
CAPITALIZE ON EXISTING PUBLIC KNOWLEDGE AND SUPPORT FOR FUEL REDUCTION	90
FOCUS ON RELATIONS WITH CITIZENS	92
DEVELOP A COMPREHENSIVE COMMUNICATION STRATEGY	95
REFERENCES	99
APPENDIX: SUMMARY OF SURVEY RESPONSES	111

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Environment/Economic Scale	31
2. How much attention do you pay to national forest issues or problems?	34
3. How well informed are you about forest conditions in the Blue Mountains?	34
4. Useful information sources about forest management in the Blue Mountains	37
5. Overall condition of forests in the Blue Mountains	43
6. Condition of forests in respondents' area specifically	43
7. Value of citizen participation in federal forest management, taking into account increased cost of government	59

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Participant Profile 2000	29
2. Influences of the Los Alamos/Cerro Grande Fire	32
3. Citizen knowledge about the effects of fire and thinning in Blue Mountain forests	36
4. Assessment of Forest Service information and outreach in the Blue Mountains	39
5. Public attitudes and acceptance of prescribed fire	46
6. Concerns about potential effects from the use of prescribed fire	48
7. Assessments of smoke	50
8. Concerns about potential effects from increased smoke levels	50
9. Tolerance levels for different smoke intensities	52
10. Public attitudes and acceptance of mechanized thinning	54
11. Preferences for prescribed fire and mechanized thinning treatments	56
12. Prescribed fire policies	57
13. Mechanized thinning policies	57
14. Preferred treatment of the existing build up of dead trees in the Blue Mountains	58
15. Realistic role for the public in federal forest management	60
16. Experiences and interactions with forest management agencies	61
17. Bivariate correlations between respondent characteristics and support for and knowledge of prescribed fire and mechanized thinning	65

CITIZEN PERSPECTIVES ON HAZARDOUS FUEL REDUCTION IN THE BLUE MOUNTAINS: FINDINGS AND IMPLICATIONS FROM PANEL RESEARCH

INTRODUCTION

Forests in the Blue Mountains region of Oregon and Washington are threatened by drought, insect outbreaks, and the risk of catastrophic wildfire (Mutch et al. 1993; Tanaka et al. 1995). Resource managers on the National Forests within the region are utilizing multiple strategies to reduce hazardous fuels and restore forest health. Two of the most frequently used methods are prescribed fire and mechanized thinning treatments. Research demonstrates that a large-scale application of these treatments can address the principal causes of declining forest health and increased fire risks and serve to increase biological diversity, improve plant communities, reduce the number of invasive species, and ultimately create more natural forest conditions (Mutch et al. 1993).

Citizen support is an essential component of effective prescribed fire and mechanical thinning programs (Manfredo et al. 1990; Shelby and Speaker 1990). The public has legitimate concerns about these activities following decades of fire suppression activities and fire exclusion education from forest management agencies (e.g., Daniel 1990; Shelby and Speaker 1990) as well as exposure to high-profile escaped prescribed fires such as the Cerro Grand Fire in Los Alamos,

New Mexico during spring 2000. Agency educational programs nationwide, and within the Blue Mountains region particularly, attempt to address these concerns by citing the benefits of fuel reduction activities. Fuel reduction projects and information programs on the Wallowa-Whitman, Umatilla, and Malheur National Forests provide an opportunity to examine citizen perspectives on the legitimacy of these practices and the effectiveness of informational messages.

This thesis presents a summary of research conducted in 2000/2001 in Blue Mountain communities. This current study replicates research conducted in 1996 (Shindler and Reed 1996) by resurveying the same individuals about forest conditions and management practices. It also introduced a new line of inquiry to help examine more recent concerns expressed by forest managers in the region including public reactions to smoke, how citizens view their interactions with agency personnel, and the usefulness of Forest Service outreach programs. This type of longitudinal research—called a panel study—is particularly informative. Evaluating the attitudes of the same respondents over time helps us identify shifts in public attitudes and behaviors and recognize the factors that influence individual actions.

This thesis is organized into six chapters. Following this Introduction, the Literature Review presents related findings from prior research related to citizen support and acceptability of management practices. The Methods section details the research design and the process utilized to gather data and address the study objectives. Results are then presented in the Findings chapter and further

deliberated in the Discussion. Lastly, the Conclusion highlights management implications from research findings.

STUDY SETTING

The forests of the Blue Mountains region have been cited as an example of the complexity inherent to federal land management in the 21st century (Langston 1995). Historically these forests were dominated by open, park-like stands of old-growth ponderosa pine. The current stand structure is very different from these historic conditions. Past harvesting practices focused primarily on removing mature ponderosa pine (Wickman 1992). Fire suppression efforts stifled the characteristic frequent, low-intensity fires resulting in encroachment of more shade-tolerant true fir and Douglas-fir in the understory and leading to overstocking of the remaining stands of ponderosa pine (Hall 1980). As a result, current stands are more susceptible to drought and insect outbreaks and are characterized by high amounts of tree mortality, decreased forest productivity, and increased risk of catastrophic fire (Wickman 1992). These conditions were also apparent to the public as 69% of those surveyed in the 1996 study rated forests in the Blue Mountains “unhealthy.”

Declining forest health is not unique to the Blue Mountains, but is evident throughout forests of the western United States (Langston 1995). Poor forest conditions have greatly increased the risk of catastrophic wildfire and the fires of 2000 brought national attention to this situation. Citizens within the Blue

Mountains area have strong ties (economic, recreational, historical) to surrounding public lands and are attentive to National Forest issues and conditions (Shindler and Reed 1996). In order for programs to enjoy long-term success in this setting, especially programs like fuel management that involve a degree of risk and uncertainty, they must be both beneficial for the natural system and accepted by local citizens (Shindler et al. 2002).

OBJECTIVES

The purpose of this study is to improve our understanding of the factors that contribute to public acceptance of prescribed fire and mechanized thinning to reduce hazardous fuels in the Blue Mountains region. The research design provided the ability to collect data at different points in time, allowing for unique comparisons not possible with single case studies. Study objectives were to:

- 1) Compare the current research findings with the 1996 study to describe changes in public attitudes and behaviors;
- 2) Examine factors that have influenced the study population's knowledge of and response to fuel reduction programs;
- 3) Identify levels of support for fuel reduction activities and examine underlying concerns;
- 4) Identify citizens' information needs, preferred forms of information exchange, and which information delivery systems are most effective; and
- 5) Examine Forest Service interactions with local publics.

LITERATURE REVIEW

SOCIAL ACCEPTABILITY

Public interest in the management of federal lands has increased considerably in recent decades, prompting passage of legislation (e.g. the National Environmental Policy Act, the National Forest Management Act) mandating public involvement in resource decision making and causing resource managers to pay greater attention to citizen concerns (Shindler et al. 2002). This increase in public interest has ensured that virtually all resource decisions will undergo critical scrutiny, as demonstrated by the large number of forest plan appeals—811 filed between 1976 and 1989 (Gericke et al. 1992)—and citizen use of judicial and legislative processes to influence policy decisions (Shindler et al. 1993). Indeed, as suggested by Shindler et al. (2002), a simple glance at the daily headlines provides ample evidence of the influence public judgments can wield on the implementation of any management strategy.

In order for a program to enjoy long-term success in this atmosphere, it must be socially acceptable (Shindler et al. 2002). The concept of socially acceptable resource management was first proposed by Walter Firey (1960). Firey's research indicated that the long-term durability of resource policy was dependent upon being physically possible, economically feasible, and culturally adoptable (or socially acceptable). To meet this criteria a project must function within the natural limits of the ecological system, provide positive economic

return (either in revenue produced or elimination of costs incurred as a consequence of not taking action), and be compatible with social norms and desires. Each of these criteria is a necessary component of sustainable policy; even if a decision is based on sound science and provides generous economic return it has little chance of long-term success if it lacks public support (Stankey 1996). Public judgments and support are strongly influenced by contextual aspects including a history of past interactions, decisions, and forest practices (Shindler et al. 1999). Thus, management actions or forest conditions acceptable in one situation may not necessarily be acceptable elsewhere (Brunson 1993; Shindler et al. 2002).

Although public judgments are often dismissed as less critical to policy success than “best science” or a “positive benefit-cost ratio,” Shindler et al. (2002) cite four reasons why we need to pay attention to social acceptability. First, while technical information is necessary to describe potential policy alternatives and consequences, ultimately the final decision involves interpreting the information according to human values into the “best” or “right” decision. Second, according to the laws governing resource management (e.g., National Environmental Policy Act, National Forest Management Act) citizens, as the owners of public land, simply deserve an opportunity to participate in resource management decisions. Third, given our democratic ideology, lack of public support and understanding will limit the ability to implement virtually any decision. Fourth, public judgments are provisional in nature and subject to

change; paying attention to social acceptability offers an opportunity for open discussion of the complexities involved in management decisions and create opportunities for mutual learning.

The majority of research conducted on the social acceptability of resource management has consisted of cross-sectional research designs; thus, providing limited ability to track changes and trends over time. Babbie (1995, p. 95) likens the limitation of cross-sectional studies to illuminate ongoing processes to “determining the speed of a moving object on the basis of a high-speed, still photograph that freezes the movement of the object.” Longitudinal research methods, which provide for data collection at different points in time, are designed to overcome the limitations of cross-sectional studies (Babbie 1995). However, because longitudinal studies require a significantly greater investment of time and money and are more complex to design and implement, cross-sectional research designs are typically utilized (Vogt and Stewart 2001). Regarding the social aspects of resource management longitudinal research has largely concentrated on the use of coping mechanisms by recreationists (e.g., Kuentzel and Heberlein 1992; Shindler and Shelby 1995), adaptation strategies of displaced workers (Carroll et al. 2000), and the effects of environmental education on citizen understanding and attitudes (e.g., Armstrong and Impara 1991; Brunson and Reiter 1996).

Although considerable research has focused on the biological implications of fuel reduction methods, comparatively few studies have addressed their

associated social implications (Shindler et al. 2002). Moreover, most of this research has focused primarily on the use of prescribed fire; much less is known about attitudinal trends or the acceptability of alternative methods of hazardous fuel reduction (e.g., mechanical thinning, mowing, crushing, etc). Longitudinal studies on fuel reduction have been limited to a trend study of attitudes and understanding of prescribed fire use by recreationists (McCool and Stankey 1986) and use of a quasi-experimental design to test the effects of educational and belief-targeted messages on attitudes (Bright et al. 1993).

PRESCRIBED FIRE

The majority of social science research related to prescribed fire use has focused on aesthetic concerns and the manner in which basic knowledge of treatment objectives and outcomes influences acceptance levels (e.g., Stankey 1976; Carpenter et al. 1986; Manfreda et al. 1990). The severity of the 2000 fire season clearly increased national attention on the federal agencies responsible for fire suppression. In the aftermath, much of this attention has focused on the continuing shift in fire management priorities from fire suppression to the use of fire as a management tool. While suppression is still important, the use of fire to restore forest conditions and reduce hazardous fuels has become more prominent in recent years. Although public awareness of prescribed fire is growing, this use of fire still seems contradictory to the practices that many have come to expect from forest agencies (Lee 1987; Beebe and Omi 1993).

Public concerns with prescribed fire typically focus on risk (danger of escapes to public safety and private property), aesthetics (potential loss of scenic quality and recreation uses), health issues (the impact of smoke on air quality), ecological effects (impacts to wildlife, vegetation, water quality), and economic impacts (loss of valuable timber) (Taylor and Daniel 1984; Carpenter et al. 1986; Daniel 1990; Shelby and Speaker 1990). While in the past, fire management programs may not have been sufficiently sensitive to the public's values and concerns (Daniel 1990), adequate attention must be given to public concerns to ensure long-term success of prescribed fire use (Shelby and Speaker 1990). Without a full understanding of options and associated consequences our society tends to discount future benefits and reacts to the most immediate threat (Daniel 1990). Accordingly a homeowner may be more likely to fear increased smoke levels or property damage from a management-ignited prescribed burn on adjacent Forest Service land than the uncertain risk of a potential future wildfire event.

In spite of these concerns, public attitudes nationwide have been evolving toward a greater acceptance of the use of fire in forest ecosystems, particularly as agencies improve their communication strategies to increase citizen awareness of fire management (e.g., Stankey 1976; Carpenter et al. 1986; Loomis et al. 2001). One of the earliest studies conducted on the social aspects of fire management (Stankey 1976) found that participants generally overestimated the negative effects of fire while underestimating fire's beneficial effects and the impact of

years of fire suppression. Not surprisingly, a majority preferred a policy of fire suppression. Although knowledge was generally low, Stankey (1976) identified a positive association between knowledge levels and support for more flexible fire management policies. Subsequent research in other areas verified this association and identified higher levels of knowledge and support than Stankey (Gardner et al. 1985; Carpenter et al. 1986). These findings prompted each of the researchers to call for increased public education on the benefits of using prescribed fire.

However, longitudinal studies were lacking to test long-term trends across the population. McCool and Stankey (1986), in a trend study, revisited users of the Selway-Bitterroot Wilderness area 13 years after Stankey's original study utilizing much of the original study design. Their results indicated that recreation users were more knowledgeable about fire effects and more supportive of management policies that allow some fires to burn in wilderness areas than in the original study. While their study design did not allow a causal inference to be drawn, the authors believed the increase in knowledge and support was likely due to increased agency educational efforts.

Although these studies (Gardner et al. 1985; Carpenter et al. 1986; McCool and Stankey 1986) found increasing levels of knowledge and support, research conducted by Manfredo et al. (1990) suggested that these increases may be regional occurrences and not representative of national attitudes. Shelby and Speaker (1990), in a review of related research, argued that general acceptance of flexible fire management policies lagged behind the implementation of these

strategies on public land. They attributed much of this lag in acceptance to the success of early educational messages about the destructive impacts of wildfire, an initial lack of consensus among forest managers about the reintroduction of fire, and public concern about the effects of prescribed fire on air quality, ecosystems, and private property.

While knowledge has consistently been identified as the variable most strongly associated with treatment support, studies suggest that other factors may also play an important role. In a synthesis of three previous studies Carpenter et al. (1986) found that specific information about individual burns increased support levels. Though less conclusive, associations have been identified between support levels and various demographic characteristics including an inverse relationship with age (Carpenter et al. 1986; McCool and Stankey 1986), and a direct relationship between education (Carpenter et al. 1986), income (Carpenter et al. 1986) backcountry experience (McCool and Stankey 1986) and gender (males more supportive) (Gardner et al. 1985).

MECHANIZED THINNING

Little research has been conducted on the social acceptability of mechanized thinning treatments to reduce hazardous fuels; however, it is likely that public attitudes about mechanized thinning may generally reflect views about harvesting. Identified concerns range from aesthetic impacts and potential ecological effects of harvesting practices (Brunson and Reiter 1996) to doubts

about whether thinning treatments will result in a sufficient quantity of marketable timber to offset increased operation costs (Shindler and Collson 1998). Another important issue involves public trust in our forest agencies to effectively implement mechanized thinning programs on federal lands; in particular, citizens have reservations about how much license managers will take in thinning forest stands. Overall, timber harvesting is one of the most contentious issues in the highly charged sociopolitical environment in which our natural resource agencies operate. One of the dangers for fire managers is that many citizens believe using thinning treatments to reduce fuel loads is really just another way to continue harvesting or, in other words, conduct “business as usual” (Brunson 1993; Stankey 1995).

Some additional insights into citizen judgments of these practices can be gained from reviewing studies assessing the acceptability of alternative harvesting techniques including postharvest retention of live trees and snags, wider spacing of trees in young stands, and increased variation in harvest unit size (Brunson and Shelby 1992; Fiedler 1992). While the primary focus of these studies was to assess the visual acceptability of alternative harvesting techniques, research suggests that citizens associate visual impacts with ecological impacts (Bliss et al. 1994; Schuh 1995; Shindler et al. 2002).

In a review of prior studies (e.g., Rutherford and Shafer 1969; Hamilton et al. 1973; Patey and Evans 1979), McCool et al. (1986) concluded that stands that had undergone a light silvicultural treatment were generally preferred over natural

stands. McCool et al. (1986) also assessed viewer preferences of a continuum of untreated to highly modified and found that respondents preferred no or light modification over highly modified stands. More recent studies (Brunson and Shelby 1992; Brunson and Reiter 1996) have identified similar results. In these studies, mature stands were rated as most acceptable, clearcuts were least acceptable, and moderately modified stands were somewhere in between. Benson (1982) found that it was necessary to remove the residual material after treating a stand in order to maintain high visual quality ratings; an important finding, since many of the alternative harvesting techniques call for leaving behind snags and coarse woody debris.

Recent events would make it easy to conclude that there is almost universal opposition to harvesting practices on public forests; however, research has identified that some form of timber production is recognized as a legitimate forest use by all but the most extreme groups (Shindler and Collson 1998). Similarly, studies conducted in the Pacific Northwest have consistently identified highest support for a management approach that strikes a balance between economic and environmental concerns with a majority siding slightly towards emphasizing environmental conditions (Shindler et al. 1993; Brunson et al. 1997; Shindler and Wright 2000). These findings seem to suggest that while some timber production is acceptable, the public will not support harvesting activities that come at the expense of ecological values.

PUBLIC INVOLVEMENT

Public involvement in designing management plans is mandated by legislation (e.g., the National Forest Management Act, the National Environmental Policy Act), is recognized as central to fire management strategies (Wakimoto 1989; Chambers 1992-1993), and is a basic premise of ecosystem management (Brunson 1993). It has become increasingly evident that management plans that do not give adequate consideration to public values result in increased opposition and delayed, or blocked, implementation (Blahna and Yonts-Shepard 1989; Walesh 1999). Indeed, failing to provide an adequate public involvement process is the main cause behind the majority of court challenges of forest management plans (Brunson 1996a; Shindler 1998).

Research demonstrates a widely held citizen belief in the value of public involvement (Gericke et al. 1992) regardless of increases in costs of government (Shindler et al. 1993; Shindler and Wright 2000; Williams 2001). In fact, a majority of residents in Oregon communities desire an even greater role in forest management (Shindler and Wright 2000; Williams 2001). Purposes for citizen involvement include improving the quality of agency decision making (Lawrence et al. 1997), increasing awareness of local conditions (Shindler et al. 1999), building support for and increasing ownership of decisions (Lawrence and Daniels 1996), reducing conflict (Duram and Brown 1999), and improving the relationship between citizens and agencies (e.g., Lauber and Knuth 1999; Shindler et al. 1999).

While resource agencies typically focus on the decision outcome, Lawrence and Daniels (1996) argue that the decision making process plays an equally important role in forming citizen judgments. This argument is supported by findings that citizens are ultimately more likely to view management decisions as fair if the public has been involved in the decision making process, even if they do not agree with the final decision (Knopp and Caldbeck 1990; Lauber and Knuth 1999).

Research suggests several contributory factors to successful public participation strategies (e.g., Blahna and Yonts-Shepherd 1989; Lawrence and Daniels 1996; Shindler and Neburka 1997; Lauber and Knuth 1999). Shindler and Wright (2000) provide a summary of five frequently cited characteristics of successful processes. First, early initiation and continued public involvement throughout the decision making process (Blahna and Yonts-Shepherd 1989; Shindler et al. 1999). The second characteristic involves the use of effective communication methods, such as group interaction and dialogue, between stakeholders (Lawrence and Daniels 1996; Shindler and Neburka 1997; Shindler et al. 1999). Next, processes should be open and representative of all stakeholders (Shindler et al. 1999; Walesh 1999). Fourth, groups should utilize current and reliable scientific information (Shindler and Neburka 1997). Finally, citizens want evidence that their participation is meaningful by seeing their comments, ideas, and concerns reflected in management plans (Yankelovich 1991; Shindler et al. 1999; Lauber and Knuth 1999).

However, several barriers impede implementation of successful public participation strategies. From the agency perspective, perhaps the most formidable barrier is the Federal Advisory Committee Act (FACA). Originally designed to ensure an open process, balance membership, and prevent wasteful spending on advisory committees (Lynch 1996), judicial interpretation of FACA has increased agency reluctance to actively involve citizen groups in planning activities (Frentz et al. 1997). Indeed, Stankey and Shindler (1997, p. 13-14) find that "although FACA was designed to discourage an undemocratic style of participation, it was not structured to encourage true democratic participation." Thus, they contend that some adaptations to the current FACA legislation is needed to ensure citizen participation while preventing interest groups from wielding undue influence.

Successful involvement processes are also impeded by the rigid top-down institutional structure of resource agencies which provide limited flexibility or incentives for collaboration at the local level (Shindler et al. 1993; Cortner et al. 1996; Selin et al. 1997). Additionally, the history of past interactions have often resulted in low levels of trust that make people wary of working together (Shindler et al. 1999). Finally, exclusive reliance on scientific information (Cortner et al. 1996; Shindler et al. 2002), often coupled with use of agency jargon and terms (Brunson 1992) can frustrate citizens and prevent them from participating.

KNOWLEDGE

There is general recognition of two types of knowledge, scientific and experiential (Shindler and Wright 2000). Scientific knowledge is empirical in nature and is based on findings generated from application of the scientific method (Kloppenburg 1991). This type of knowledge is typically transferred through books, textbooks, scientific journals, and classrooms (Shindler and Wright 2000), and is the main focus of the educational instruction associated with natural resource programs (Kennedy and Thomas 1995). Experiential knowledge results from personal experiences, observations, and interactions between people and the areas where they live, work, and recreate (Kloppenburg 1991; DeWalt 1994; Shindler et al. 2002).

Experiential knowledge was once the basis for most natural resource management decisions; however, since the earliest days of federal forest management resource agencies have primarily relied upon the ability of scientific knowledge to provide the answers to natural resource issues (Kloppenburg 1991; Lawrence et al. 1997). This long-time reliance upon scientific information can create the perception among resource professionals and citizens that scientific research is inherently objective (Wynne 1987) and provides indisputable facts (Ravetz 1987). This suggests that every question only has one correct answer, regardless of the complexity of the issue (Lawrence et al. 1997; Shindler et al. 2002). However, many issues facing land managers today are not only complex but are considered “wicked” (Allen and Gould 1986) because they involve moral

and social aspects and “right” and “wrong” answers are based as much on values as on facts (King 1993). Scientific knowledge alone is ill-equipped to provide answers to the “wicked,” value-based issues facing resource managers today (Collingridge and Reeve 1986).

The value of experiential knowledge has been increasingly recognized as resource professionals have begun to work more closely with citizens in the decision making process (Aldred-Cheek et al. 1997). While difficult to incorporate into traditional analyses (Shindler et al. 2002), utilizing experiential knowledge can increase the social acceptability of management decisions (Shelby and Speaker 1990; Mackinson and Nottesad 1998). This is not to say that scientific knowledge is irrelevant to today’s resource management. Given the increasing complexity involved in evaluating and deciding among management alternatives and their potential consequences, scientific literacy is necessary for effective citizen participation in decision processes (Yankelovich 1991; Yaffee 1996). As Jamieson (1994, p. 27) suggested, part of the “admission price” for public dialogue is “knowing something substantive about the issues: the relevant science, the economics, the values and interests that are at stake, and so on.” Thus, both types of knowledge are important to resource management today. Indeed, Shindler and Collson (1998) found that although the public respects scientific information they feel that resource decisions should also account for and incorporate local knowledge.

ENVIRONMENTAL EDUCATION

Natural resource agencies have an important responsibility to improve the public's scientific literacy (Jamieson 1994). For example, information from professional forest managers has been particularly important in shaping public judgments of the role of fire in forested lands (Shelby and Speaker 1990).

Agencies have developed and implemented a wide variety of environmental education programs (e.g., Smokey Bear, brochures, public meetings, videos, web pages, elementary school programs, newsletters, interpretive information, demonstration sites, field trips). Although the objective of each program is to provide learning opportunities, research indicates that environmental education programs have met with varying degrees of success (e.g., Leeming et al. 1993; Zelezny 1999). These findings suggest that people not only respond to the information itself but also to tangential factors.

For example, the credibility of the information provider plays an important role in program effectiveness (Moore 1996). Steel et al. (1992-1993) found that citizens often base their judgments of new information on the credibility of the source. Indeed, Jamieson (1994) suggests that with the current levels of distrust in institutions and experts individuals are more likely to regard their friends, relatives or neighbors as credible information sources, even if they have no expertise on the topic being discussed. Moreover, the context in which educational programs are implemented can greatly influence their success. Spatial context (the manner the ideas relate to familiar or special places) and

social context (the judgments of one's reference group) can particularly influence individual reactions and judgments (Brunson 1993). Also important is the process of how the information is communicated (Aldred-Cheek et al. 1997). Vining and Schroeder (1987) found that even subtle differences in the manner that information was presented produced different citizen responses. Thus, serious consideration must be given to the educational process and not solely on the tools used to convey the information (Jamieson 1994).

Traditionally natural resource information programs have consisted of a one-way flow of information to the public. In recent years these programs have been expanded to include colorful newsletters, brochures, public meetings, and so on; however, most continue to be uni-directional communication devices with the goal of "educating" the public about agency programs (Brunson 1992; Shindler and Neburka 1997). Research suggests that people do not respond well to these traditional information provision formats (Cortner et al. 1998). Thus, many natural resource agencies have begun to look for more effective, more innovative formats for communicating with their publics.

Essential to successful outreach programs is presenting citizens with a rational set of choices (Ehrenhalt 1994) and providing an opportunity to evaluate the full range of relevant information, including potential tradeoffs and positive and negative consequences (Brunson and Reiter 1996). Resource agencies have not typically done a good job of framing these issues (Shindler and Brunson

1999) and often present policy decisions as single choices without adequate description of the related tradeoffs (Shindler et al. 2002).

Presenting overly simplistic information can have long-lasting effects. For example, the Smokey Bear campaign perpetuated the notion that all fires were destructive and unnatural (Little 1993). Natural resource agencies coupled aggressive fire suppression policies with Smokey's message, leaving behind a legacy of overstocked forest stands, declining levels of forest health, and increased fire risks. Much has been written about the long-term impact of Smokey's message on the public's acceptance of the use of fire as a management tool (e.g., Daniel 1990; Manfredo et al. 1990; Shelby and Speaker 1990; Little 1993). Smokey helped create the impression widely held among the public that a greater percentage of fires are caused by arson and that most fires are more destructive (including higher rates of animal mortality) than is actually the case (Daniel 1990; Shelby and Speaker 1990).

Nevertheless, recent studies (e.g., Wondolleck and Yaffee 1994; Hansis 1995; Brunson and Reiter 1996) have found that outreach programs, including programs focused specifically on fire management (Taylor and Daniel 1984; Nielson and Buchanan 1986; Loomis et al. 2001), can be successful at increasing knowledge levels and changing citizen attitudes. Research indicates that public understanding and support are more likely to develop in the context of a personal relationship than in anonymous information provision (Jamieson 1994), when management decisions are equated to local problems that are relevant to people's

daily lives (Cortner et al. 1998), and when information about management options is integrated with what people observe on the ground (Shindler and Reed 1996). Considerable research (Force and Williams 1989; Aldred-Cheek 1997) suggests that interactive methods, including manager guided field trips (Shindler 2000), demonstration projects (Newton 2001), and on-site interpretative messages that couple descriptions of ecological systems with management objectives (Veverka 1996), offer considerable potential as outreach programs. Public meetings have received mixed marks. Usefulness seems to depend on the number of people involved, meeting organization, agency leadership, and ability for meaningful discussion and dialogue (Brunson and Reiter 1996; Shindler and Collson 1998).

It is important to note that although effective outreach programs play a critical role in enriching citizen knowledge and perceptions, environmental education is not a panacea. Agency professionals have often lamented that if the public were simply better informed they would support agency policies (Shindler et al. 2002). Because judgments are formed by many factors in addition to scientific knowledge, it is unlikely that citizen judgments or behaviors will change solely on the basis of information provision (Jamieson 1994) and technical enlightenment (Stankey 1996). For example, public acceptance also depends on how and why certain messages are shared with the public and whether people trust the information providers. Knowledge and information, while certainly important, are only part of the suite of factors which play a role in establishing citizen judgments (Shindler and Wright 2000).

TRUST

Public acceptance of management policies is strongly influenced by citizen trust in resource professionals and agencies (Brunson 1996b). Not surprisingly, people are willing to grant greater amounts of influence in decision making to organizations they trust (Shindler et al. 1996). Given the importance of trust, it is noteworthy that recent research (Jacobson et al. 1996; Hoover et al. 1997) has identified low levels of trust in public land managers. This mistrust is the dark heart of wicked problems (King 1993) currently facing resource managers.

However, research suggests a difference between institutional trust, or trust in a government bureaucracy, and personal trust, or trust in agency personnel. Agency employees are viewed not only as agency representatives, but also as individuals. While people are often distrustful of the agency, they may express confidence in local managers whom they know (Shindler and O'Brian 1998; Shindler 2000). Whereas relationships of trust with agency personnel are based on interpersonal attributes (e.g., honesty, reciprocity, knowledge, openness, genuine concern) (Moore 1996; Peters et al. 1997) research indicates that institutional trust is based on a complex set of characteristics (Moore 1996; Shindler et al. 1999). Moreover, Shannon (1990) found that citizens often attribute "bad" actions taken by trustworthy agency personnel to "bad" agency policies, suggesting that institutional trust may be more susceptible to decay.

An examination of citizen-agency interactions by Shindler et al. (1999) suggested that trustworthy relations were typified by inclusiveness, sincere leadership, innovative and flexible methods, early and continual commitment, sound organizational and planning skills, and efforts that result in action. Others have suggested that institutional trust is fostered by full disclosure of information, including uncertainties as well as potential positive and negative consequences of management alternatives (Shindler et al. 2002), and fair decision processes (Moore 1996). Indeed, research suggests that agency failure to provide open and inclusive participation processes is a principle reason for declining levels of trust (Shindler 1998; Brunson 1996a). While there are some indications that collaborative decision processes can be effective at rebuilding trust at the organizational level (Yaffee and Wondolleck 1997), it is important to note that as these relationships have developed over time they will not be repaired overnight (Lawrence et al. 1997).

METHODS

Social science research with respect to natural resource issues seeks to understand the human dimensions of resource management, frequently with a focus on the political dynamics of affected communities. Research methods regularly employed in these studies provide a “snapshot” of a cross-section of the population at one specific point in time; researchers then make inferences about existing conditions and circumstances. Although careful analysis of cross-sectional data can provide considerable insight, there are limitations in our ability to understand ongoing processes with data collected from a single reference point (Babbie 1995). To overcome these limitations, longitudinal research designs provide for data collection and analysis over time.

A particularly beneficial type of longitudinal research known as a panel study—the type used for this project—involves evaluations of the same individuals using the same questions at different points in time. Panel data can provide a richer understanding of ongoing processes and help us identify general trends within the population of interest. Responses from the individual study participants can be “paired,” or linked, over the separate data collection points to allow identification of shifts in individual attitudes and beliefs. Paired data typically reduce the variability that could obscure small but significant differences between results (Devore & Peck 1986).

RESEARCH DESIGN

Panel members came from Shindler and Reed's 1996 survey of residents in the Blue Mountains region of eastern Oregon and Washington. A stratified random sampling procedure was originally employed to ensure accurate representation of the region's multiple small communities; an equal number of participants were selected from communities with more than 10,000 residents and those with fewer than 10,000 residents.

Questionnaire design was based on the 1996 questionnaire format, replicating a majority of questions in order to allow for comparison of results. The length of the survey was extended to 12 pages by the inclusion of additional questions to address current concerns, notably Forest Service information programs, citizen knowledge, issues related to smoke management, and citizen-agency interactions. A 15 item true-false quiz was developed to allow direct assessment of citizen knowledge levels. Quiz questions were based on previous studies and related literature (e.g., Stankey 1976; McCool and Stankey 1986; Manfredo et al. 1990). Each question include a "not sure" response to discourage respondents from making a random guess. (See Appendix A for the full text of the questionnaire.)

DATA COLLECTION

A new mail-back questionnaire was administered to panel participants following a modified version of the "total design method" (Dillman 1978).

Surveys were sent in three waves, consisting of a questionnaire, personalized letter, and a self-addressed, stamped return envelope; a reminder postcard following the first mailing. All waves were conducted in two week intervals beginning in August 2000.

In 2000 we located 455 of the 533 original respondents. Of these, 32 were removed from the sample (29 were deceased or unable to complete the survey due to health reasons, and 3 had moved from the Blue Mountains region). From the useable sample of 423 names, 323 respondents completed questionnaires for a 76% adjusted response rate. Market research analysts consider this number of respondents sufficient and this rate of return substantially high to accurately represent our population of interest (Lehman 1989).

DATA ANALYSIS

Data were analyzed with SPSS v. 10.0 software. Prior to analysis, data were paired with responses from 1996. Descriptive statistics were employed to provide a general account of citizen characteristics, knowledge, interactions with management agencies, and perspectives on prescribed fire and mechanized thinning. Where appropriate, data from replicated questions were compared utilizing paired T-tests and significant differences in responses are noted. For selected items, bivariate correlation analysis (Pearson's Correlation Coefficient) was used to test the strength of association between variables. Significance is reported at $p \leq 0.05$ level unless otherwise noted.

FINDINGS

Study findings are presented in written and graphical formats in the following sections: 1) participant profile, knowledge and information sources, 2) public attitudes about prescribed fire and mechanical thinning, and 3) opinions about citizen-agency interactions. When appropriate, data from replicated questions (1996 and 2000) are compared utilizing paired t-tests and significant differences in responses are noted.

PARTICIPANT PROFILE, KNOWLEDGE AND INFORMATION SOURCES

Respondent Characteristics

The descriptive characteristics shown in Table 1 help provide a composite picture of survey respondents. This information will be used later in the report to identify similarities and differences in the way that various population segments respond to resource conditions and management practices.

A few findings seem particularly noteworthy because of potential influences on citizen responses and knowledge levels. Respondents have lived in the Blue Mountains study area for an average of 41 years. Over two thirds (73%) have received at least some college education and one-third (33%) have completed college level or advanced degrees. A large percentage of respondents rely upon traditional natural resource occupations for their economic livelihood;

the most dominant industries include farming (34%), timber (30%), and ranching (23%).

Table 1: Participant Profile 2000

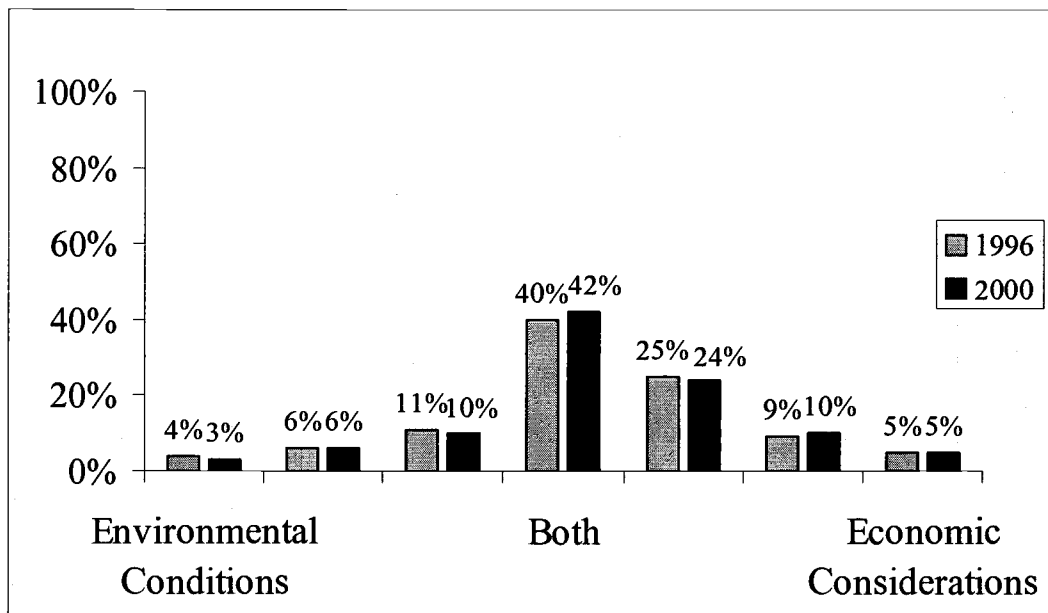
Sample Size	323
Mean years of residency in Blue Mountains	41 years
Mean Age	59 years
Gender	
female	16%
male	84%
Education	
high school only	26%
some college	40%
college graduate	20%
graduate degree	13%
Mean household income range	\$40,000 - \$49,999
Economic sector on which immediate family depends for livelihood (could select more than one)	
farming	34%
timber	30%
ranching	23%
tourism/recreation	11%
special forest products	8%
hydro-electric power	7%
fishing	4%
mining	3%
other	16%
Retired	43%
Membership in organization interested in public land issues	
farm or rangeland group	12%
recreation group	9%
timber or commodity group	5%
environmental group	5%
watershed council	2%
other	5%
Someone in household suffers from a respiratory ailment	32%

Policy Orientations

As in 1996, respondents were asked to identify their policy orientation along a seven-point scale regarding the environmental and economic tradeoffs often associated with forest management decisions (Figure 1). Responses to the far left of the midpoint indicate that the highest priority should be given to managing for natural conditions even if this results in negative economic consequences. Those to the far right of the midpoint believe that highest priority should be given to economic considerations even if it is at the expense of the environment. Responses at the midpoint indicate that management should balance environmental and economic considerations. There was no significant change in orientation from the 1996 study. In 2000, 42% favored a balance between the environment and economy while slightly fewer (39% collectively) gave preference to economic considerations and 19% preferred priority be given to environmental conditions.

Figure 1: Environment/Economic Scale

Should highest priority be given to maintaining natural environmental conditions or to economic considerations?



Influences of Cerro Grande Fire

The Cerro Grande fire near Los Alamos, New Mexico just previous to this study focused national attention on some particularly devastating impacts of prescribed fire use. The fire, which originated as a prescribed burn, eventually burned over 47,000 acres and destroyed more than 225 structures. Because of the national attention generated by the Cerro Grande fire, we incorporated a line of questioning into this survey to evaluate potential influences on respondent attitudes.

Table 2 shows that nearly all respondents (93%) had heard about the Cerro Grande fire. These participants were split with 49% indicating that it had influenced their opinion about further use of prescribed fire. Of those who said the fire had influenced their opinion, over half (52%) now feel more skeptical about the ability of natural resource agencies to implement a responsible prescribed fire program, 20% feel more negative about its use, and 11% want to know more about prescribed fire. However, a majority (64%) of those who had heard about the fire agreed that the Los Alamos fire was an isolated incident that should not prevent prescribed fire from being used in the Pacific Northwest.

Table 2: Influences of the Los Alamos/Cerro Grande Fire

Did you hear about the forest fires at Los Alamos, New Mexico this past spring?	Yes 93%	No 7%
If yes, did the fire in Los Alamos influence how you feel about the use of prescribed fire?	Yes 49%	No 51%
If so, how did it influence your feelings about the use of prescribed fire?		
• Feel more negative about the use of prescribed fire.		20%
• Feel more positive about the use of prescribed fire.		4%
• Want to know more about the purpose and/or implementation of prescribed fire.		11%
• Feel more skeptical about the ability of natural resource agencies (such as the Forest Service or the National Park Service) to effectively implement a prescribed fire program.		52%
Respondents who heard about the fire at Los Alamos were asked about their agreement with the following statement: "I think the Los Alamos case was an isolated incident that should not keep prescribed fire from being used in the Pacific Northwest."		
Agree/Strongly Agree		64%
Disagree/Strongly Disagree		24%
Don't Know		8%

Public Awareness

Citizen understanding of forest practices and conditions is central to their acceptance of management decisions. For example, previous studies have identified a link between public knowledge levels about wildfire and support for the use of prescribed fire. In this study, participants were first asked to give a short self-assessment of their awareness and then answer questions about fire and thinning in the Blue Mountains region.

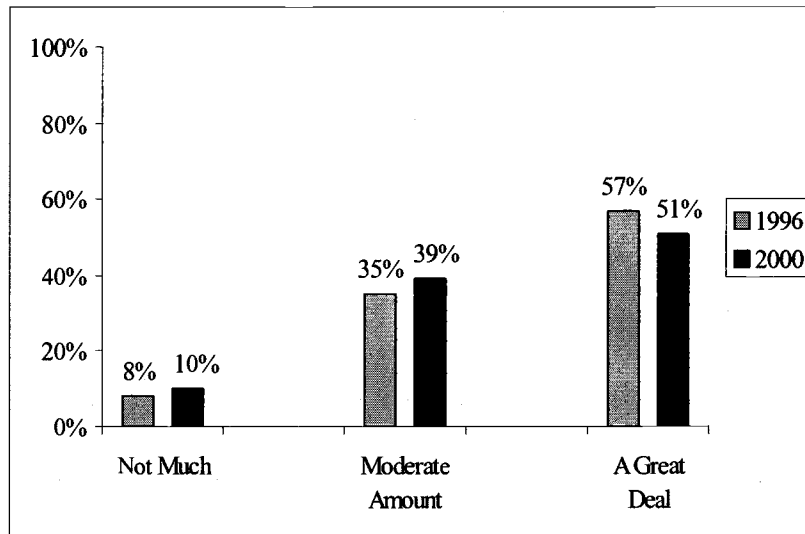
Respondents indicated their level of attentiveness and how well informed they are about national forest issues or problems. Just as in 1996, public awareness about national forests is high. Figures 2 and 3 show that over half pay a great deal of attention to forest issues, while 80% believe they are at least moderately well informed about conditions in the Blue Mountains specifically. Overall, there were no significant changes in responses between 1996 and 2000.

Public Knowledge

To help gauge citizen understanding about the use of fire and thinning, a new line of inquiry was introduced in the 2000 questionnaire that engaged respondents in a 15-item true/false quiz. Quiz statements and responses are shown in Table 3.

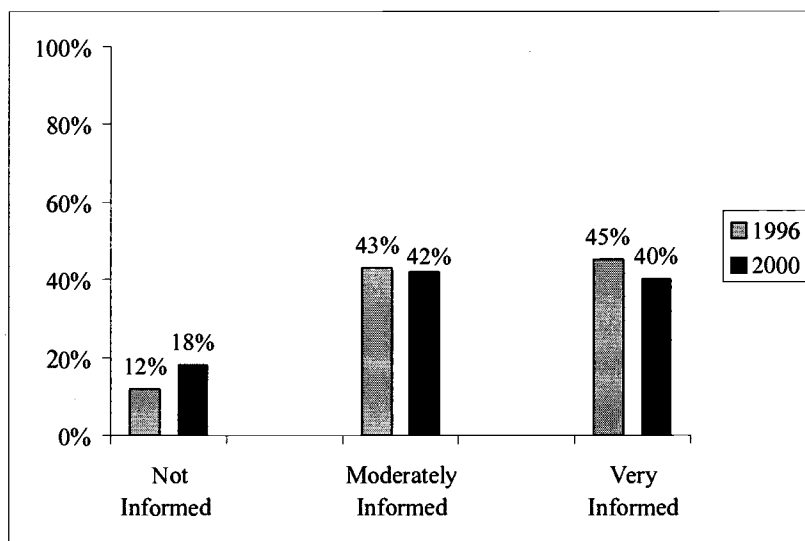
Overall, respondents were generally knowledgeable about both prescribed fire and thinning; the average correct score across all questions was 70%. Several specific findings seem noteworthy. About one-third (35%) of the respondents did

Figure 2: How much attention do you pay to national forest issues or problems?



No significant differences in responses between 1996 and 2000.

Figure 3: How well informed are you about forest conditions in the Blue Mountains?



No significant differences in responses between 1996 and 2000.

not know (answered incorrectly or not sure) about the role fire has played in shaping natural forests in the Blue Mountains. Almost half were either misinformed or not sure about the effects of prescribed fire on small trees and understory vegetation, in promoting growth of ponderosa pine, and in controlling noxious weeds — all key objectives for the use of prescribed fire. Similarly, almost one-third (30%) did not know that thinning could be used to encourage growth of ponderosa pine. Overall, participants appeared significantly more knowledgeable about the effects of thinning than about prescribed fire.

Information Sources

Knowledge and information play an important role in forming support for management practices. In peoples' everyday lives, there are many different places where citizens might obtain information about natural resource issues. Using a 4-point scale (none, slight, moderate, high) respondents were asked to rate the usefulness of nine likely sources of information about forest management in the Blue Mountains (Figure 4).

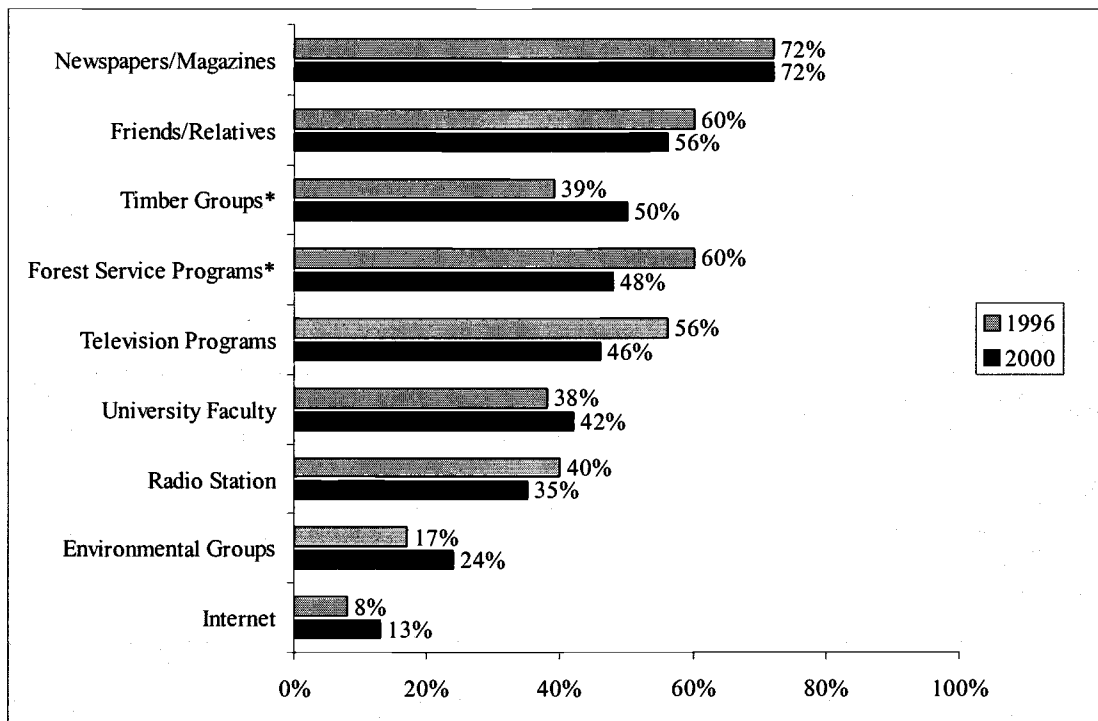
Newspapers/magazines and friends or relatives continued to be the most useful sources and were the only ones to receive a moderate to high rating by a majority of respondents in both 1996 and 2000. Of particular interest are ratings for timber groups and the Forest Service; these are the only sources to receive significantly different ratings

Table 3: Citizen knowledge about the effects of fire and thinning in Blue Mountain forests^a

-----Fire-----		Generally True	Generally False	Not Sure
a.	Fires have played a significant role in shaping natural forests in the Blue Mountains. (True)	66%	13%	22%
b.	Prescribed fires make additional minerals and nutrients available for plants and trees. (True)	67%	12%	21%
c.	Prescribed fires cause the immediate death of the majority of animals in the burned area. (False)	7%	80%	13%
d.	Prescribed fires result in the death of the majority of large, established trees in the burned area. (False)	15%	74%	11%
e.	Prescribed fires promote the growth of plants that serve as food for deer and elk. (True)	84%	9%	7%
f.	Prescribed fires kill most of the small, young trees and vegetation beneath the forest canopy. (True)	51%	30%	19%
g.	Prescribed fires encourage tree growth in ponderosa pine forests. (True)	56%	10%	34%
h.	Prescribed fire is effective in controlling noxious weeds. (True)	52%	24%	24%
-----Thinning-----				
i.	Selective thinning can be effective in controlling outbreaks of insects and disease. (True)	78%	7%	15%
j.	Selective thinning reduces competition for minerals and nutrients on crowded sites. (True)	80%	7%	13%
k.	Selective thinning mimics natural conditions by providing openings in the forest canopy. (True)	74%	9%	17%
l.	Selective thinning causes the immediate death of the majority of animals in the thinned area. (False)	2%	89%	9%
m.	Selective thinning encourages tree growth in ponderosa pine forests. (True)	70%	6%	24%
n.	Selective thinning results in decreased habitat for deer and elk. (False)	13%	77%	11%
o.	Selective thinning results in the death of the majority of the remaining trees on the site. (False)	3%	90%	8%

^a Commonly accepted answers in parentheses and percent answering correctly is indicated in bold.

Figure 4: Useful information sources about forest management in the Blue Mountains



Data reflect percentage of citizens who rate importance level as moderate or high on a 4-point scale (none, slight, moderate, high).

* 1996 and 2000 responses are significantly different at $p \leq .01$

during the study period. The usefulness rating of timber groups rose (39% to 50%), while opinions of the Forest Service as a useful information source fell from 60% to 48%. Overall, the lowest ratings were for radio, environmental groups, and the internet.

To probe this area more thoroughly in 2000, additional questions focused on specific Forest Service information programs. The agency has invested considerable time and effort in outreach activities and this study presented an

opportunity to ask citizens about the effectiveness of these activities within the Blue Mountains region (Table 4).

For presentation purposes, the outreach programs have been divided into interactive and uni-directional formats. Interactive programs are those that provide for either personal contact with agency representatives or on-the-ground learning experiences. Uni-directional programs are those that typically involve a one-way flow of communication from the agency to the public. While web pages have the capability to provide a form of virtual interaction, they are included with the one-way messages because none of the Forest Service websites within the Blue Mountains offered an interactive option at the time of this study.

The first column represents the percentage of respondents who were unfamiliar with the particular information program and, consequently, had no basis for opinion to answer the questions in subsequent columns. Thus, the columns to the right present responses from those familiar with each program; the middle three columns show the percentages who agreed the program is **easy to understand**, is **convenient**, and is a **trustworthy** source of information and the final two indicate respondent ratings of the program's overall **level of usefulness** (moderate/high or none/some).

No basis for opinion responses ranged from a low of 10% who were unfamiliar with Smokey Bear's message to a high of 67% who had no experience with Forest Service internet web pages. Differences in familiarity between programs were expected given the different lengths of time the programs have

Table 4: Assessment of Forest Service Information and Outreach in the Blue Mountains

Information Program	-Level of Usefulness ^a -					
	No Basis for Opinion	Easy to Understand ^a	Convenient ^a	Trustworthy Source ^a	Moderate/High	None/Some
Interactive Programs						
a. Elementary school educational programs	50%	94%	88%	74%	70%	30%
b. Conversations with agency personnel	36%	79%	56%	72%	68%	32%
c. Visitor centers and interpretative information	25%	97%	88%	84%	66%	35%
d. Guided field trip to forests	56%	93%	48%	76%	62%	39%
e. Forest Service public meetings	46%	76%	47%	62%	46%	54%
Uni-directional Programs						
f. Smokey Bear message	10%	99%	97%	91%	76%	24%
g. Television messages	30%	91%	91%	62%	55%	45%
h. Regular newsletters	46%	84%	84%	68%	54%	46%
i. Prescribed fire brochures	48%	82%	62%	69%	53%	47%
j. Exhibits at state/county fairs	39%	95%	79%	82%	47%	52%
k. Environmental impact statements	36%	24%	29%	29%	33%	67%
l. Informational videos	61%	82%	53%	54%	33%	67%
m. Forest Service internet web pages	67%	68%	48%	49%	26%	74%

^a Percentages reflect responses from individuals who had an opinion about the specific program. Scores reported for *easy to understand*, *convenience*, and *trustworthy* are “yes” responses from a yes/no scale.

existed and the potential for citizens to access them. For example, Smokey Bear has been around for over 50 years, while internet web pages came into existence within the past decade and may be more difficult for some people to access.

Overall, there are no recognizable trends in the level of familiarity (no basis for opinion responses) between interactive and uni-directional programs.

Nearly all programs, both interactive and one-way messages, were rated as **easy to understand** by a majority of the respondents familiar with them. Six of these—elementary school programs, visitor centers and interpretative information, guided field trips, Smokey Bear, television messages, and exhibits at fairs—received scores over 90%. Environmental Impact Statements (EISs) were rated the lowest, with only 24% finding them understandable.

Although most programs were also rated as **convenient** by a majority of respondents, scores for specific programs are worth noting. Particularly high ratings were given to elementary school programs, visitor centers and interpretative information, Smokey Bear, television messages, and newsletters—all forms of communication that are prepackaged to fit into peoples' lives with little effort by the consumer. Two similar formats (brochures, videos) received slightly lower scores but were still convenient to a majority. Three interactive methods (conversations with agency personnel, guided field trips, public meetings) received lower ratings, doubtless because each requires the agency to first present the opportunity and then individual initiative to attend. EISs had the

lowest convenience rating which seems to correspond with a similarly low rating for how easy they are to understand.

While most programs were rated as **trustworthy** by a majority of respondents, it is likely that scores in this column carry a different value than ratings of other categories. Central to the success of the Forest Service, particularly in resource-based communities, is establishing trust in the information, the information provider, and the formats used to convey it. Thus, a simple majority rating of its programs may not represent a strong vote of confidence overall; for example, even a 62% rating (as in the case of public meetings) suggests that a substantial number of people do not place a good deal of faith in the information they receive in these settings. Overall, Smokey Bear, interpretative centers, and fair exhibits—all fairly traditional forms of information programs—were the most highly regarded, while EISs and internet web sites were the least trustworthy. As a group, interactive programs seem to be more trustworthy than uni-directional ones; all but public meetings received positive ratings by at least 70% of the respondents.

The next two columns report the percentage of those familiar with the program who rated its level of usefulness as either moderate/high or none/some. Four of the five most highly rated programs were interactive—elementary school programs, conversations with agency personnel, interpretative centers, and guided field trips—indicating greater dividends may be achieved from this form of

outreach. Of the interactive programs only Forest Service public meetings failed to resonate with a majority of the respondents.

Of the uni-directional programs, four—Smokey Bear, television messages, newsletters, and prescribed fire brochures—were useful to a majority of respondents. Alternatively, few people found EISs, informational videos, and Forest Service internet web pages to be useful.

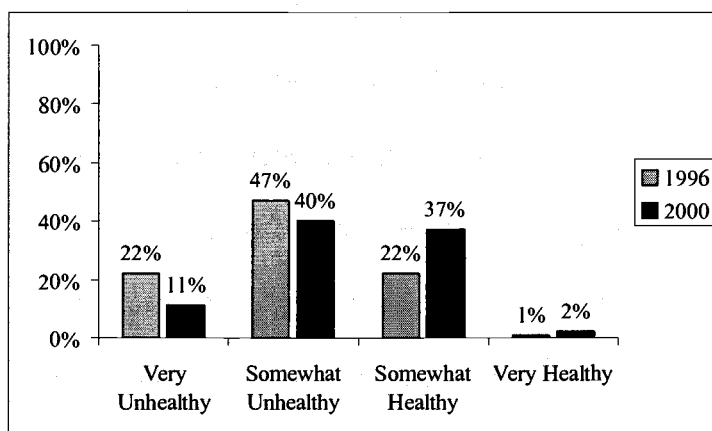
Interestingly, all but one (EISs) received lower usefulness scores than might be expected based on preceding program characteristic scores. For example, over 90% agreed that the Smokey Bear message was easy to understand, trustworthy, and convenient, but only 76% rated his message as moderately or highly useful. It is likely that although Smokey's message is easy to understand, trustworthy, and convenient, people also understand it is limited in scope. Similar factors also influence the usefulness ratings of other individual programs; each is more thoroughly evaluated in the discussion section.

Forest Health Conditions

One of stated goals for the use of prescribed fire and mechanized thinning treatments is the restoration of healthy forest conditions. Respondents were asked to indicate their perception of the condition of Blue Mountain forests in general as well as the condition of forests near their community. Opinions about forest health conditions have improved significantly since 1996, both in the Blue Mountains in general and in peoples' specific area (Figures 5 and 6). While only

a few respondents considered conditions to be “very healthy” in either year, responses generally shifted from the lower end (unhealthy) towards the “somewhat healthy” category.

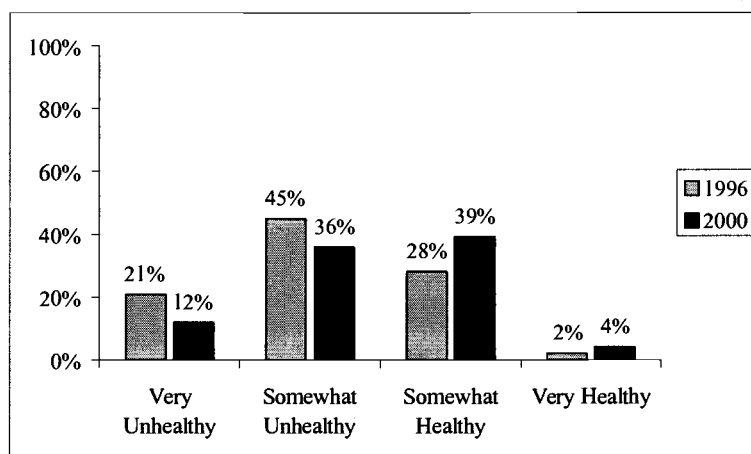
Figure 5: Overall condition of forests in the Blue Mountains



“Don’t know” responses omitted.

1996 and 2000 responses significantly different at $p \leq .01$.

Figure 6: Condition of forests in respondents’ area specifically



“Don’t know” responses omitted.

1996 and 2000 responses significantly different at $p \leq .01$.

PUBLIC ATTITUDES ABOUT PRESCRIBED FIRE AND MECHANIZED THINNING

Prescribed Fire

Because of the different terms and definitions used to describe fire management activities, care was taken to explain for respondents the definition of prescribed fire used in the questionnaire. The same general treatment description from the 1996 study was used.

Resource managers on national forests are attempting to use **prescribed fire** (also called controlled burning) to control disease, insects, and excessive build up of dead trees. Prescribed fire has two forms: 1) wildland fire where a decision may be made to allow a fire ignited by nature (primarily lightning) to burn under control to accomplish resource benefits and 2) management-ignited prescribed fire where fire is used as a tool—also to accomplish resource benefits—but in this case, managers schedule these burns around the weather, fuel loadings, season, and their ability to maintain control of the fire. The questions in the survey pertain to **management-ignited prescribed fire**.

Respondents were asked to evaluate prescribed fire as an approach to fuel reduction and forest health restoration in the Blue Mountains. They were first presented with 17 sets of opposing statements about the use of prescribed fire and then asked to indicate which statement in each pair most closely reflected their opinion (Table 5). These statements were designed to make respondents consider the tradeoffs associated with using prescribed fire. For presentation purposes the statements have been arranged in categories with affirmative statements on the left side of the table and the opposing statements on the right. On the actual

questionnaire the statement sets were ordered randomly. Response categories have also been collapsed from five to three categories (agree, neutral, agree). A *don't know* option was included to differentiate between respondents who were neutral about a particular set of statements and those who did not know enough to select an answer. *Don't know* responses are not displayed in Table Q-6 because they did not constitute a high percentage for any item (ranged from 1% to 8%).

Findings from both 1996 and 2000 indicate respondents generally were very positive and supportive about the use of prescribed fire and the eventual treatment outcomes. On most items, scores show high levels of agreement for its use and in only three cases were responses significantly different in 2000 than in the previous survey.

In the **treatment effectiveness** category, approximately two-thirds of study participants still agreed that prescribed fire decreases the chance of wildfire, reduces hazardous fuel, and restores forest health. Regarding the **environmental effects** of prescribed fire, large majorities continue to understand the benefits of this practice on components of the natural ecosystem, and similar levels are willing to accept the short-term impacts on water quality and wildlife habitat.

Table 5: Public attitudes and acceptance of prescribed fire

Prescribed fire:		Agree	Neutral	Agree		Significance Level ^a
Treatment Effectiveness						
decreases the chance of high-intensity wildfires.	1996	73%	9%	16%	has little overall effect on wildfire intensity or frequency.	NS
	2000	73%	11%	15%		
effectively reduces the amount of excess fuels in the forest.	1996	72%	9%	16%	causes more damage than benefits provided from reducing fuels.	NS
	2000	68%	10%	20%		
effectively keeps insects and diseases at minimum levels by maintaining healthy trees.	1996	72%	10%	13%	causes more damage than benefits provided from getting rid of insects and disease.	NS
	2000	61%	19%	18%		
Environmental Effects						
releases useful minerals and nutrients into soil.	1996	72%	15%	9%	creates ash that is detrimental to soil conditions.	NS
	2000	64%	22%	7%		
stimulates the growth of native grasses for wildlife and livestock.	1996	85%	7%	3%	severely damages the growth of native grasses.	≤ 0.01
	2000	75%	11%	10%		
encourages growth of plants best suited to natural ecosystem.	1996	78%	10%	7%	causes long-term damage to natural plant ecosystems.	≤ 0.05
	2000	69%	17%	10%		
causes acceptable short-term impacts to water quality and fish habitat.	1996	67%	15%	13%	causes an unacceptable decline in water quality and fish habitat.	NS
	2000	60%	20%	14%		
creates acceptable changes in native wildlife habitat.	1996	72%	11%	14%	causes unacceptable damage to critical wildlife habitat.	NS
	2000	61%	15%	20%		
Human Impacts						
causes only short-term damage to scenic beauty.	1996	74%	7%	17%	causes long-term damage to scenic beauty of forest land.	NS
	2000	70%	14%	14%		
has acceptable short-term effects on recreation uses.	1996	72%	12%	13%	has unacceptable long-term effects on recreation uses.	NS
	2000	68%	15%	15%		
smoke levels are acceptable if it means a healthier forest.	1996	68%	13%	17%	results in smoke that decreases air quality to unacceptable levels.	NS
	2000	58%	23%	17%		
is of little or no threat to nearby property and forest land.	1996	41%	21%	34%	is a big threat to nearby property and forest land.	NS
	2000	33%	25%	41%		
Treatment Appropriateness						
is a legitimate management tool.	1996	71%	12%	13%	is an untested system with too many risks.	NS
	2000	65%	17%	15%		
is a safe management tool.	1996	68%	15%	15%	is too dangerous to be used.	NS
	2000	60%	22%	16%		
overall, the benefits of prescribed fire are worth it.	1996	66%	13%	19%	overall, the risks and impacts of prescribed fire are too great.	NS
	2000	62%	16%	20%		
protecting timber for harvest should not be a consideration.	1996	21%	42%	31%	unnecessarily reduces the amount of harvestable timber.	NS
	2000	22%	37%	37%		
I trust the Forest Service to implement a responsible and effective prescribed fire program.	1996	52%	21%	25%	I do not trust the Forest Service to implement a responsible and effective prescribed fire program.	≤ 0.05
	2000	43%	21%	34%		

^a NS = Not Significant

Among the **human impacts**, responses have held steady with relatively few concerns about fire effects on scenic beauty and recreation uses. A majority still believe that increases in smoke are acceptable if it results in a healthier forest. However, only one-third were comfortable about potential threats to their property. Although response levels did not change significantly between 1996 and 2000, percent of agreement about citizens' acceptance of smoke and threats to property indicate a substantial number of citizens are either neutral—which may indicate uncertainty—or concerned about the risk of prescribed fire.

Regarding **treatment appropriateness**, most individuals still believe that prescribed fire is a legitimate and safe management tool, and almost two-thirds think the benefits outweigh the costs. People were split in their agreement about the role of fire in reducing the amount of harvestable timber, with a high percentage choosing the neutral category—a position that probably reflects uncertainty about the choices involved. Responses to the last set of statements in this section are particularly noteworthy because of the importance of trust to public support of agency programs. Not only was trust in the Forest Service to implement a responsible and effective prescribed fire program generally low, but trust levels dropped significantly during the study period (52% to 43%). In addition, a substantial number of people (21%) were still neutral, most likely reserving judgment until they see the outcome of agency decisions.

Overall, it is interesting that in all but one case agreement levels on the positive (left) side have dropped a few (or more) percentage points. Although

only three items were significantly different between 1996 and 2000, collectively these scores could be signaling a general shift in public preferences.

Concerns About Effects Of Prescribed Fire

An additional question about concerns over potential impacts of prescribed fire was asked in 2000 and findings are noted in Table 6. Although levels of concern varied among the seven items, it is noteworthy that each potential impact was of moderate or great concern to a substantial number of respondents. Responses to statements in the previous table (Table 5) indicate some ability to weigh the tradeoffs involved with the use of prescribed fire; nevertheless, people still worry about direct effects on private property, useable timber, fish and wildlife, human safety, smoke levels, and so on.

Table 6: Concerns about potential effects from the use of prescribed fire

Potential effects	Moderate concern/ Great concern ^a
Damage to private property	59%
Economic loss of useable timber	49%
Loss of wildlife and fish habitat	44%
Risk to human safety	42%
Increased levels of smoke	41%
Effects on recreation opportunities	39%
Deteriorated public water supply	38%

^a Percentage of citizens who rate concern as moderate or great on a 4-point scale (none, slight, moderate, great).

Public Assessments Of Smoke

Though temporary in nature, smoke has long been recognized as a public concern associated with the use of prescribed fire, especially because of adverse effects on human health and visibility in communities or along transportation corridors. Although much research has been conducted on the biological impacts of smoke, relatively little is known about its associated social impacts other than the notion that smoke is “bad” and people would rather not “put up with it.” This study presented an opportunity to assess the impacts of smoke in more detail.

In 1996 a substantial majority of respondents indicated that smoke levels from fire were not a problem for their family, nor did they feel that prescribed fire use should be limited because of potential health problems from smoke (Table 7). Although the majority of respondents still held similar views in 2000, significantly more people now view smoke as a problem, and, as a consequence, fewer support the use of prescribed fire. Similar to trust, smoke is another issue where a simple majority in favor of management practices is probably an insufficient level of public approval. Smoke is a highly contentious issue that can provide a rallying point for communities. Fire managers within the study area indicate the majority of complaints about prescribed fire are related to smoke.

Table 7: Assessments of smoke

		Agree	Neutral	Disagree	Significance Level
In my area, smoke levels from fire are not a problem for me or my family.	1996	76%	10%	14%	≤ .01
	2000	61%	15%	24%	
Prescribed fire should not be used because of potential health problems from smoke.	1996	12%	17%	71%	≤ .01
	2000	14%	26%	61%	

To determine the impacts of increased fire activity on communities, we asked the question, “If the use of prescribed fire led to increased smoke levels in your area, how concerned would you be about the following effects?”

Respondents were then asked to rate four potential outcomes (Table 8). Over two-thirds of respondents were moderately or greatly concerned about health effects, while approximately 50% were concerned about unpleasant odors and reduced visibility. Fewer, though still a sizeable number, worried about a decrease in the quality of recreation experiences.

Table 8: Concerns about potential effects from increased smoke levels

Potential effects	Moderate concern/ Great concern ^a
Health effects	71%
Unpleasant odors	52%
Reduced visibility	50%
Lower recreation/tourism quality	42%

^a Percentage of citizens who rate importance level as moderate or high on a 4-point scale (none, slight, moderate, great).

Smoke Tolerance Levels

Since any fire generates smoke, we wanted to begin to understand peoples' tolerance of smoke for different periods of time. Our premise was that temporal effects may be a factor in public acceptance of smoke. We asked respondents to indicate the length of time they could tolerate an increase of different smoke intensities. Both sight and smell are important, so questions addressed visibility and odor/breathability. Table 9 shows that tolerance levels follow similar patterns for both.

Regarding visibility, four response statements indicated increasing levels of smoke intensity. As expected, increased levels of smoke led to lower levels of public acceptance. The first two intensity levels assumed that although smoke was noticeable in the distance it did not affect activities; a majority of respondents could tolerate either of these levels for at least one week. Tolerable length of time decreased with the third smoke intensity level which held that smoke was noticeable near the respondent's residence and had increased to the point that some activities were affected. Although the largest number found this smoke intensity acceptable for a maximum of one day, almost one-fourth (22%) said it was not acceptable at all. The fourth intensity level, which assumed that smoke levels affected most activities, was unacceptable to 42% of respondents.

Acceptance of change in odor and breathability followed a similar pattern. The first two smoke intensities suggested that smoke levels were recognizable, but may not yet affect personal activities. These conditions were acceptable for at

least one week by the majority of respondents. Similar to visibility ratings, tolerance decreased significantly at the third intensity level. Respondents were split across the various time frames in their tolerance at this level, which assumed slight recognition of smoke when breathing. The fourth breathability level assumed that smoke was noticeable with each breath and, as anticipated, this level was largely unacceptable.

Table 9: Tolerance levels for different smoke intensities

		-----Acceptable Length of Time-----					
Visibility		Not Acceptable	A Few Hours	One Day	Three Days	One Week	More Than One Week
a.	Smoke plumes visible in the distance, but no decrease in visual quality near my residence or workplace.	5%	8%	13%	14%	16%	44%
b.	Light haze visible on the horizon and some decrease in visual quality, but not enough to affect my activities.	6%	8%	14%	17%	20%	36%
c.	Smoke is apparent near my residence or workplace and visual quality has decreased to the point that some activities are affected.	22%	16%	24%	17%	15%	6%
d.	High levels of smoke have caused poor visual quality that affects my ability to do many activities.	42%	21%	17%	12%	6%	3%
Odor/Breathability		Not Acceptable	A Few Hours	One Day	Three Days	One Week	More Than One Week
a.	Smoke plumes visible in the distance, but I cannot smell smoke when I breathe.	3%	10%	11%	13%	16%	47%
b.	Occasionally I can smell smoke, but it doesn't affect me otherwise.	7%	12%	11%	16%	20%	34%
c.	I notice the smoke slightly when I breathe.	13%	23%	19%	15%	19%	11%
d.	Smoke is highly noticeable each time I breathe, even indoors.	52%	19%	15%	8%	4%	3%

Mechanized Thinning

Respondents were given the following explanatory paragraph before being asked their opinion about 13 opposing statements regarding the use of mechanized thinning to reduce hazardous fuels:

Resource managers on national forests are attempting to use **mechanized selective thinning** to control disease, insects, and excessive build up of dead trees. Mechanized selective thinning includes a large range of different mechanized harvesting systems. Some of these systems are lighter on the land than others; various costs and impacts are associated with each. Currently managers and researchers are experimenting with ground-based harvesters and skyline (above ground) yarding to test soil compaction, erosion, wildlife disturbance, and the economics of these systems. These projects involve the removal of down logs or standing dead and dying trees less than 15" in diameter from selected forest sites.

Findings are reported in Table 10. For presentation purposes, response categories have been collapsed and *don't know* responses, which ranged in value from 1% to 7%, have been excluded. As with prescribed fire (Table 5), results have been arranged in categories and ordered with affirmative responses on the left side. Responses indicate that attitudes toward thinning are still very positive overall and opinions have been stable throughout the study period as no significant differences were found between 1996 and 2000 for any item.

In the **treatment effectiveness** category, strong majorities agreed that mechanical thinning is effective in reducing wildfire risk and fuel loads and is also effective in restoring forest health conditions. Regarding **environmental effects**, a majority of respondents were willing to accept impacts on water quality,

Table 10: Public attitudes and acceptance of mechanized thinning

Mechanized selective thinning:		Agree	Neutral	Agree	
Treatment Effectiveness					
decreases the chance of high-intensity wildfires.	1996	79%	5%	13%	has little overall effect on wildfire intensity or frequency.
	2000	81%	7%	11%	
effectively reduces the amount of excess fuels in the forest.	1996	79%	7%	9%	causes more damage than benefits provided from reducing fuels.
	2000	76%	11%	7%	
effectively keeps insects and diseases at minimum levels by maintaining healthy trees.	1996	78%	10%	9%	causes more damage than benefits provided from getting rid of insects and diseases.
	2000	76%	11%	9%	
Environmental Effects					
soil erosion is minimal and impacts on water quality and fish habitat are acceptable.	1996	63%	14%	16%	causes soil erosion with unacceptable impacts on water quality and fish habitat.
	2000	64%	15%	13%	
soil compaction is minimal and impacts on tree and plant regeneration are acceptable.	1996	65%	13%	14%	causes unacceptable levels of soil compaction that harm tree and plant regeneration.
	2000	68%	18%	7%	
causes little or no damage to natural ecosystems.	1996	65%	17%	12%	causes severe damage to natural ecosystems.
	2000	65%	21%	7%	
creates acceptable changes in native wildlife habitat.	1996	72%	13%	12%	causes unacceptable damage to critical wildlife habitat.
	2000	70%	15%	10%	
Human Impacts					
causes little or no impacts to scenic beauty of forest land.	1996	68%	13%	16%	causes long-term damage to scenic beauty of forest land.
	2000	68%	16%	12%	
has acceptable short-term effects on recreation uses.	1996	79%	7%	10%	has unacceptable long-term effects on recreation uses.
	2000	74%	13%	9%	
Treatment Appropriateness					
is a legitimate management tool.	1996	80%	13%	4%	is an untested system with too many risks.
	2000	84%	8%	3%	
is a legitimate tool for removing harvestable timber.	1996	83%	5%	10%	timber harvesting should not be a consideration.
	2000	82%	8%	7%	
overall benefits of mechanized selective thinning are worth it.	1996	76%	12%	9%	overall impacts of mechanized selective thinning are too great.
	2000	76%	14%	6%	
I trust the Forest Service to implement a responsible and effective mechanized thinning program.	1996	59%	15%	24%	I do not trust the Forest Service to implement a responsible and effective mechanized thinning program.
	2000	52%	21%	26%	

No significant differences in responses between 1996 and 2000.

tree regeneration, and fish and wildlife habitat. Overall, 65% still believe thinning causes little damage to ecosystems. Similar findings emerged with respect to **human impacts** of thinning. Most respondents were willing to accept impacts to scenic beauty and recreation uses, particularly if the impacts are short-term.

In the **treatment appropriateness** category, over three-fourths responded that thinning is a legitimate management tool, and that the overall benefits of thinning are worth the potential risks. Similar to statements about prescribed fire (Table 5), citizen confidence in the Forest Service to implement a responsible and effective thinning program appeared low. A slight majority (52%) still trusted the Forest Service; however 26% do not. Another 21% were neutral, likely reserving judgment until seeing outcomes of treatment implementation.

Treatment Preferences

An additional set of statements was used to further measure public opinion about the appropriate use of fire and mechanical thinning as management tools. Table 11 indicates that opinions have remained largely the same as those in 1996. Well over a majority of all respondents indicated that scientific experimentation with prescribed fire and mechanical thinning is appropriate on insect infested sites and that it is better to selectively thin dead and dying trees than to leave them in the forest. Although significantly fewer agreed that prescribed fires waste trees that should be used for wood products, this still appears to be a concern to over a

third of respondents. About half (49%) continue to support human intervention in ecosystems; however, 28% still prefer letting nature take its own course. It is noteworthy that nearly 50% of respondents disagreed that all fires should be extinguished as soon as possible, indicating recognition of the beneficial role of fire in the Blue Mountains ecosystem.

Table 11: Preferences for prescribed fire and mechanized thinning treatments

		Agree	Neutral	Disagree	Significance Level ^a
Scientific experimentation with prescribed fire is appropriate on insect infested sites.	1996	73%	16%	11%	NS
	2000	74%	15%	11%	
Scientific experimentation with selective thinning is appropriate on insect infested sites.	1996	84%	12%	4%	NS
	2000	86%	9%	5%	
Selectively thinning dead and dying trees is better than leaving them in the forest.	1996	88%	7%	5%	NS
	2000	87%	7%	7%	
Prescribed fires waste trees that should be used for wood products.	1996	43%	24%	33%	≤ .05
	2000	36%	21%	44%	
Following nature's way is preferable to human intervention in ecosystems.	1996	30%	13%	57%	NS
	2000	28%	23%	49%	
All fires, regardless of origin, should be put out as soon as possible.	1996	30%	14%	57%	NS
	2000	34%	17%	49%	

Responses from a 5-point scale from strongly agree to strongly disagree with a neutral midpoint.

^aNS = Not Significant

Respondents were also asked their specific opinion about Forest Service use of prescribed fire and mechanical thinning; overall support levels were similar to 1996 (Tables 12 and 13). In 2000, almost everyone supported some use of

prescribed fire in the Blue Mountains; 39% believed the Forest Service should have full discretion for its use, while an additional 50% felt the agency should use prescribed fire sparingly and only in carefully selected areas. Support was significantly higher for mechanized thinning; 97% of respondents supported some level of thinning with more than two-thirds giving the agency full discretion for its use.

Table 12: Prescribed fire policies

The use of prescribed fire in the Blue Mountains...	1996	2000
... is a legitimate management tool that the Forest Service should have the discretion to use for improving forest conditions.	44%	39%
... should be used sparingly by the Forest Service and only in carefully selected areas.	45%	50%
... creates too many impacts and should not be considered as a management alternative.	6%	7%
... is unnecessary and should not be utilized.	5%	4%

No significant differences in responses between 1996 and 2000.

Table 13: Mechanized thinning policies

The use of mechanized selective thinning in the Blue Mountains...	1996	2000
... is a legitimate management tool that the Forest Service should have the discretion to use for improving forest conditions.	68%	69%
... should be used sparingly by the Forest Service and only in carefully selected areas.	28%	28%
... creates too many impacts and should not be considered as a management alternative.	2%	2%
... is unnecessary and should not be used.	1%	1%

No significant differences in responses between 1996 and 2000.

When asked to indicate their preference for treating the build up of dead trees in the Blue Mountains, respondents clearly preferred a combined thinning and prescribed fire treatment (Table 14). It is also notable that very few respondents (4%) believed that doing nothing about this problem is a preferable option.

Table 14: Preferred treatment of the existing build up of dead trees in the Blue Mountains

selective thinning first, then follow with prescribed fire	75%
use selective thinning only	20%
use prescribed fire only	1%
nothing, let nature take its course	4%

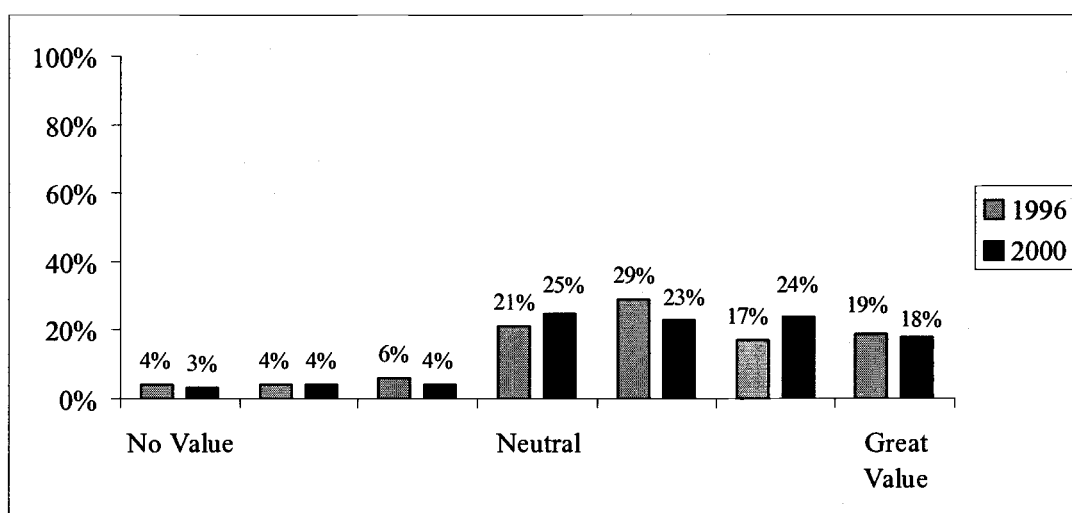
CITIZEN-AGENCY INTERACTIONS

Citizen Participation

Throughout the pacific northwest, a preference for greater citizen participation in forest planning is strong. We put this question to residents of Blue Mountain communities. Using a 7-point scale respondents indicated their opinion about the value of citizen participation in federal forest management after accounting for potential increases in the cost of government (Figure 7). Similar to 1996, a majority (65%) of respondents felt that citizen participation is of value

(right of neutral point), while only 11% indicated that participation is of little or no value (left of neutral point), about one-fourth did not seem to have an opinion (neutral midpoint).

Figure 7: Value of citizen participation in federal forest management, taking into account increased cost of government



No significant differences in responses between 1996 and 2000.

Respondents were then asked their opinion about the role the public should have in future forest management by selecting from five possible formats. Table 15 reflects citizens' interest for substantial involvement in decision processes, reinforcing their views from 1996. Few believed that management decisions should be made independently by resource professionals. Most respondents felt that citizens should either provide suggestions or serve on advisory boards that review and comment on decisions—forms of government

that are suggested under the emerging ecosystem management model. Another 29% believed that citizens should have a far greater role in making decisions about managing public forests.

Table 15: Realistic role for the public in federal forest management

	1996	2000
... none, let resource professionals (Forest Service, BLM) make decisions.	6%	4%
... provide suggestions and let the resource professionals decide.	28%	26%
... serve on advisory boards that review and comment on decisions.	34%	41%
... act as a full and equal partner in making management decisions.	24%	21%
... the public should make the decisions and resource professionals should carry them out.	8%	8%

No significant differences in responses between 1996 and 2000.

Citizen Assessments of Interactions

The ability for agencies to interact effectively with local publics is important to successful implementation of management activities. Table 16 shows responses about citizens' experiences with the Forest Service from both surveys and responses to four new questions asked only in 2000. Opinions were mixed about these interactions; however, if viewed as a report card on the quality of citizen-agency interactions, the scores overall are not particularly good. In terms of a general overview, there were also a substantially high number of neutral responses, suggesting many individuals did not know enough about some elements to offer an opinion.

Table 16: Experiences and interactions with forest management agencies

		Agree	Neutral	Disagree	Significance Level ^a
Agencies like the Forest Service are open to public input and use it to shape forest management decisions.	1996	41%	25%	34%	≤ .01
	2000	31%	27%	42%	
Forest managers usually create plans without input from local communities surrounding national forests.	1996	55%	23%	22%	≤ .01
	2000	46%	24%	30%	
The Forest Service does a good job of providing information about their management activities.	1996	33%	33%	35%	≤ .05
	2000	27%	29%	43%	
Our federal forest management systems need major changes, not just minor adjustments.	1996	59%	24%	18%	NS
	2000	62%	23%	15%	
The Forest Service should provide a stronger leadership role.	1996	54%	32%	14%	NS
	2000	49%	35%	17%	
Federal forest managers build trust and cooperation with citizens so that people will feel that the agency is acting in their best interest.	2000	23%	25%	52%	N/A
I trust the local Blue Mountains Forest Service staff, but I don't trust government at the national level to let them do their job.	2000	65%	19%	16%	N/A
Local Forest Service staff are prohibited from doing their job because of national restrictions and regulations.	2000	68%	24%	8%	N/A
The Forest Service contributes to public knowledge by educating communities about potential benefits and costs of proposed plans.	2000	33%	37%	30%	N/A

Responses on a 5-point scale from strongly agree to strongly disagree with a neutral midpoint.

^aNS = Not Significant, N/A = question not asked in 1996

More specifically, the data show there were several changes since 1996 in respondent assessments of their interactions with the Forest Service. Although agreement was low to begin with, significantly fewer respondents agreed in 2000 that federal agencies use public input to shape management decisions. Given this level of response, it is curious that the number of respondents who agreed that managers usually create plans without input from local communities has

decreased, although almost half still believe this to be the case. These two responses seem contradictory, but could be an indication that while more citizens recognize the Forest Service does solicit public comments they do not believe these comments are reflected in management plans. Also, fewer respondents, just 27%, believed the Forest Service does a good job of providing information about their management activities. As in 1996, a majority of respondents agreed that our federal forest management systems need major changes and nearly 50% felt the Forest Service should provide a stronger leadership role.

Responses to new statements added on the 2000 questionnaire provide increased cause for concern. Few people viewed Forest Service actions as building trust and cooperation with citizens; in fact, a majority disagreed with this statement. The next two items seem to shed light on this finding. Frustration over national level politics and external influences on managing local forests runs high; about two-thirds indicated they trust local Forest Service personnel, but feel government at the national level hinders these individuals from doing their job. Participants were split in their agreement of whether the Forest Service educates communities about the benefits and costs of proposed plans.

As mentioned, a substantial number of people chose the neutral response about these issues. Since no “don’t know” category was provided, one assumption is that many of the neutral responses were from people who had no basis for judgment about these statements. This situation usually indicates an

opportunity to reach out to a segment of the public and positively influence how these individuals come to view the agency.

SOCIODEMOGRAPHIC CHARACTERISTICS AS INFLUENCES ON ATTITUDES AND KNOWLEDGE

Public attitudes about natural resource issues are often associated with sociodemographic characteristics (Steel et al. 1997). In this section bivariate correlations test the strength and direction of association between certain participant characteristics and treatment support and knowledge levels.

Correlation coefficients range in value from -1 to 1 ; the size of the coefficient indicates the strength of the relationship. A coefficient of 1 indicates the strongest possible direct relationship between variables, a coefficient of -1 indicates the strongest possible inverse relationship, and a value of 0 indicates the absence of any linear relationship between the variables.

Support for the use of prescribed fire and mechanized thinning was tested for correlation with twelve variables:

- 1) age
- 2) gender
- 3) income
- 4) economic dependence on timber industry
- 5) environmental/economic orientation (based on responses to the environmental/economic scale reported in Figure 1)

- 6) whether the respondent was retired
- 7) level of formal education
- 8) length of residency in the Blue Mountains region
- 9) whether someone in the respondent's household suffers from a respiratory ailment
- 10) treatment specific knowledge (based on knowledge questions regarding prescribed fire and mechanized thinning, respectively, displayed in Table 3)
- 11) level of agreement that the Forest Service provides good information
- 12) level of trust in the Forest Service to implement a responsible and effective prescribed fire or thinning program.

Participant knowledge was measured according to a 15-item true/false quiz (displayed in Table 3). Knowledge was tested for correlation with eight variables:

- 1) age
- 2) gender
- 3) income
- 4) economic dependence on timber industry
- 5) environmental/economic orientation
- 6) whether the respondent is retired
- 7) level of formal education
- 8) length of residency in the Blue Mountains region.

Table 17: Bivariate correlations between respondent characteristics and support for and knowledge of prescribed fire and mechanized thinning

Characteristics	Support for Prescribed Fire	Support for Mechanized Thinning	Participant Knowledge
Age	-.043	-.040	-.203**
Gender	-.060	-.105	-.180**
Income	.083	.057	.159**
Economic dependence on timber industry	-.031	.186**	.121*
Environmental/Economic orientation	.015	.253**	.118*
Retired	-.056	-.101	-.218**
Education	.113	-.066	-.011
Length of residency in Blue Mountains region	-.132*	.018	-.231**
Someone in respondent's household suffers from a respiratory ailment	-.033	-.094	—
Treatment specific knowledge	.424**	.316**	—
Agrees Forest Service provides good information	.274**	.059	—
Trusts the Forest Service to implement a responsible and effective fire/thinning program	.490**	.260**	—

* Significant at $p \leq .05$, ** Significant at $p \leq .01$

Prescribed Fire

Four respondent characteristics were associated with support for the use of prescribed fire: 1) length of residency in the Blue Mountains region, 2) level of agreement that the Forest Service provides good information about management activities, 3) prescribed fire knowledge (according to performance on knowledge

questions pertaining only to prescribed fire), and 4) trust in the Forest Service to implement a responsible prescribed fire program. (Results displayed in Table 17.)

Length of residency was inversely correlated with support; in other words, the longer respondents have lived in the Blue Mountains region the less likely they are to support the use of prescribed fire. There was a strong direct relationship between support and knowledge; the more knowledgeable individuals are about prescribed fire, the more likely they are to support its use. Similarly, respondents who agreed that the Forest Service provides good information about their management activities were more likely to support the agency's use of prescribed fire. The strongest identified association was between trust levels in the Forest Service and prescribed fire support; as trust in the agency's ability to implement a responsible and effective program increased so did support for the use of prescribed fire.

Mechanized Thinning

Table 17 also shows that support for the use of mechanized thinning was associated with four variables: 1) economic dependence on the timber industry, 2) environmental/economic orientation, 3) mechanized thinning knowledge (according to performance on knowledge questions pertaining only to thinning), and 4) trust in the Forest Service to implement an effective thinning program.

Respondents who rely upon the timber industry and those who favor giving priority to economic over environmental considerations were more likely

to support the use of thinning. As with prescribed fire, support for thinning was also directly associated with increased knowledge levels about the practice and higher levels of trust in the agency to implement a responsible and effective thinning program.

Knowledge

Knowledge was correlated with seven variables: 1) age, 2) gender, 3) income, 4) economic dependence on timber industry, 5) environmental/economic orientation, 6) whether the respondent was retired, and 7) length of residency in the Blue Mountains region.

Age was inversely associated with knowledge; older residents are less knowledgeable about prescribed fire and mechanical thinning practices. Findings indicate that males were more knowledgeable about prescribed fire and mechanical thinning than females. There was a direct association between income and knowledge; respondents with higher incomes displayed higher levels of knowledge. Similarly, those respondents who rely upon jobs in the timber industry and those who favor management priority given to economic considerations had higher knowledge scores. Similar to age, respondents who were retired had lower knowledge scores.

While other studies have identified a relationship between level of formal education and general knowledge of natural resource issues (e.g., Arcury 1990; Shindler and Wright 2000), there was no evidence of an association between

education and knowledge of treatments. This is likely due, at least in part, to the specific nature of the questions about the use of prescribed fire and mechanical thinning; topics not typically covered in formal education courses. Finally, the inverse association between knowledge and length of residency in the Blue Mountains region seems counterintuitive as one would expect knowledge to increase with increasing length of residency. However, given that most respondents had an extended length of residency in the Blue Mountains area (nearly 90% of respondents had lived in the Blue Mountains for more than 15 years) typical associations may not apply. It is also likely that this association was heavily influenced by the inverse relationship between knowledge and age.

DISCUSSION

The purpose of this study was to improve our understanding of the factors that contribute to public acceptance of prescribed fire and mechanical thinning practices to reduce hazardous fuels in the Blue Mountains region. The intent is to develop a better understanding of influences on public attitudes and behaviors so that management personnel can more directly respond to citizen concerns and communicate more effectively in forest communities. Specific project objectives were to: (a) compare the current research findings with the 1996 study to describe changes in public attitudes and behaviors, (b) examine the factors that have influenced the study population's knowledge of and response to fuel reduction programs, (c) identify levels of support for fuel reduction activities and examine underlying concerns, (d) identify citizens' information needs, preferred forms of information exchange, and which delivery systems are most effective, and (e) examine Forest Service interactions with local publics.

CHANGES IN PUBLIC ATTITUDES: 1996-2000

The research design incorporated a survey protocol to collect data at two different points in time from the same individuals. This form of longitudinal analysis provided a method for unique comparisons not possible in single studies; it offers the most comprehensive data for assessing change in public opinion over time (Babbie 1995). Overall, findings show that attitudes remained relatively

stable over the study period; notable is the high level of support for use of both prescribed fire and mechanized thinning. However, several important shifts did emerge in the way citizens view forest conditions in the Blue Mountains as well as how they feel about their interactions with the Forest Service. This latter area may be problematic over the long term. The key significant differences in responses between 1996 and 2000 were

- a) respondents believe forests in the Blue Mountains are healthier now than in 1996;
- b) more people are now concerned about smoke from prescribed fire;
- c) people now pay more attention to information from industry groups;
- d) people now pay less attention to information from the Forest Service;
- e) fewer citizens believe the Forest Service does a good job of providing information;
- f) more believe that the Forest Service now seeks public input for planning purposes;
- g) less believe the Forest Service is open to public input and uses it to make decisions; and
- h) fewer citizens trust the Forest Service to implement a responsible and effective prescribed fire program.

These shifts are discussed in greater detail in the following sections.

PARTICIPANT AWARENESS AND KNOWLEDGE OF CONDITIONS

As we might expect among a population where the average length of residency is forty-one years, the study group overall is quite knowledgeable of forest conditions and continues to pay attention to issues involving National Forest lands. It is also no surprise that most individuals want a balanced approach to forest management; in recent years citizens throughout the northwest have demonstrated their preferences for ecosystem-based strategies that both protect the integrity of forests and provide a range of resources (Shindler et al. 1993; Brunson et al. 1997; Shindler and Wright 2000). One of the first steps to reaching agreement about how to manage for these diverse priorities is to develop an understanding of public awareness and knowledge about these concepts (Shindler et al. 2002).

Respondents were extremely attentive to forest management issues and a very strong majority consider themselves at least moderately well informed about conditions in the Blue Mountains. Although these findings were based on self-assessed measures, research indicates that feeling informed about an issue can motivate individuals to become involved in resource management (Pierce et al. 1989). Conversely, what people believe about forests is not always consistent across settings; judgments often reflect differences in how individuals understand the “facts” (Kearney et al. 1999) or reflect their personal values about resource management. Regardless, Blue Mountains residents are aware of, interested in,

and feel they know something about forest conditions in their area. Thus, good agency leadership is required to structure local conversations so that communities and the Forest Service can work toward a common understanding of environmental complexities—one that includes the causes of forest conditions, the effects of management alternatives, and methods for reaching agreement on forest plans (Shindler and Neburka 1997).

Performance on knowledge questions about prescribed fire and mechanized thinning indicates a knowledgeable public in local communities. Given amount of personal experience in forested landscapes residents are probably more sophisticated in their views of forest practices than those who live elsewhere, but some misperceptions still exist about several core objectives for the use of these treatments. Among these are a lack of common understanding about the historical role of fire in the Blue Mountains, about the benefits of fire in reducing understory vegetation and controlling noxious weeds, and about promoting growth of ponderosa pine through both fire and thinning treatments. Managers can use this type of information to help focus the discussion on important ecological concepts where gaps in public understanding exist (Manfredo et al. 1990). Citizen support for these practices often rests on their understanding of the rationale behind agency actions and the likelihood that desired outcomes will occur (Shindler and Collson 1998).

Respondents believe forests in the Blue Mountains are healthier now than in 1996. While this shift may be due to Forest Service restoration efforts, other

explanations are possible. For example, it may be that local citizens have simply grown accustomed to diminishing forest conditions and no longer view these conditions as unhealthy. People often employ various mechanisms to cope with and adapt to unfavorable conditions (such as poor forest health). Readjusting one's expectations and definitions of resource conditions is a common strategy employed by individuals to cope with a marginal, or even unsatisfactory, situation (Kuentzel and Heberlein 1992; Shindler and Shelby 1995). In other words, people adapt to adverse conditions because they want to feel good about their surroundings. Nonetheless, the evaluations of long-term residents are important in that they can help provide perspective in community forums where forest plans are deliberated and alternatives discussed. While inconclusive, these findings also provide a useful perspective for monitoring purposes.

Reflecting a pattern throughout the Pacific Northwest, the largest number of Blue Mountains respondents preferred forest management that strikes a balance between environmental and economic considerations. However, nearly an equal number preferred policies that gave priority to economic considerations—a departure from residents in other areas of the state or in national surveys (Shindler et al. 1993; Shindler and Wright 2000). Undoubtedly these sentiments are tied to the number of local people who earn their living from natural resource-based industries (i.e., farming, ranching, forestry). Although public orientations have generally shifted towards the environmental end of the spectrum in other areas of the state (Williams 2001; Brunson et al. 2002), the face of communities in the

Blue Mountains seems to be changing less rapidly. It is likely that many citizens here will continue to judge management policies based on the impacts to local economies.

The consequences of the Cerro Grande fire in Los Alamos may not have long-term significance in the Blue Mountains, but the reaction among our respondents is worth noting. Research has shown that dramatic events, and the media coverage they receive, can influence public perceptions of risk (Beebe and Omi 1993). As the use of prescribed fire increases nationwide other escapes will occur, perhaps closer to home than Los Alamos. The resulting skepticism and decreased confidence in an agency's ability to control conditions are normal reactions in these situations. From an agency standpoint, this reinforces the need to anticipate these reactions in communities where managers are planning fire treatments and underscores the importance of credible communications with residents prior to program implementation. This also provides a reminder about avoiding the tendency to overstate fire personnel's ability to control conditions (Carpenter et al. 1986).

INFORMATION SOURCES AND THE EFFECTIVENESS OF DELIVERY SYSTEMS

Given the association between knowledge of fire management practices and public support for management programs (e.g., Stankey 1976; Carpenter et al. 1986; Loomis et al. 2001), it is important to understand which sources citizens

rely on for credible information. In the past, the public has turned largely to agency professionals for information about fuel conditions and fire management (Shelby and Speaker 1990). However, decreased ratings of the Forest Service as a useful source, compared to other popular information providers, indicate a shift in where citizens in the Blue Mountains place their attention. Several explanations exist including the notions that people are less trusting of the agency and government institutions in general (Shindler and O'Brian 1998) and that the information provided—or the formats used to disseminate it—may not resonate with the needs and experiences of local citizens. Other characteristics such as message clarity and convenience are also factors. Findings about specific methods of Forest Service information provision can help determine where personnel might choose to focus their efforts.

For each method of delivery listed in Table 4 there is a substantial number of citizens who simply are unfamiliar with, and thus have no basis for opinion about, these messages from the Forest Service. Different reasons apply depending on the format used, but these data provide a starting point as the agency decides how and where to invest scarce resources for communicating with the public. For example, some of the same skills (if not funding levels) are required to produce interpretive information, video messages, and internet web sites; however, public awareness of each form is uneven and usefulness ratings among people who are familiar with them are dramatically different. On the other hand, half of the individuals surveyed had no opinion about school educational

programs but this format had one of the highest usefulness ratings among individuals who knew about them. Format usefulness can only begin to be measured when someone is exposed to a message; essential criteria include how easy the message is to understand, how convenient it is to access, and how trustworthy the provider is (Steel 1992-1993). Specific conversations within communities about preferred forms of information exchange can help identify the most cost effective and influential communication programs.

Given the climate in which forestry decisions are made, a reliance on traditional, one-way methods for transmitting information (e.g., brochures, written reports, and large meetings for “information sharing”) is not an effective strategy (Cortner et al. 1998). More interactive forms of communication—for example, field trips to treatment sites, interpretive programs, and open discussion with respected agency personnel—offer effective learning experiences and generally are considered more useful tools for influencing attitudes about natural resources (Wondolleck and Yaffee 1994; Veverka 1996; Newton 2001; Williams 2001). Most often, programs that simply provide information are not very effective at improving peoples’ understanding or changing their behavior (Jamieson 1994). Learning about, and ultimately public acceptance of forest practices, is more likely to occur in the context of personal relationships than in one-way, anonymous communication. One drawback is that participation in interactive programs requires greater initiative on the part of the public (as well as

managers), but these forms of communication hold considerable promise for a more informed constituency.

Interactive Programs

School educational programs were highly rated. No doubt this view stems from citizens who have seen these programs in action, but it is also likely that many responded positively because educational programs seem like a good idea for the intended audience, youth. Nevertheless, environmental education research generally reports positive results from classroom exposure to information about natural resources (see Leeming et al. 1993 and Zelezny 1999 for a comprehensive review) and the ratings here suggest that Blue Mountains residents feel this would be a good long-term investment. As with any educational program, however, the delivery system is essential. As noted in other regions (Shindler and Collson 1998), classroom tools such as workbooks, video, and interactive computer applications seem particularly well suited to students learning about topics like fuel management and forest health problems.

Conversations with agency personnel, perhaps one of the most informal and earliest forms of outreach, continue to be relevant for most people. Most residents reported experience with this form of communication, indicating that agency personnel have a strong presence in local communities. In more rural settings citizens often recognize Forest Service employees and value their opinions, even in informal situations when agency members are not acting in an

official capacity (i.e., in their role as ordinary citizens) (Coglianese 1997). Most people also believed these conversations were a trustworthy form of communication suggesting that these personal interactions can provide a basis for more formal planning activities.

Visitor centers and interpretive information were also highly rated, consistent with previous research (Olson et al. 1984). Most people have been exposed to such sites where information is typically crafted for clarity and convenience. People typically visit during their free time when they are usually more receptive to these softer, more easily accessible messages. It is likely that ratings of trustworthiness for this method were high because information is delivered by naturalists or interpreters who are seen as friendly, competent, and approachable. Fire and fuel management has just recently begun to appear as interpretive topics in visitor facilities; these venues seem to be a good place for increasing outreach efforts.

Large numbers also agreed that guided field trips provide messages that are easy to understand and come from a trustworthy source; such reactions are reiterated in research throughout the Pacific Northwest (Shindler and Wilton 2002). One drawback to field trips is that they are inconvenient; as indicated by low ratings for this component and that fewer than half of the respondents had actually participated in such a trip. However, this obstacle is currently being addressed with opportunities provided, for example, by the Blue Mountains Demonstration Area, the Heritage Forest Demonstration Project (Deschutes NF),

and the Cascade Center for Ecosystem Management (Willamette NF).

Experiences in each suggest that field visits to treatment areas can be made more convenient for citizens particularly in communities adjacent to National Forest lands. This is especially true when residents help plan these site visits in conjunction with other local activities such as watershed council or homeowner association meetings. The benefits of getting the public on-site are often substantial (Newton 2001); people are able to witness the effects of treatment alternatives and engage agency personnel—often resource specialists—in informal, meaningful discussion.

Public meetings were the one interactive program to receive a low rating as a useful source of information. In recent years, and in virtually every region throughout the U.S., citizens have been critical of how the Forest Service conducts this form of outreach, often because people feel they are being “talked at” rather than included in a meaningful way (e.g., Blahna and Yonts-Shepherd 1989; Shindler and Neburka 1997; Cortner et al. 1998; Shindler and Collson 1998). Research has clearly shown that structure and leadership are critical components of successful public meetings (See Shindler et al. 1999 for a comprehensive summary). Citizens expect to have a useful role when they attend, respond well to clearly defined meeting objectives, prefer interactive settings as opposed to simple information sharing, and appreciate leaders that they see as genuine and trustworthy. Depending on the attention given to the design and process elements of public meetings, these settings can be either detrimental or

highly useful forms of outreach (e.g., Blahna and Yonts-Shepherd 1989; Lawrence et al. 1997). There is evidence that some local ranger districts in the Blue Mountains have made improvements in and recognize the importance of this type of community interaction. Willingness to expand and experiment with meeting formats is likely to result in more effective communication with citizens (Shindler and Cheek 1999; Shindler et al. 2002).

Uni-directional Programs

Overall, Smokey Bear was the most highly rated outreach program. However, given the scope of Smokey's message, the benefits of this information source are probably limited to education about fire prevention. The three uni-directional programs that received mid-level usefulness ratings were television messages, newsletters, and prescribed fire brochures. While most people have been exposed to these sources, and a high percentage found them easy to understand, fewer rated them as trustworthy. Credibility often depends on who is behind the message (e.g., an interest group, government agency, or university researchers) as well as message content (Steel 1992-1993). Convenience is also a consideration for the public; television is typically a convenient format, although opportunities to broadcast messages about fire management are limited. Mailed newsletters are also convenient, but can get lost in the large amount of material people receive these days. Although a staple of management agencies, brochures are not particularly convenient because they can get misplaced in the shuffle of

outdoor activities and are typically considered poorer forms of communication (Veverka 1996).

For any of these formats to be effective, information must be concise and focused; the dilemma is that people are less likely to trust an overly simplistic message that presents only one point of view (Ehrenhalt 1994). Considerable care and expertise is required in the design of these informational products. Although television spots, newsletters, and brochures provide some benefits, they probably should not be relied on as primary forms of outreach.

Three formats—environmental impact statements, videos, and Forest Service internet sites—were rated the least useful. Although an EIS is a necessary part of the planning process, the technical language used, their limited accessibility, and typical length indicate these documents should not be counted on to provide an educational message. Ratings of videos and web sites are more troublesome because these formats represent areas of recent emphasis as outreach tools. Evaluating their usefulness is complicated because of limited public exposure; however, even those who have seen them did not rate them highly. In the case of videos, one explanation could be that our culture has become particularly astute observers of this communication medium and informational videos will need to meet a high standard to capture attention. In any case, videos are better at generating public awareness of a problem or project than for imparting specific details about agency programs. As for web sites, they may be a place where people go for travel information or to book reservations, but they are

not likely to be sought out for coverage of policy issues such as fire management or forest health.

ATTITUDES AND SUPPORT FOR FUEL REDUCTION PRACTICES

Overall support continues to be strong for both prescribed fire and mechanized thinning. Moderate levels of concern exist over recognized risks from fire practices (e.g., damage to property, human safety, loss of timber and wildlife habitat), but citizens generally consider the benefits to be a worthwhile tradeoff. Thus far, the most vocal opposition to the use of fire in the region has been over increased smoke levels. Although the data indicate mixed reactions over smoke, concerns are not likely to dissipate. The sensitive nature of these risks suggests that any increases in perceived threats—for example, a particularly damaging escape of a local prescribed fire or the presence of smoke for lengthy periods—will result in substantially decreased support for the use of fire. On balance, people are more supportive of thinning treatments and are willing to give the agency more discretion in implementing these projects. These sentiments seem to stem from the potential economic benefits that might accrue locally as well as a general awareness that many stands need to be thinned prior to safely putting fire into these systems.

Although most people still believe that prescribed fire decreases the chance of high intensity wildfires, agreement levels about the other benefits of fire (Table 5) have dropped a number of percentage points since 1996 and might

forewarn of a shift in attitudes overall. While only a few of these changes were statistically significant, on a collective basis data patterns suggest less agreement about the merits of using fire now than in 1996. If this analysis is correct, two explanations seem likely. First, the current fuel buildup may be viewed as too severe for prescribed fire to provide much relief. Second, diminishing trust in the Forest Service to implement a responsible prescribed fire program may be influencing how people feel about treatment effectiveness.

At least two important findings about smoke emerged. First, more people now view smoke as a problem for their family than in 1996. Although most people still believe that smoke should not be a deterrent to the use of prescribed fire, a higher number now are less certain about their views. This shift suggests that people will be more watchful about the presence of smoke and will make judgments based on how well fire managers control treatment effects. Second, given the potential effects of smoke, it is surprising that most respondents demonstrated relatively high tolerance for lower smoke intensities (Table 9). How reactions actually play out in communities once smoke is present may well be another matter. One certainty exists however; it does not take many people who are either uncomfortable with smoke levels or who suffer from respiratory ailments to marshal a vocal response. Community discussions about the tradeoffs of (low level) smoke from prescribed fire versus more substantial levels from large-scale wildfire may be useful (Daniel 1990). In any case, we are just

beginning to learn about the public's tolerance for smoke and further investigation into this problem is necessary.

Even with several of the caveats mentioned here, support for the use of fire and thinning practices remains high. Mechanized thinning is the overwhelming treatment of choice, but almost 90% of respondents also believe that prescribed fire could at least be used sparingly and in carefully selected areas—an apt description of current agency fire policies.

The influence of several sociodemographic characteristics on support for practices is noteworthy. As in numerous studies, an individual's familiarity with fire and thinning and the ecological benefits of each are closely associated with support (e.g., Stankey 1976; Carpenter et al. 1986; Loomis et al. 2001). Similarly, trust in the Forest Service as well as its ability to provide credible information are strong indicators of treatment acceptance. Such findings reinforce the notion that the public must understand a practice in order to support it and thus underscore the importance of agency communication strategies (Shindler et al. 1996; Yaffee and Wondolleck 1997). Although decreasing levels of trust are problematic, responses here suggest that much of citizens' negative feelings are directed at the federal bureaucracy in general and not necessarily at Forest Service personnel in the Blue Mountains. If this is true, local managers may not be largely to blame, but they will bear the brunt of eroding support for federal forest policy decisions.

CITIZEN-AGENCY INTERACTIONS

The most critical finding of this study involves elements of the agency's relationship with citizens. This is a primary concern in that research throughout the past decade overwhelmingly indicates that feelings of distrust and disenfranchisement in communities can trump agency attempts to initiate forest programs (Shindler et al. 2002). For example, the degree that citizens feel they were represented in the planning process is critical to support of agency decisions (Blahna and Yonts-Shepherd 1989; Lawrence et al. 1997). When decision outcomes are emphasized at the expense of deliberative, inclusive decision processes, citizens will often seek alternative means to influence local policies (Shindler et al. 1993). This has occurred repeatedly in recent years as organized groups in the pacific northwest have invoked the courts, sought the support of legislators, organized state-level referendums, and used the media to focus attention on their interests. Although there appears to be less activism in Blue Mountains communities than in more urban areas, once grass-roots efforts gain momentum they can be a powerful force. Currently, citizens in the Blue Mountains have expressed a desire for increased opportunities for participation with a majority preferring an expanded role in decision-making over what is called for in the National Environmental Policy Act. Several key findings help provide an explanation for this local trend.

Less than one-third of the respondents, a significant drop since 1996, agreed that the Forest Service is open to public input and uses it to shape

management plans. It is likely these sentiments are linked with a similarly low level of agreement that the agency is doing a good job of providing information about its management activities. Both findings suggest a need for more inclusive, more transparent decision processes where citizens can recognize how their input is represented in management plans (Blahna and Yonts-Shepherd 1989; Lawrence et al. 1997).

As suggested by research in other areas of the west, findings demonstrate that trust remains the key issue in the Blue Mountains (see Shindler et al. 2002 for a comprehensive review). Currently less than one-fourth of the respondents trust the Forest Service to build cooperation in communities and act in the best interest of citizens. As mentioned previously, it is likely that these feelings are influenced by general public dissatisfaction with national politics and Forest Service policy on a broad level. This view is supported somewhat by a stronger statement of trust for local agency personnel; however, a substantial number (about one-third of the respondents) still do not trust local staff or are uncertain about where to place their trust. All of this suggests there is considerable room for building better relations in local communities, particularly among people who have not made up their minds about how well the agency responds to citizens.

The high level of frustration with the federal forest management system is a growing problem. A majority of people in the Blue Mountains, as in many areas across the country (Shindler et al. 2002), believe changes are necessary. This public view can be equally frustrating for local managers who have little

control over national politics and regulations that derive elsewhere. Until this situation changes—either by leadership at the national level or by a radical shift in public opinion—agency personnel on ranger districts and Forests will need to continue to look for ways to engage citizens locally, build partnerships that are meaningful in these communities, and achieve results that are important for local forests and stakeholders (Shindler and Neburka 1997).

There also is low level agreement that the Forest Service contributes to public understanding of the benefits and costs of proposed plans. Although there are individuals with little interest in Forest Service activities, most people in the area are attentive to National Forest issues and want a meaningful role in the planning and allocation of resources. To be effective participants, they need good information and appropriate forums for participation (Yankelovich 1991). The responsibility to provide these conditions largely rests with the Forest Service (Jamieson 1994). This requires a critical look at the depth and focus of current outreach programs. Information provided here is a good starting point, but more specific conversations within communities about meaningful message formats are also essential.

CONCLUSION

Public acceptance is an essential element in virtually every resource management decision facing public agencies today. Problems such as fire management and forest health, given the attendant risk and uncertainties surrounding these issues, are particularly subject to public debate (Daniel 1990; Manfredo et al. 1990). The socio-political environment surrounding such decisions guarantees that public judgments about what is good or bad, acceptable or unacceptable, involves more than simple opinion *for* or *against* a policy (Shindler and Reed 1996). Judgments involve a wide range of influences that derive from the citizens themselves, the actions of the management agency, and the situational context within which programs are planned and implemented (Shindler et al. 2002).

Particularly in rural communities, the nature of the judgments made by citizens about fuel management as well as the strength with which these judgments are held, are shaped largely by the personal relevance of the situation. Judgments are particularly strong when the issue is important to people, personalized by proximity and the likelihood that outcomes will affect a valued place, an individual's livelihood, or a strongly held belief (Brandenburg and Carroll 1995; Bright and Manfredo 1997; Cortner et al. 1998). As indicated from this and similar studies (Shindler et al. 2002), public acceptance is provisional. As citizens become more aware of the factors involved in fuel management—the

choices and consequences, the costs involved, how and why decisions are made, and so on—what seemed reasonable in the past may be deemed inappropriate today. By its nature then, public acceptance of fire management programs and resulting forest conditions is a continuing process rather than an end product. The job of reaching agreement among stakeholders is long-term and rarely final or absolute.

Although research findings highlight numerous areas of public support for fuel management practices as well as several specific areas of concern, these are complex issues. Problems are often embedded within one another and connected to factors beyond agency control (Shindler et al. 2002). Today, the roles that agency personnel are being asked to play are much different than in the past, when citizen participation was minimal and technical expertise was foremost (Kennedy 1985; Brunson and Kennedy 1995; Shindler and Cheek 1999). In this new role, greater public acceptance will be achieved by being aware of, and responsive to, the suite of intertwined ecological factors and community circumstances affecting fuel management.

The longitudinal nature of this study allowed for an enriched understanding of the factors that contribute to citizen judgements of fuel reduction practices including the opportunity to track support and attitudes over time. Results illustrate that public acceptance of fire and fuel management is a product of the long-term interactions between citizens and resource managers and reflects the beliefs, trust, and confidence that citizens hold about those responsible for

federal forests. Given these findings, the concluding comments involve a set of three overarching themes, expressed as basic strategies, that emerge from this analysis. The unique comparisons permitted by the longitudinal research design of this study indicate that these themes are essential to continued support of prescribed fire and mechanized thinning within the Blue Mountains area.

CAPITALIZE ON EXISTING PUBLIC KNOWLEDGE AND SUPPORT FOR FUEL REDUCTION

Given the controversy surrounding most federal resource management decisions, agency personnel can feel that there is little public support for or understanding of management actions. These perceptions of citizen attitudes are often based on the voices of individuals and organized groups within a community clamoring loudest for attention while seeking to fulfill specific agendas. Although important, the opinions expressed by these groups do not always represent the attitudes and perceptions of the larger community. Primary results from this study indicate the presence of a knowledgeable general public in the Blue Mountains, solid support for both prescribed fire and mechanized thinning to reduce forest fuels, and an overall stability of public attitudes throughout the study period. Collectively, these findings provide positive news for Forest Service programs. They also suggest that this existing base of well-informed, supportive stakeholders could be a central asset in building future management programs.

Several findings suggest Blue Mountains residents are a relatively sophisticated audience. For example, citizens recognized an improvement in forest health conditions in recent years. Although not conclusive, this evidence may be in response to fuel management and forest restoration campaigns over the last five years. Visual assessments play an important role in public judgments (Bliss et al. 1994; Ribe 1999) and it is important for the agency to provide citizens with opportunities to witness first-hand changes in forest conditions (Shindler and Reed 1996; van Es 1996).

Second, it is clear that the public support registered in this study represents more than simple public opinion polling where responses are not linked to likely consequences (Yankelovich 1991). These responses appear to be based on knowledge about treatments and a willingness to accept a number of tradeoffs (e.g., temporary impacts on forest aesthetics, wildlife habitat, recreation opportunities, and air quality) associated with treatment implementation.

Third, there are also indications that citizens are able to differentiate between national politics and what local managers are attempting to accomplish. This is important because local relationships provide the cornerstone for building effective programs at the ranger district level (Shindler et al. 2002). Many citizens expressed a preference for stronger leadership from Blue Mountains personnel, signaling a willingness to allow managers to plan and implement programs to solve local problems.

Study results also indicate that public understanding and support for treatments is not universal; trouble spots exist. Foremost are increased concerns over smoke from prescribed fire, declining levels of trust for effective treatment implementation, and an overall declining relationship between the Forest Service and their local publics. In the case of fire management, support is often dependent on the level of uncertainty about outcomes and public understanding of the risks involved (Daniel 1990). To be relevant to the public, fire management policies will need to be placed in a context that is important to them (Bright and Manfredo 1997). To the extent possible, managers will need to provide scenarios that depict what changes in forest conditions will look like, how soon they could occur, and help citizens understand what the consequences of changes will mean for forest ecosystems and surrounding communities.

Responses suggest that citizens in the Blue Mountains are cautiously willing to allow these policies to proceed. As effective treatments continue to be implemented and public awareness of these successes grows, so too will belief that the Forest Service can be trusted to handle the risks associated with fire and fuel management.

FOCUS ON RELATIONS WITH CITIZENS

The most troublesome finding from this study is the erosion of relations between citizens and the Forest Service. As elsewhere, many of these feelings are attributable to the tension between policies set at the national level and the need to

create strategies for managing forests at the community level (Shindler 2000), but it is unlikely this circumstance explains all aspects of the declining relationship with the public in the Blue Mountains. Thus, two approaches seem particularly useful. First, to the extent possible, agency personnel will need to filter out the national debate and focus on what can be accomplished in local forests (Shindler and Neburka 1997). Programs will need to target local priorities; the Blue Mountains Demonstration Area which seeks to accelerate the restoration of healthy forests and enhance the economic and social well-being of local communities may prove to be a good model. Second is the necessity to rebuild relationships of trust with local communities by providing ordinary citizens and organized groups a more meaningful role in planning and implementing fire management strategies (Chambers 1992-1993; Shindler et al. 1999). Trustworthy relations among stakeholders are key to all aspects of forest management; regardless of the science behind or the merits of an agency plan, nothing will be validated unless the people involved trust one another (Shindler et al. 2002).

The initial requirement for improving relations and building public trust is an organizational commitment to multi-partner collaboration (Shindler et al. 2002). Currently, most collaborative efforts and the trust building process remain the job of individuals at the ranger district level where relationships are established and face-to-face interactions can make a difference for residents and their communities (Stankey et al. 2002). The informal nature of these situations is perhaps the most productive form of relationship building (Coglianese 1997). But

this can only occur in a meaningful way when the agency promotes these ideas and supports personnel in their outreach efforts (Cortner et al. 1996).

Research indicates that key actions at the Forest and ranger district level for improving community relations include *enabling* resource personnel to design and implement effective strategies for community collaborations, *encouraging* partnership efforts within the management unit, and *clarifying* the roles of participants—both agency personnel and citizens (Wondolleck and Yaffee 1994; Shindler et al. 2002). Enable personnel by utilizing training programs and hiring mechanisms to develop staff capabilities. In other words, hire people with appropriate skills and provide them with the tools necessary to conduct successful participatory processes. Equally important is administrative encouragement for collaborative efforts within management units through flexibility and internal support for experimentation with new approaches for partnership building. Lastly, is the need to clarify participant roles in these new partnerships. Because participants will be unsure of their responsibilities in these new arrangements, it is essential to define partnership objectives, including the amount of responsibility the agency is willing to share.

The data here show that citizens would like an expanded role in their interactions with the agency and want local personnel to provide greater leadership. Considerable opportunity exists in Blue Mountains communities to expand the role of citizen groups in fuel reduction efforts. Local watershed councils, friends and sportsman groups, and homeowner associations are greatly

concerned about these conditions and usually have a real stake in the outcomes.

Paying attention to local communication networks and working within the existing structure of these organizations can serve the common goals of public and private stakeholders (Maiolo et al. 1992).

DEVELOP A COMPREHENSIVE COMMUNICATION STRATEGY

The tendency to confuse providing information with increased public understanding and eventual support is a mistake. Although information and knowledge are necessary elements of any public communication strategy, the nature of the communications is likely to be just as important (Aldred Cheek et al. 1997). Thus, a comprehensive communication strategy will focus on the information to be provided, the method of communication, and the process of how people come to understand forest conditions and support policies.

Regarding the communication method, the data from this project and other recent studies can help organize an approach for the Blue Mountains (e.g., Shindler and Wright 2000; Shindler and Wilton 2002). Two basic levels of communication exist, each is useful depending on the purpose and intended coverage. One is general information dispersal; this usually involves broad messages that can be conveyed by traditional “bulk” formats such as newspapers, brochures and public service announcements. These are typically for general public consumption and, as such, provide few opportunities to target specific audiences. Because it is difficult to ensure that information is received and

understood, their effectiveness as an educational tool is limited. Data in this study seem to reinforce this assessment; most forms of communication in this category are uni-directional formats that received moderate to low level usefulness ratings. Although the agency should continue to use these informational devices—they are often inexpensive, may be helpful in notifying large audiences about upcoming meetings or proposed projects, and provide some value collectively as a critical mass of information—outreach personnel should not rely on these as primary tools for communicating with local publics.

The second level of communication is more focused in scope and usually includes opportunities for interaction at the community or individual level. In this category are the more highly rated activities such as school programs, visitor centers, and guided field trips. Although these forms generally have wide-spread acceptance as effective outreach devices, they are highly dependent on good organization and communication abilities of agency personnel who plan and implement them (Shindler and Cheek 1999). For example, public meetings fall into this category but our participants (as elsewhere) did not respond well to this format (Cortner et al. 1998). This seems to be a sign that the more traditional agency formats—information-sharing or scoping meetings—should be abandoned in favor of other meeting formats. From a practical standpoint, findings from this study can be used by local personnel to engage communities about which level and forms of information exchange are preferable.

The substantive content of information sources is also a primary consideration, and other studies have helped identify what people look for and find useful in agency messages. Most content ideas are simple and straightforward—almost intuitive—but neglecting them can be detrimental to communications. Research in forest communities by Shindler and Neburka (1997) as well as Winter et al. (2002) show that specific characteristics of good message content include 1) clearly defined terms, 2) current and understandable information from a reliable source, 3) prescribed fire plans that specifically account for local conditions (e.g., weather, proximity to homes, timing of events), 4) treatment plans that provide mitigation measures to reduce impacts, 5) contingency measures for escapes, 6) cost comparisons of various treatment alternatives, and 7) details about who to contact with questions and concerns.

With respect to public process, findings indicate that citizens do not respond well to the traditional meeting formats that are commonly used to satisfy NEPA requirements or to otherwise engage the public. These approaches provide for little real participation by citizens, and thus little commitment, either in the plan (or project) itself or in the process by which it was developed (Blahna and Yonts-Shepherd 1989). Most people like those in our study region are capable of assessing the tradeoffs, including positive and negative consequences, and welcome the chance to do so.

The ability of fire management professionals to specify conditions and engage citizens in discussion about the nature of the options is just as essential as

providing objective, unbiased information. Of course, this will mean that personnel must be forthcoming about difficult decisions, including the uncertainty of outcomes associated with the use of fire and thinning treatments. Useful forums for discussion about forest conditions and fuel management usually involve interactive exchanges, often in places where people can evaluate real-life scenarios prior to policy changes or broad scale implementation of treatments (Shindler et al. 2002). This study shows that Blue Mountain residents prefer settings where they can have a more active, legitimate role—settings such as field visits to treatment sites to review alternatives or planning sessions where stakeholders are given consideration for their points of view and their suggestions are openly discussed and evaluated. Such situations involving open debate and deliberation can often be helpful in eliminating some of the uncertainty—or even serve to deflate some of the contentiousness—surrounding the use of fuel reduction treatments.

REFERENCES

- Aldred-Cheek, K., B. Shindler, and A. McQuillan. 1997. The role of knowledge in public acceptance of ecosystem management: A literature review. Corvallis, OR: Department of Forest Resources, Oregon State University.
- Allen, G.M., and Jr. Gould, E.M. 1986. Complexity, wickedness, and public forests. *Journal of Forestry* 4(4):20-23.
- Arcury 1990. Environmental attitude and environmental knowledge. *Human Organization* 49 (4):300-304
- Armstrong, J.B., and J.C. Impara. 1991. The impact of an environmental education program on knowledge and attitude. *Journal of Environmental Education* 22:36-40.
- Babbie, E. 1995. *The practice of social research*. 7 ed. Belmont, CA: Wadsworth Publishing Company.
- Beebe, Grant S., and Philip N. Omi. 1993. Wildland Burning: The perception of risk. *Journal of Forestry* 91 (9):19-24.
- Benson, R.E. 1982. *Management consequences of alternative harvesting and residue treatment practice: Lodgepole pine*. USDA Forest Service Research Paper INT-132. USDA Forest Service, Intermountain Forest and Range Experiment Station. Ogden, UT.
- Blahna, D.J., and S. Yonts-Shepard. 1989. Public involvement in resource planning: Toward bridging the gap between policy and implementation. *Society and Natural Resources* 2 (3):209-227.
- Bliss, J.C., S.K. Nepal, R.T. Brooks, and M.D. Larsen. 1994. Forestry community or granfalloon? *Journal of Forestry* 92 (9):6-10.
- Brandenburg, A.M., and M.S. Carroll. 1995. Your place or mine?: The effect of place creation on environmental values and landscape meanings. *Society and Natural Resources* 8:381-398.
- Bright, A.D., and M.J. Manfredo. 1997. The influence of balanced information on attitudes toward natural resource issues. *Society and Natural Resources* 10:469-483.

- Bright, A.D., M. Fishbein, M. J. Manfredo, and A. Bath. 1993. Application of the theory of reasoned action to the National Park Service's controlled burn policy. *Journal of Leisure Research* 25 (3):263-280.
- Brunson, M., B. Shindler, and B.S. Steel. 1997a. Consensus and dissension among rural and urban publics concerning forest management in the Pacific Northwest. In *Public Lands Management in the West: Citizens, Interest Groups, and Values*, edited by B. S. Steel. Westport, CT: Praeger.
- Brunson, M., B. Shindler, L. Gilbert, and E. Toman. 2002. Fire conditions on public forests and rangelands: A survey of citizens. Research Report. Corvallis, OR: Department of Forest Resources, Oregon State University.
- Brunson, M.W. , and B. Shelby. 1992. Assessing recreational and scenic quality: How does New Forestry rate? *Journal of Forestry* 90 (7):37-41.
- Brunson, M.W. 1992. Professional bias, public perspectives, and communication pitfalls for natural resource managers. *Rangelands* 14 (5):292-295.
- Brunson, M.W. 1993. 'Socially acceptable' forestry: What does it imply for ecosystem management? *Western Journal of Applied Forestry* 8 (4):116-119.
- Brunson, M.W. 1996a. A definition of "social acceptability" in ecosystem management. Pp. 7-16 In *Defining social acceptability in ecosystem management: a workshop proceedings*, edited by M. Brunson, L. Kruger, C. Tyler and S. Schroeder. Gen. Tech. Rep. PNW-GTR-369. Portland, OR: USDA Forest Service, Pacific Northwest Research Station.
- Brunson, M.W. 1996b. The social context of ecosystem management: Unanswered questions and unresolved issues. Pp. 113-126 In *Defining social acceptability in ecosystem management: a workshop proceedings*, edited by M. W. Brunson, L. E. Kruger, C. B. Tyler and S. A. Schroeder. Gen. Tech. Rep. PNW-GTR-369. Portland, OR: USDA Forest Service, Pacific Northwest Research Station.
- Brunson, M.W., and D.K. Reiter. 1996. Effects of ecological information on judgments about scenic impacts of timber harvest. *Journal of Environmental Management* 46 (1):31-41.

- Brunson, M.W., and J.J. Kennedy. 1995. Redefining "multiple use": Agency responses to changing social values. In *A New Century for Natural Resources Management*, edited by R. L. Knight and S. F. Bates. Washington, D.C.: Island Press.
- Brunson, M.W., B. Shindler, and B.S. Steel. 1997. Consensus and dissension among rural and urban publics concerning federal forest management in the Northwest. In *Public lands management in the West: citizens, interest groups and values*, edited by B. S. Steel. Westport, CT: Greenwood Press.
- Carpenter, E.H., J.G. Taylor, H.J. Cortner, P.D. Gardner, M.J. Zwolinski, and T.C. Daniel. 1986. Targeting audiences and content for forest fire information programs. *Journal of Environmental Education* 17 (3):33-42.
- Carroll, M.S., K.A. Blatner, F.J. Alt, E.G. Schuster, and A.J. Findley. 2000. Adaptation strategies of displaced Idaho woods workers: results of a longitudinal panel study. *Society and Natural Resources* 13 (2):95-104.
- Chambers, V. 1992-1993. Public involvement in fire management. *Fire Management Notes* 53-54 (2):8-9.
- Coglianesi, C. 1997. Assessing consensus: the promise and performance of negotiated rulemaking. *Duke Law Journal* 46:1225-1348.
- Collingridge, D., and C. Reeve. 1986. *Science speaks to power: the role of experts in policymaking*. New York, NY: St. Martin's Press.
- Cortner, H.J., M.A. Shannon, M.G. Wallace, S. Burke, and M.A. Moote. 1996. Institutional barriers and incentives for ecosystem management: a problem analysis. Gen. Tech. Rep. PNW-GTR-354. Seattle, WA: USDA Forest Service, Pacific Northwest Research Station.
- Cortner, H.J., M.G. Wallace, S. Burke, and M.A. Moote. 1998. Institutions matter: The need to address the institutional challenges of ecosystem management. *Landscape and Urban Planning* 40:159-166.
- Daniel, Terry C. 1990. Social/political obstacles and opportunities in prescribed fire management. Paper read at Effects of Fire Management of Southwestern Natural Resources, November 15-17, 1988, at Tucson, AZ.
- Devore, J., and R. Peck. 1986. *Statistics: The exploration and analysis of data*. Los Angeles, CA: West.

- DeWalt, B.R. 1994. Using indigenous knowledge to improve agriculture and natural resource management. *Human Organization* 53:123-131.
- Dillman, D.A. 1978. *Mail and telephone surveys: The total design method*. New York: John Wiley and Sons.
- Duram, L.A., and K.G. Brown. 1999. Assessing public participation in U.S. watershed planning initiatives. *Society and Natural Resources* 12 (5):455-467.
- Ehrenhalt, A. 1994. Let the people decide between spinach and broccoli. *Governing* 7 (10):6-7.
- Fiedler, C. 1992. New Forestry: Concepts and applications. *Western Wildlands* 17 (4):2-7.
- Firey, W. 1960. *Man, mind, and land*. Glencoe: IL: The Free Press.
- Force, J.E., and K.L. Williams. 1989. A profile of national forest planning participants. *Journal of Forestry* 87 (1):33-38.
- Frentz, I.C., D.E. Voth, S. Anderson, and W.F. Pell. 1997. A talk in the woods: An impartial advisory committee eases conflict on the Ouachita. *Journal of Forestry* 95 (6):26-31.
- Gardner, P.D., H.J. Cortner, K.F. Widaman, and K.J. Stenberg. 1985. Forest-user attitudes toward alternative fire management policies. *Environmental Management* 9 (4):303-312.
- Gericke, K.L., J. Sullivan, and J.D. Wellman. 1992. Public participation in National Forest Planning: Perspectives, procedures, and costs. *Journal of Forestry* 90 (2):35-38.
- Hall, F. C. 1980. Fire history-Blue Mountains Oregon. Pp. 75-81 In *Proceedings of the fire history workshop*. General Technical Report RM-181. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experimental Station.
- Hamilton, L., T. Rader, and D. Smith. 1973. Aesthetics and owner attitudes toward suburban forest practices. *Northern Logger* 22 (3):18-19 and 38-39.

- Hansis, R. 1995. The social acceptability of clearcutting in the Pacific Northwest. *Human Organization* 54 (1):95-101.
- Hoover, W.L., W.L. Jr. Mills, and S. Vasan. 1997. Nonindustrial private forest landowners in Indiana: are their objectives and attitudes consistent with ecosystem management? Paper read at Integrating social science and ecosystem management: a national challenges, December 12-14, 1995, at Helen, GA.
- Jacobson, M., E. Jones, and B. Abt. 1996. Landowner attitudes toward landscape-level management: challenges and policy implications. Paper read at 6th International Symposium on Society and Resource Management, May 18-23, 1996, at University Park, PA.
- Jamieson, D. 1994. Problems and prospects for a Forest Service program in the human dimensions of global change. Pp. 23-28 In *Breaking the mold: Global change, social responsibility, and natural resource management*, edited by K. Geyer and B. Shindler. U.S. Department of Agriculture, Forest Service research report. Corvallis, OR: Oregon State University.
- Kearney, A., G. Bradley, R. Kaplan, and S. Kaplan. 1999. Stakeholder perspectives of appropriate forest management in the Pacific Northwest. *Forest Science* 45 (1):62-72.
- Kennedy, J.J. 1985. Conceiving forest management as providing for current and future social value. *Forest Ecology and Management* 13:121-132.
- Kennedy, J.J., and J.W. Thomas. 1995. Managing natural resources as social value. In *A New Century for Natural Resources Management*, edited by R. L. Knight and S. F. Bates. Washington, D.C.: Island Press.
- King, J.B. 1993. Learning to solve the right problems: The case of nuclear power in America. *Journal of Business Ethics* 13:105-116.
- Kloppenborg, J.J. 1991. Social theory and de/reconstruction of agricultural science: local knowledge for an alternative agriculture. *Rural Sociology* 56:519-548.
- Knopp, T.B., and E.S. Caldebeck. 1990. The role of participatory democracy in forest management. *Journal of Forestry* 88 (5):13-18.

- Kuentzel, W.F., and T.A. Heberlein. 1992. Cognitive and behavioral adaptations to perceived crowding: a panel study of coping and displacement. *Journal of Leisure Research* 24 (4):377-393.
- Langston, Nancy. 1995. *Forest dreams, forest nightmares: The paradox of old growth in the inland west*. Edited by W. Cronon, Weyerhaeuser Environmental Books. Seattle: University of Washington Press.
- Lauber, T.B., and B.A. Knuth. 1999. Measuring fairness in citizen participation: a case study of moose management. *Society and Natural Resources* 12 (1):19-37.
- Lawrence, R.L., and S.E. Daniels. 1996. Public involvement in natural resource decision making: Goals, methodology, and evaluation. Corvallis, OR: Forest Research Laboratory, Oregon State University.
- Lawrence, R.L., S.E. Daniels, and G.H. Stankey. 1997. Procedural justice and public involvement in natural resource decision making. *Society and Natural Resources* 10:577-589.
- Lee, R. G. 1987. Community Fragmentation: Implications for Future Wildfire Management. In . *Symposium on Wildland Fire 2000*, edited by J. B. Davis and R. E. Martin. General Technical Report PSW-101. Berkeley, CA: USDA Forest Service, Pacific Southwest Forest and Range Experiment Station.
- Leeming, F.C., W.O. Dwyer, B.E. Porter, and M.K. Cobern. 1993. Outcome research in environmental education: A critical review. *Journal of environmental education* 24 (4):8-21.
- Lehman, D.R. 1989. *Market research and analysis*. 3 ed. Boston, MA: Irwin.
- Little, Charles. 1993. Smokey's revenge. *American Forests* 99 (5/6):24-25; 58-60.
- Loomis, J.B., L.S. Bair, and A. Gonzalez-Caban. 2001. Prescribed fire and public support: Knowledge gained, attitudes changed in Florida. *Journal of Forestry* 99 (11):18-22.
- Lynch, S. 1996. The Federal Advisory Committee Act: an obstacle to ecosystem management by federal agencies? *Washington Law Review* 71:431-459.
- Mackinson, S., and L. Nottestad. 1998. Combining local and scientific knowledge. *Reviews in Fish Biology and Fisheries* 8:481-490.

- Maiolo, J.R., J. Johnson, and D. Griffith. 1992. Application of social science theory to fisheries management: three examples. *Society and Natural Resources* 5 (4):391-407.
- Manfredo, M.J., M. Fishbein, G.E. Haas, and A.E. Watson. 1990. Attitudes toward prescribed fire policies: The public is widely divided in its support. *Journal of Forestry* 88 (7):19-23.
- McCool, S. F., and G. H. Stankey. 1986. Visitor attitudes toward wilderness fire management policy--1971-84. Research Paper INT-357 Ogden, UT: USDA Forest Service, Intermountain Research Station.
- McCool, S.F., R.E. Benson, and J.L. Ashor. 1986. How the public perceives the visual effects of timber harvesting: An evaluation of interest group preferences. *Environmental Management* 10 (3):385-391.
- Moore, S.A. 1996. The role of trust in social networks: Formation, function, and fragility. In *Nature Conservation 4: The Role of Networks*, edited by D. A. Saunders, J. Graig and E. M. Matiske. Chipping Norton, New South Wales, Australia: Surrey Beattty and Sons.
- Mutch, R. W., S. F. Arno, J. K. Brown, C. E. Carlson, R. D. Ottmar, and J. L. Peterson. 1993. Forest health in the Blue Mountains: A management strategy for fire-adapted ecosystems. Gen. Tech. Rep. PNW-GTR-310. Portland, OR: USDA Forest Service, Pacific Northwest Research Station.
- Newton, B.J. 2001. Environmental education and outreach: experiences of a federal agency. *Bioscience* 51 (4):297-300.
- Nielson, C., and T. Buchanan. 1986. A comparison of the effectiveness of two interpretive programs regarding fire ecology and fire management. *Journal of Interpretation* II (1):1-10.
- Olson, E.C., M.L. Bowman, and R.E. Roth. 1984. Interpretation and nonformal environmental education in natural resources management. *Journal of Environmental Education* 15 (4):6-10.
- Patey, R.C., and R.M. Evans. 1979. Identification of scenically preferred forest landscapes. Pp. 532-538 In *Proceedings: Our national landscape: a conference on applied techniques for analysis and management of the visual resource*, at Berkely, CA.

- Peters, R.G., V.T. Covello, and D.B. McCallum. 1997. The determinants of trust and credibility in environmental risk communication: An empirical study. *Risk Analysis* 17 (1):43-54.
- Pierce, J.C., N.P. Lovrich, Jr., T. Tsuruntani, and T. Abe. 1989. *Public knowledge and environmental politics in Japan and the United States*. Boulder, CO: Westview Press.
- Ravetz, J. 1987. Uncertainty, ignorance, and policy. Pp. 77-94 In *Science for Public Policy*, edited by H. Brooks and C. L. Cooper. New York, NY: Pergamon Press.
- Ribe, R. 1999. Regeneration harvests versus clearcuts: Public views of the acceptability and aesthetics of Northwest Forest Plan harvests. *Northwest Science* 73:102-117.
- Rutherford, W., and E.L. Shafer. 1969. Selection cuts increased beauty in two Adirondack Forest stands. *Journal of Forestry* 67:415-419.
- Schuh, D. 1995. Managing esthetic values. *Journal of Forestry* 93 (2):20-25.
- Selin, S.W., M.A. Schuett, and D.S. Carr. 1997. Has collaborative planning taken root in the national forests? *Journal of Forestry* 95 (5):25-28.
- Shannon, M.A. 1990. Building trust: The formation of a social contract. Pp. 229-240 In *Community and Forestry: Continuities in the Sociology of Natural Resources*, edited by R. G. Lee, D. R. Field and J. W.R. Burch. Boulder: Westview Press.
- Shelby, B., and R.W. Speaker. 1990. Public attitudes and perceptions about prescribed burning. In *Natural and Prescribed Fire in Pacific Northwest Forests*, edited by J. D. Walstad, S. R. Radosovich and D. V. Sandberg. Corvallis, OR: Oregon State University Press.
- Shindler, B., and A. Wright. 2000. Watershed management in the central Cascades: A study of citizen knowledge and the value of information sources in the lower South Santiam basin. Corvallis, OR: Department of Forest Resources, Oregon State University.
- Shindler, B., and B. Shelby. 1995. Product shift in recreation settings: Findings and implications from panel research. *Leisure Sciences* 17:91-107.

- Shindler, B., and J. Neburka. 1997. Public participation in forest planning: Eight attributes of success. *Journal of Forestry* 95 (1):17-19.
- Shindler, B., and J. Wilton. 2002. Citizen survey of federal forest conditions and ecosystem health. Draft Research Report. Corvallis, OR: Department of Forest Resources, Oregon State University.
- Shindler, B., and K.A. Cheek. 1999. Integrating citizens in adaptive management: A propositional analysis. *Conservation Ecology* 3 (1):9.
- Shindler, B., and M. Reed. 1996. Forest management in the Blue Mountains: Public perspectives on prescribed fire and mechanical thinning. Corvallis, OR: Department of Forest Resources, Oregon State University.
- Shindler, B., and P. Collson. 1998. Assessing public preferences for ecosystem management practices. In *Ecosystem Management: A Social Science Perspective*, edited by D. Soden and B. L. Lamb. Commack, N.Y.: Nova Science.
- Shindler, B., B. Steel, and P. List. 1996. Public judgments of adaptive management: A response from forest communities. *Journal of Forestry* 94 (6):4-12.
- Shindler, B., K. Aldred-Cheek, and G. H. Stankey. 1999. Monitoring and evaluating citizen-agency interactions: a framework developed for adaptive management. GTR PNW-GTR-452. Portland, OR: USDA Forest Service, Pacific Northwest Research Station.
- Shindler, B., P. List, and B. Steel. 1993. Managing federal forests: Public attitudes in Oregon and nationwide. *Journal of Forestry* 91 (7):36-42.
- Shindler, B.A. 2000. Landscape-level management: it's all about context. *Journal of Forestry* 98 (12):10-14.
- Shindler, B.A., and K. O'Brian. 1998. Citizen survey of public involvement in federal forest management. Research Summary. Corvallis, OR: Department of Forest Resources, Oregon State University.
- Shindler, B.A., M. Brunson, and G.H. Stankey. 2002. Social acceptability of forest conditions and management practices: a problem analysis. Gen. Tech. Rep. PNW-GTR-537. Portland, OR: USDA Forest Service, Pacific Northwest Research Station.

- Stankey, G. H. 1976. Wilderness fire policy: An investigation of visitor knowledge and beliefs. Research Paper INT-180. Ogden, UT: USDA Forest Service, Intermountain Forest and Range Experiment Station.
- Stankey, G. H., and B. Shindler. 1997. Adaptive management areas: Achieving the promise, avoiding the peril. General Technical Report, PNW-GTR-394. Portland, OR: USDA Forest Service, Pacific Northwest Research Station.
- Stankey, G. H., B. T. Bormann, C. Ryan, B. Shindler, V. Sturtevant, and C. Philpot. 2002. Learning to learn: Adaptive management and the Northwest Forest Plan. Draft Research Report. Portland, OR: USDA Forest Service, Pacific Northwest Research Station.
- Stankey, G.H. 1995. The pursuit of sustainability: joining science and public choice. *The George Wright Forum* 12 (3):11-18.
- Stankey, G.H. 1996. Defining the social acceptability of forest management practices and conditions: Integrating science and social choice. Pp. 99-112 In *Defining Social Acceptability in Ecosystem management: A Workshop Proceedings*, edited by M. W. Brunson, L. E. Kruger, C. B. Tyler and S. A. Schroeder. Gen. Tech. Rep. PNW-GTR-369. Portland, OR: US Department of Agriculture, Forest Service, Pacific Northwest Research Station.
- Steel, B.S., N.P. Lovrich, and J.C. Pierce. 1992-3. Trust in natural resource information sources and postmaterialist values: A comparative study of U.S. and Canadian citizens in the Great Lakes area. *Journal of Environmental Systems* 22 (2):123-136.
- Steel, B.S., P. List, and B. Shindler. 1997. Managing federal forests: National and regional public orientations. Pp. 17-31 In *Public Lands Management in the West: Citizens, Interest Groups, and Values*, edited by B. S. Steel. Westport, CT: Praeger.
- Tanaka, J. A., G. L. Starr, and T. M. Quigley. 1995. Strategies and recommendations for addressing forest health issues in the Blue Mountains of Oregon and Washington. General Technical Report. PNW-GTR-350. Portland, OR: USDA Forest Service, Pacific Northwest Research Station.
- Taylor, J.G., and T.C. Daniel. 1984. Prescribed fire: Public education and perception. *Journal of Forestry* 82 (6):361-365.

- van Es, J.C., D.P. Lorence, G.W. Morgan, and J.A. Church. 1996. Don't know responses in environmental surveys. *The Journal of Environmental Education* 27 (4):13-18.
- Veverka, J. 1996. Interpretation as a management tool. *InterpEdge* 3 (1):22-23.
- Vining, J., and H.W. Schroeder. 1987. Emotions in environmental decision making: Rational planning versus the passionate public. Pp. 181-192 In *Social Science in Natural Resource Management Systems*, edited by M. L. Miller, R. P. Gale and P. J. Brown. Boulder: Westview Press.
- Vogt, C.A., and S.I. Stewart. 2001. Response problems in a vacation panel study. *Journal of Leisure Research* 33 (1):91-106.
- Wakimoto, R.H. 1989. National fire management policy: a look at the need for change. *Western Wildlands* 15 (2):35-39.
- Walesh, S.G. 1999. DAD is out, POP is in. *Journal of the American Water Resources Association* 35:535-544.
- Wickman, B. E. 1992. Forest health in the Blue Mountains: The influence of insects and diseases. PNW-GTR-295. Portland, OR: USDA Forest Service Pacific Northwest Research Station.
- Williams, R. 2001. Public knowledge, preferences and involvement in adaptive ecosystem management. M.S. thesis, Department of Forest Resources, Oregon State University, Corvallis, OR.
- Winter, G.J., C. Vogt, and J.S. Fried. 2002. Fuel treatments at the wildland-urban interface: common concerns in diverse regions. *Journal of Forestry* 100 (1):15-21.
- Wondolleck, J.M., and S.L. Yaffee. 1994. Building bridges across agency boundaries: In search of excellence in the United States Forest Service. Research Report PNW 92-0215. Seattle, WA: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.
- Wynne, B. 1987. Uncertainty-technical and social. Pp. 95-111 In *Science for Public Policy*, ed. H. Brooks and C. L. Cooper. New York, NY: Pergamon Press.

- Yaffee, S.L. 1996. Ecosystem management in practice: the importance of human institutions. *Ecological Applications* 63 (3): 724-727.
- Yaffee, S.L., and J.M. Wondolleck. 1997. Building bridges across agency boundaries. Pp. 381-396 In *Creating a Forestry for the 21st Century*, ed. K. A. Kohm and J. F. Franklin. Washington, D.C.: Island Press.
- Yankelovich, D. 1991. *Coming to public judgment: making democracy work in a complex world*. Syracuse, NY: Syracuse University Press.
- Zelezny, L.C. 1999. Educational interventions that improve environmental behaviors: A meta-analysis. *Journal of Environmental Education* 31 (1):5-14.

APPENDIX: SUMMARY OF SURVEY RESPONSES

Citizen Survey of Forest Practices in the Blue Mountains



**Oregon State University
Department of Forest Resources
Corvallis, OR**

Principal Investigator:

Bruce Shindler
Associate Professor – Senior Research

Research Assistant:

Eric Toman
Department of Forest Resources
Oregon State University

This preliminary report summarizes responses to a mail survey of citizens in the Blue Mountains of eastern Oregon and Washington who participated in a similar study in 1996. Overall, 423 individuals were re-contacted and 321 completed the survey for a 76% response rate. This report provides a summary of frequency distributions only. Some categories for questions have been collapsed for presentation purposes (eg. *strongly agree* and *agree* responses were combined into a single category). Significant differences in responses from 1996 to 2000 are indicated for each question when differences occurred at $p < .05$ (*) or $p < .01$ (**).

- I. This section contains questions asked in both the 2000 and the 1996 surveys and presents data from both sets of responses. An additional series of questions was asked in 2000 with these findings reported on Pages 11-15.**

1. How much attention do you pay to national forest issues or problems?

	Not Much	Moderate Amount	A Great Deal
2000	10%	39%	51%
1996	8%	35%	57%

2. How well informed would you say you are about forest conditions in the Blue Mountains?

	Not Informed	Moderately Informed	Very Informed
2000	18%	42%	40%
1996	12%	43%	45%

3. Forest health problems have been described as large amounts of trees dying from disease, infestation or drought. How would you rate the overall condition of the forests in....

..... the Blue Mountains in general?**

	2000	1996
very healthy	2%	1%
somewhat healthy	37%	22%
somewhat unhealthy	40%	47%
very unhealthy	11%	22%
don't know	10%	8%

..... your area specifically?**

	2000	1996
very healthy	4%	2%
somewhat healthy	39%	28%
somewhat unhealthy	36%	45%
very unhealthy	12%	21%
don't know	9%	5%

4. How useful are the following sources of information for you concerning national forest management in the Blue Mountains? By "useful" we mean sources that you pay attention to and that provide good information.

		----Level of Usefulness----	
		Moderate/ High	None/ Slight
a. Newspapers or magazines	2000	72%	28%
	1996	72%	28%
b. Radio station	2000	35%	65%
	1996	40%	60%
c. Television programs	2000	46%	54%
	1996	56%	44%
d. Friends or relatives	2000	56%	44%
	1996	60%	40%
e. Forest Service programs**	2000	48%	52%
	1996	60%	40%
f. Environmental groups	2000	24%	76%
	1996	17%	83%
g. Timber groups**	2000	50%	50%
	1996	39%	61%
h. University researchers/educators	2000	42%	58%
	1996	38%	62%
i. Internet	2000	13%	87%
	1996	8%	92%

5. Many federal forest management issues involve difficult trade-offs between natural environmental conditions (wildlife, old growth forests) and economic considerations (employment, tax revenues). **Where would you locate yourself on the following scale concerning these issues?**

	2000	1996
Highest priority should be given to maintaining natural environmental conditions even if there are negative economic consequences.	19%	21%
Both environmental and economic factors should be given equal priority.	42%	40%
Highest priority should be given to economic considerations even if there are negative environmental consequences.	39%	39%

The Use of Prescribed Fire

6. Below are sets of opposing statements about the use of **prescribed fire** (definition on cover letter). **Place an "X" on the space that most closely reflects your agreement about the two statements.** You are not being judged on right or wrong answers, we want your opinions. Base your answers on what you believe to be true. If you truly feel you don't know enough about an item to give an opinion, write the letters DK (for don't know) on the lines for that set of statements.

(Percentages given may not equal 100% because of "don't know" responses. These responses did not represent significant values and were left out for presentation purposes.)

Prescribed fire:		Agree	Neutral	Agree	
decreases the chance of high-intensity wildfires	2000 1996	73% 73%	11% 9%	15% 16%	has little overall effect on wildfire intensity or frequency.
effectively reduces the amount of excess fuels in the forest.	2000 1996	68% 72%	10% 9%	20% 16%	causes more damage than benefits provided from reducing fuels.
is of little or no threat to nearby property and forest land.	2000 1996	33% 41%	25% 21%	41% 34%	is a big threat to nearby property and forest land.
effectively keeps insects and diseases at minimum levels by maintaining healthy trees.	2000 1996	61% 72%	19% 10%	18% 13%	causes more damage than benefits provided from getting rid of insects and disease.
stimulates the growth of native grasses for wildlife and livestock. **	2000 1996	75% 85%	11% 7%	10% 3%	severely damages the growth of native grasses. **
releases useful minerals and nutrients into soil.	2000 1996	64% 72%	22% 15%	7% 9%	creates ash that is detrimental to soil conditions.
encourages growth of plants best suited to natural ecosystem. *	2000 1996	69% 78%	17% 10%	10% 7%	causes long-term damage to natural plant ecosystems. *
causes acceptable short-term impacts to water quality and fish habitat.	2000 1996	60% 67%	20% 15%	14% 13%	causes an unacceptable decline in water quality and fish habitat.

		Agree	Neutral	Agree	
creates acceptable changes in native wildlife habitat.	2000	61%	15%	20%	causes unacceptable damage to critical wildlife habitat.
	1996	72%	11%	14%	
smoke levels are acceptable if it means a healthier forest.	2000	58%	23%	17%	results in smoke that decreases air quality to unacceptable levels.
	1996	68%	13%	17%	
causes only short-term damage to scenic beauty.	2000	70%	14%	14%	causes long-term damage to scenic beauty of forest land.
	1996	74%	7%	17%	
has acceptable short-term effects on recreation uses.	2000	68%	15%	15%	has unacceptable long-term effects on recreation uses.
	1996	72%	12%	13%	
is a legitimate management tool.	2000	65%	17%	15%	is an untested system with too many risks.
	1996	71%	12%	13%	
is a safe management tool.	2000	60%	22%	16%	is too dangerous to be used.
	1996	68%	15%	15%	
overall, the benefits of prescribed fire are worth it.	2000	62%	16%	20%	overall, the risks and impacts of prescribed fire are too great.
	1996	66%	13%	19%	
protecting timber for harvest should not be a consideration.	2000	22%	37%	37%	unnecessarily reduces the amount of harvestable timber.
	1996	21%	42%	31%	
I trust the Forest Service to implement a responsible and effective prescribed fire program.*	2000	43%	21%	34%	I do not trust the Forest Service to implement a responsible and effective prescribed fire program.*
	1996	52%	21%	25%	

7. In my opinion, prescribed fire in the Blue Mountains:

	2000	1996
... is a legitimate management tool that the Forest Service should have the discretion to use for improving forest conditions.	39%	44%
... should be used sparingly by the Forest Service and only in carefully selected areas.	50%	45%
... creates too many impacts and should not be considered as a management alternative.	7%	6%
... is unnecessary and should not be utilized.	4%	5%

8. When you see smoke in the distance can you distinguish if it is from a prescribed fire used for forestry purposes or one used for agricultural purposes (field burning)?*

	2000	1996
Yes	40%	45%
No	41%	31%
Not Sure	20%	24%

The Use of Mechanized Thinning

9. Below are sets of opposing statements about **mechanized selective thinning** (definition on cover letter). As before, place an "X" (or DK for don't know) on the space that most closely reflects your agreement about the statements. You are not being judged on right or wrong answers; we want your opinions.

(Percentages given may not equal 100% because of "don't know" responses. These responses did not represent significant values and were left out for presentation purposes.)

Mechanized selective thinning:		Agree	Neutral	Agree	
decreases the chance of high-intensity wildfires.	2000	81%	7%	11%	has little overall effect on wildfire intensity or frequency.
	1996	79%	5%	13%	
effectively reduces the amount of excess fuels in the forest.	2000	76%	11%	7%	causes more damage than benefits provided from reducing fuels.
	1996	79%	7%	9%	
effectively keeps insects and diseases at minimum levels by maintaining healthy trees.	2000	76%	11%	9%	causes more damage than benefits provided from getting rid of insects and diseases.
	1996	78%	10%	9%	
soil erosion is minimal and impacts on water quality and fish habitat are acceptable.	2000	64%	15%	13%	causes soil erosion with unacceptable impacts on water quality and fish habitat.
	1996	63%	14%	16%	
soil compaction is minimal and impacts on tree and plant regeneration are acceptable.	2000	68%	18%	7%	causes unacceptable levels of soil compaction that harm tree and plant regeneration.
	1996	65%	13%	14%	
causes little or no damage to natural ecosystems.	2000	65%	21%	7%	causes severe damage to natural ecosystems.
	1996	65%	17%	12%	
creates acceptable changes in native wildlife habitat.	2000	70%	15%	10%	causes unacceptable damage to critical wildlife habitat.
	1996	72%	13%	12%	
causes little or no impacts to scenic beauty of forest land.	2000	68%	16%	12%	causes long-term damage to scenic beauty of forest land.
	1996	68%	13%	16%	
has acceptable short-term effects on recreation uses.	2000	74%	13%	9%	has unacceptable long-term effects on recreation uses.
	1996	79%	7%	10%	
is a legitimate management tool.	2000	84%	8%	3%	is an untested system with too many risks.
	1996	80%	13%	4%	
is a legitimate tool for removing harvestable timber.	2000	82%	8%	7%	timber harvesting should not be a consideration.
	1996	83%	5%	10%	
overall benefits of mechanized selective thinning are worth it.	2000	76%	14%	6%	overall impacts of mechanized selective thinning are too great.
	1996	76%	12%	9%	
I trust the Forest Service to implement a responsible and effective mechanized thinning program.	2000	52%	21%	26%	I do not trust the Forest Service to implement a responsible and effective mechanized thinning program.
	1996	59%	15%	24%	

10. In my opinion, mechanized selective thinning in the Blue Mountains: (select the best answer)

	2000	1996
... is a legitimate management tool that the Forest Service should have the discretion to use for improving forest conditions.	69%	68%
... should be used sparingly by the Forest Service and only in carefully selected areas.	28%	28%
... creates too many impacts and should not be considered as a management alternative.	2%	2%
... is unnecessary and should not be used.	1%	1%

11. Please indicate your preference for treating the existing build up of dead trees in the Blue Mountains.

	2000
use selective thinning only	20%
use prescribed fire only	1%
selective thinning first, then follow with prescribed fire	75%
nothing, let nature take its course	4%

[In 1996 the question was phrased differently. The combined thinning first, then prescribed fire alternative was not included.]

Please rank your preference for treating the existing build up of dead trees in the Blue Mountains.

	1996
selective thinning projects	77%
prescribed fire	15%
nothing, let nature take its course	7%

Interactions with the Forest Service

12. Recently there has been considerable debate over efforts to increase citizen participation in federal forest management. Where would you place yourself regarding these efforts?

	2000	1996
Citizen participation is of little or no value and adds needlessly to the cost of government.	10%	14%
Neutral	25%	21%
Citizen participation is of moderate or great value even if it adds to the cost of government.	65%	65%

13. In your opinion, a realistic role for the public in federal forest management should be:

	2000	1996
... none, let resource professionals (Forest Service, BLM) make decisions.	4%	6%
... provide suggestions and let the resource professionals decide.	26%	28%
... serve on advisory boards that review and comment on decisions.	41%	34%
... act as a full and equal partner in making management decisions.	21%	24%
... the public should make the decisions and resource professionals should carry them out.	8%	8%

14. Forest agencies often interact with local communities. Please give us your opinion about your experiences and interactions with forest management agencies.

		agree/ strongly agree	neutral	disagree/ strongly disagree
Agencies like the Forest Service are open to public input and use it to shape forest management decisions.**	2000	31%	27%	42%
	1996	41%	25%	34%
Forest managers usually create plans without input from local communities surrounding national forests.**	2000	46%	24%	30%
	1996	55%	23%	22%
Federal forest managers build trust and cooperation with citizens so that people will feel that the agency is acting in their best interest.	2000	23%	25%	52%
	1996	N/A	N/A	N/A
Our federal forest management systems need major changes, not just minor adjustments.	2000	62%	23%	15%
	1996	59%	24%	18%
The Forest Service does a good job of providing information about their management activities.*	2000	27%	29%	43%
	1996	33%	33%	35%
The Forest Service should provide a stronger leadership role.	2000	49%	35%	17%
	1996	54%	32%	14%
I trust the local Blue Mountains Forest Service staff, but I don't trust government at the national level to let them do their job.	2000	65%	19%	16%
	1996	N/A	N/A	N/A
Local Forest Service staff are prohibited from doing their job because of national restrictions and regulations.	2000	68%	24%	8%
	1996	N/A	N/A	N/A
The Forest Service contributes to public knowledge by educating communities about potential benefits and costs of proposed plans.	2000	33%	37%	30%
	1996	N/A	N/A	N/A

15. To help forest managers make decisions, please tell us how you feel about the following:

		agree/ strongly agree	neutral	disagree/ strongly disagree
a.	Following nature's way is preferable to human intervention in ecosystems.	2000 28%	23%	49%
		1996 30%	13%	57%
b.	All fires, regardless of origin, should be put out as soon as possible.	2000 34%	17%	49%
		1996 30%	14%	57%
c.	I usually have difficulty knowing which is burning -- a wildfire or a prescribed fire.**	2000 54%	15%	31%
		1996 40%	20%	40%
d.	In my area, smoke levels from fire are not a problem for me or my family.**	2000 61%	15%	24%
		1996 76%	10%	14%
e.	Prescribed fire should not be used because of potential health problems from smoke.**	2000 14%	26%	61%
		1996 12%	17%	71%
f.	Prescribed fires waste trees that should be used for wood products.*	2000 36%	21%	44%
		1996 43%	24%	33%
g.	Scientific experimentation with prescribed fire is appropriate on insect infested sites.	2000 74%	15%	11%
		1996 73%	16%	11%
h.	Scientific experimentation with selective thinning is appropriate on insect infested sites.	2000 86%	9%	5%
		1996 84%	12%	4%
i.	Selectively thinning dead and dying trees is better than leaving them in the forest.	2000 87%	7%	7%
		1996 88%	7%	5%
j.	Reliable knowledge about forest ecosystems is lacking.	2000 44%	33%	24%
		1996 46%	26%	29%

II. The following section displays frequencies of questions asked only in the 2000 survey.

- 16. Please answer the following questions to the best of your ability by indicating whether you believe the answer is generally true, generally false, or that you are not sure.**

	Generally True	Generally False	Not Sure
-----Fire-----			
a. Fires have played a significant role in shaping natural forests in the Blue Mountains.	66%	13%	22%
b. Prescribed fires make additional minerals and nutrients available for plants and trees.	67%	12%	21%
c. Prescribed fires cause the immediate death of the majority of animals in the burned area.	7%	80%	13%
d. Prescribed fires result in the death of the majority of large, established trees in the burned area.	15%	74%	11%
e. Prescribed fires promote the growth of plants that serve as food for deer and elk.	84%	9%	7%
f. Prescribed fires result in an increased number of animals in the burned area for the first few years.	42%	27%	32%
g. Prescribed fires kill most of the small, young trees and vegetation beneath the forest canopy.	51%	30%	19%
h. Prescribed fires encourage tree growth in Ponderosa Pine forests.	56%	10%	34%
i. Prescribed fire is effective in controlling noxious weeds.	52%	24%	24%
-----Thinning-----			
j. Selective thinning can be effective in controlling outbreaks of insects and disease.	78%	7%	15%
k. Selective thinning reduces competition for minerals and nutrients on crowded sites.	80%	7%	13%
l. Selective thinning mimics natural conditions by providing openings in the forest canopy.	74%	9%	17%
m. Selective thinning causes the immediate death of the majority of animals in the thinned area.	2%	89%	9%
n. Selective thinning encourages tree growth in Ponderosa Pine forests.	70%	6%	24%
o. Selective thinning results in decreased habitat for deer and elk.	13%	77%	11%
p. Selective thinning results in the death of the majority of the remaining trees on the site.	3%	90%	8%

17. The use of **prescribed fire** may create concerns for some people in forest communities.
Please indicate how you feel about the following regarding the use of **prescribed fire**.

	Moderate concern/ Great concern	Not a concern/ Slight concern
a. Damage to private property.	59%	41%
b. Economic loss of useable timber.	49%	51%
c. Loss of wildlife and fish habitat.	44%	57%
d. Risk to human safety.	42%	58%
e. Increased levels of smoke.	41%	59%
f. Effects on recreation opportunities.	39%	61%
g. Deteriorated public water supply.	38%	62%

Smoke Issues

18. Even though **prescribed fires** are planned in order to minimize the amount of smoke produced, some increase in smoke levels is unavoidable. We would like to know what levels of smoke are acceptable to you and what is the amount of time that you could tolerate the increase. Place an "X" on the appropriate line to indicate the length of time each different smoke intensity would be tolerable to you.

	-----Acceptable Length of Time-----					
-----Visiblity-----	Not Acceptable	A Few Hours	One Day	Three Days	One Week	More than One Week
e. Smoke plumes visible in the distance, but no decrease in visual quality near my residence or workplace.	5%	8%	13%	14%	16%	44%
f. Light haze visible on the horizon and some decrease in visual quality, but not enough to affect my activities.	6%	8%	14%	17%	20%	36%
g. Smoke is apparent near my residence or workplace and visual quality has decreased to the point that some activities are affected.	22%	16%	24%	17%	15%	6%
h. High levels of smoke have caused poor visual quality that affects my ability to do many activities.	42%	21%	17%	12%	6%	3%
-----Odor/Breathability-----						
e. Smoke plumes visible in the distance, but I cannot smell smoke when I breathe.	3%	10%	11%	13%	16%	47%
f. Occasionally I can smell smoke, but it doesn't affect me otherwise.	7%	12%	11%	16%	20%	34%
g. I notice the smoke slightly when I breathe.	13%	23%	19%	15%	19%	11%
h. Smoke is highly noticeable each time I breathe, even indoors.	52%	19%	15%	8%	4%	3%

19. The presence of smoke from forest fires can affect people in several ways. **If the use of prescribed fire led to increased smoke levels in your area, how concerned would you be about the following effects?**

	Moderate concern/ Great concern	Slight concern/ Not a concern
a. Health effects	71%	29%
b. Unpleasant odors	52%	49%
c. Reduced visibility	50%	50%
d. Lower recreation/tourism quality	42%	58%

20. On burn days smoke may accumulate. **Do you have a preference for what type of burning is more acceptable? (check one)**

agricultural/field burning	20%
forest fuels reduction burning (prescribed fire)	31%
don't care	36%
don't want any smoke	13%

21. **Do you, or anyone in your household, suffer from a respiratory ailment?**

No	66%
Yes	32%
Don't Know	2%

Forest Service Information Programs

22. The Forest Service has used various programs to provide information about management actions such as fire prevention, prescribed burning, and thinning hazardous fuels. We want to know how useful the following information programs have been to you.

Information Program	No Basis for Opinion	Level of Usefulness ^a				
		Moderate/ High	None/ Some	Easy to Understand ^a	Trustworthy Source ^a	Convenient ^a
n. Smokey Bear message	10%	76%	24%	99%	91%	97%
o. Elementary school educational programs	50%	70%	30%	94%	74%	88%
p. Conversations with agency personnel	36%	68%	32%	79%	72%	56%
q. Interpretative signs or materials at visitor centers or along trails	25%	66%	35%	97%	84%	88%
r. Guided field trip to forests	56%	62%	39%	93%	76%	48%
s. Television messages	30%	55%	45%	91%	62%	91%
t. Regular newsletters	46%	54%	46%	84%	68%	84%
u. Prescribed fire brochures	48%	53%	47%	82%	69%	62%
v. Exhibits at State/County fairs	39%	47%	52%	95%	82%	79%
w. Forest Service public meetings	46%	46%	54%	76%	62%	47%
x. Environmental impact statements	36%	33%	67%	24%	29%	29%
y. Informational videos	61%	33%	67%	82%	54%	53%
z. Forest Service internet web pages	67%	26%	74%	68%	49%	48%

^a (Percentages reflect responses from individuals who had an opinion about the specific program.)

Effects of Los Alamos

23. Did you hear about the forest fires at Los Alamos, New Mexico this past spring?

NO	7%
YES	93%



23-a. Did the fires in Los Alamos influence how you feel about the use of prescribed fire?

NO	51%
YES	49%



23-b. Please check all that apply regarding your current feelings concerning the use of prescribed fire.

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| • feel more negative about its use | 20% |
| • feel more positive about its use | 4% |
| • want to know more about its purpose and/or implementation | 11% |
| • feel more skeptical about the ability of natural resource agencies (such as the Forest Service or the Park Service) to effectively implement a prescribed fire program | 52% |

24. I think that the Los Alamos case was an isolated incident that should not keep prescribed fires from being used in the Pacific Northwest. Do you agree or disagree with this statement? (circle one number)

Strongly agree/Somewhat agree	65%
Don't know	8%
Strongly disagree/Somewhat disagree	28%

Demographic Information

26. Sex:		2000	27. Age:	2000
	Male:	84%		59 years (average)
	Female:	16%		

27. What is the highest level of formal education that you have completed?

	2000
Some high school	4%
High school graduate	22%
Some college	40%
Bachelor's degree	14%
Some graduate school	6%
Completed graduate degree	13%

28. What was your approximate household income from all sources in the previous year?

2000	1996
\$40,000 to \$49,999 (mean income)	\$40,000 to \$49,999 (mean income)

29. Are you retired?	2000	1996
Yes	43%	32%

30. Do you or any of your immediate family depend on the following industries for your economic livelihood? (If retired, did you depend on any of them?)

	2000	1996
Timber	30%	33%
Ranching	23%	22%
Farming	34%	28%
Fishing	4%	4%
Hydro-electric	7%	5%
Tourism/recreation	11%	9%
Special forest products	8%	10%

31. Are you a member of an organization interested in public lands issues such as timber management, recreation use or environmental protection?

	2000	1996
Timber or commodity group*	5%	10%
Environmental group	5%	5%
Watershed council	2%	N/A
Recreation group	9%	13%
Farm or rangeland group	12%	N/A

32. Years of residency in the Blue Mountains region:	2000
	41 years (average)