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**The Use of Prescribed Fire:  
Identifying Perspectives and the Resulting  
Policy Implications**

By

Michelle Dawn Byington Anderson

B.S. Agriculture

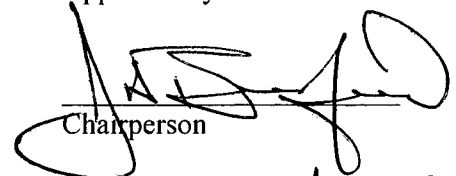
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Approved by:



Chairperson



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The Use of Prescribed Fire: Identifying Perspectives and the Resulting Policy Implications (174 pp.)

Chair: James A. Burchfield



Natural resource policy is intended to provide direction for public land management, and prescribed fire policy offers guidelines for the incorporation of fire use into those activities. Public policy is generally expected to manifest political will or public interest. The purpose of this study was to identify different perspectives on the use of prescribed fire using a Delphi exercise and content analysis, and to evaluate the treatment of those perspectives within the current prescribed fire policy.

Four main components of prescribed fire as a management strategy emerged: the process to identify goals, goals for prescribed fire use, geographic priorities and scale of activities, and potential constraints on the use of prescribed fire. Contrasting perspectives emerged regarding the function of scientific information in management, public involvement in goal-setting, federal responsibility in wildland-urban interface areas, prioritization of ecological and human concerns, the appropriate extent of management activities, the use of fire in wilderness, the timing of prescribed burn applications, and economic gains attached to management activities. The prescribed fire policy, reviewed and updated in January 2001, addresses many of the concerns identified by Delphi respondents, and in some cases advances a particular perspective over others. The policy advocates management strategies fundamentally based on science, traditional involvement strategies, local and state government responsibility in the wildland-urban interface, landscape scale application, and "in-season" burning. Other concerns or concepts expressed by Delphi respondents are not addressed, including public acceptability, the prioritization of goals, the uncertainty of scientific knowledge, and manager accountability for potential prescribed fire damage.

The prescribed fire policy succeeds in presenting broad guidelines for the use of fire, and incorporates some of the increasingly prevalent, abstract concepts in natural resource management, including sustainability and forest health. The policy emphasizes those issues that are of particular salience to the federal agencies themselves, with little attention paid to more external concerns. In describing the broad directives, the policy fails to provide guidelines for actually implementing those directives. Specific policy positions are sacrificed in favor of broad-reaching philosophies, resulting in ambiguity regarding many respondent perspectives.

## **Acknowledgements**

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# The Use of Prescribed Fire: Identifying Perspectives and the Resulting Policy Implications

## Chapter 1: Introduction

*“The challenge of managing wildland fire in the United States is increasing in complexity and magnitude. Catastrophic wildfire now threatens millions of wildland acres, particularly where vegetation patterns have been altered by past land-use practices and a century of fire suppression. Serious and potentially permanent ecological deterioration is possible where fuel loads exceed historical conditions. Enormous public and private values are at high risk, and our nation’s capability to respond to this threat is becoming overextended.”*

*Federal Wildland Fire Management Program and Policy Review (USDA and USDI 1995)*

The philosophies guiding natural resource management have witnessed a considerable shift in recent years. The concept of technocratic management that founded land management agencies has been criticized as ineffective and exclusionary, catering to a few select interests that include economically-based extractive industries and, more recently, ecologically-based scientific interests (Cortner and Moote 1999, Klyza 1996). Natural resource professionals emerged during a time when rational, neutral, fact-based science was being advanced as the appropriate basis for decision-making (Hays 1959, Cortner 1996). Resource managers became the experts acting in the public interest, and professionalism was defined as the neutral expert who bases decisions solely on empirical measures and is in no way impacted by political ideology (Cortner 1996). Management, however, is by necessity a social and political process. Resource planning and management decisions are inherently political exercises, involving value-based choices among several competing perceptions of the public interest; however, the tendency to treat resource decisions simply as technical problems persists (Cortner 1996).

In order to be truly sustainable, resource management must be socially acceptable, receiving the support of the public for whom federal lands are managed. Forest resource policy objectives must be closely related to the general objectives, attitudes, and values of society itself (Cubbage et al 1993). Frequently in resource management, presumptions are made about what the best course of action is to achieve some predetermined appropriate outcome. These questions about what should be done, how it should be done, and why it should be done are often addressed by some designated group of experts, though recent controversy has demonstrated that these decisions are impacted by judgements of social acceptability. As a result, new strategies for improved public involvement are being discussed. There has been a renewed interest in bringing a multitude of values and perspectives into natural resource management activities and designing resource policies that integrate a variety of goals and objectives (USDA Forest Service 2000, Johnson et al 1999).

Hailed as a new paradigm in resource management, these shifting ideas of land management can be expected to impact the way that resource policies are formulated. Creating a “corporatist model” or a collective of interests (versus a competition of interests) may provide a means to improve institutions and alter policy patterns, over time re-defining the relationship between the agencies and the public in a way more consistent with new management goals (Klyza 1996). However, little study has been done regarding the emergence of these principles of inclusion and representation in national resource policy, or more specifically, national fire policy. The policy statement above reflects the essence of fire policy in recent years, and explains the context in which demands for increased prescribed fire activities have emerged. This exploratory study

investigates interests and concerns held by several stakeholders impacted by prescribed fire activities, and evaluates the current prescribed fire policy in the context of those identified perspectives. The geographic focus of the study is on the interior west, which is particularly affected by federal fire management policies due to its vast tracts of public land, expanding wildland-urban interface areas, and preponderance of fire-evolved ecosystems. The policy focus is national, because although specific plans, actions, and practices on federal land are often contested, the larger, national policy provisions ostensibly guide those activities; federal lands dominate the west as a region, but their administration is a national issue. Thus, inclusiveness or the opportunity for inclusion must come from those national guidelines. This effort attempts to define what the policy is intended to accomplish, how it intends to accomplish it, and what viewpoints are represented.

The views and concerns of various interests are generally represented by what political officials and important social leaders define as public opinion (Ellefson 1992). The policy process and debate about policy options is then framed within these ideas about public opinion. Political leaders may formally check the sentiments regarding a policy proposal through a comment or hearing process, but the public's involvement is largely passive and interpreted from the top-down (Ellefson 1992). However, this involvement may be galvanized by certain issues, at which point more people become political activists, seeking to change policy substance. This desire to directly impact resource policy creates a bottom-up form of involvement where citizens are no longer a passive audience.

Political science knowledge and methods, such as policy evaluation, can help improve understanding of the identification and incorporation of different interests in resource management goals and actions (Cubbage 1999). To evaluate the effectiveness of this policy to deal with contrasting and often opposing viewpoints, it is necessary to determine the underlying perspectives that guide the policy recommendations. By understanding the foundations of this fire management policy as well as its ability or inability to incorporate and address other concerns, we can further evaluate the appropriateness of current prescribed fire policy, as well as the implications for future fire policy.

### **The Function of Public Policy**

Lester and Stewart (1996) offer several definitions of public policy, the two most salient to this discussion are presented here: 1) a projected program of goals, values, and practices (Starling 1979); and 2) a purposive course of action followed by an actor or set of actors in dealing with a problem or matter of concern (Anderson 1990). Public policy is a means societies use to decide how forests should be managed to achieve some objective of that society (Ellefson 1992), and forest policy can be defined as “settled or definite course or method adapted and followed by a governmental institution, body, or individual (Sharpe et al 1986)” for the purposes of managing forest resources. These definitions offer a sense of the role of public policy and forest policy, but they fail to address the complexity and difficulty inherent in the policy process. Determining goals and formulating policy is not a straightforward process; it is a necessarily messy political endeavor. Cubbage and others (1993) capture the tension in the following statement: “the

laws and policies that govern the use and management of public lands are ‘an expression of and are guided by the public interest’ (Coggins and Wilkinson 1987), however, ‘the public interest cannot always be definitely determined’ (Worrell 1970).”

The difficulty in creating resource policy is agreeing on and attaining a balanced mix of purposes and benefits; policy is not just about direct benefits, it is about broader social goals (Cubbage et al 1993). Conflicting social objectives may produce policies that are internally inconsistent. Cubbage and others (1993) have identified four classes of conflict, which constitute the principal source of forest resource issues. The first of these classes is physical impossibility, where one objective prevents or interferes with the attainment of another objective. The second is economic conflict, which occurs when the total amount of funds available for resource management is limited. The third class is called value conflicts, which occur when different groups have different conflicting values about resource use and preservation. The fourth and final class is based on time perspectives; individuals often have short planning horizons in natural resource use and management, which conflicts with the longer time horizon that society may prefer for resource conservation. Wondolleck (1991) offers three additional reasons for land management conflicts, based primarily on power relationships: 1) a resource-user group has “captured” an agency through the exertion of political power; 2) an agency’s management options have been limited by budgetary or legislative mandates; and 3) an agency deliberately ignores other groups because of real or imagined power. Being able to determine what values are fundamentally and profoundly in opposition and what values are able to generate a resolution may help develop policies that are socially and politically acceptable (Ewert 1996, Bengston 1994).

In the United States, natural resource policies have historically been subject to contention; their inability to serve all purposes necessitates compromise and prioritization between competing values. Resource policies dictate the management of *public land* – land that is held in trust for the whole of the citizenry. How that land is managed thus impacts all citizens rather than some targeted segment of the population. This sense of ownership has become increasingly important in recent years, spurring a shifting sense of the responsibilities held by management agencies. The management of public lands via governmental agencies is one broad means of implementing resource policy, and public ownership implies that resources associated with public lands will be allocated largely by political processes (Cubbage et al. 1993). Because public policy is a combination of various beliefs, facts, and norms, matching policy with diverse interests will always be a challenge for the natural resource manager (Ewert 1996).

According to Ellefson (1992), the formulation of policies “requires a specification of goals and the policies to achieve them, within the context of a well-defined issue.” Well-formulated policy options “arise from the intersection of three forces: 1) the interests of groups in society; 2) the intellectual convictions of experts and policy-makers; and 3) comparative knowledge, usually carried in the heads of experts or subject-matter specialists, of the ways in which problems have been previously handled elsewhere (Polsby 1984).” This may be especially important for natural resource policy, an area in which the whole population has a sense of ownership, and where the supremacy of the expert has only recently been called into question. There has been an increasing demand for wider public representation in resource policy, and an erosion of the technocratic privilege of resource managers. There are growing concerns about the

appropriateness of management techniques and decisions, questions about the motivations driving resource management, and discontent regarding how removed the citizenry has become from the stewardship of their public lands. The demand for a stronger voice in natural resource management continues to build. Policy must reflect not only scientific understanding of natural process, but the current political will. As a result, forest resource policies are often presented in vague and general terms in an attempt to accommodate a highly variable range of resource and administrative conditions, and to assure agreement among a variety of interested parties that hold dissimilar views about the management of forests (Ellefson 1992).

### **The Public Interest**

There are several theories about how political will, or public interest, manifests itself in public policy. This study uses the concept of pluralism as a theoretical guide, focusing on the importance of interest groups in developing public policy. Pluralism contends that power is group based, with each having equal opportunity to the policy process via multiple point of access. It also contends that interest groups are the principal means available for individuals to influence public policy due to the complexity of contemporary government (Lester and Stewart 1996, Cabbage et al. 1993). These interest groups compete for power and resources, and no single interest group dominates all decisions. Policy outcomes are the result of bargaining and negotiation (Lester and Stewart 1996), and represent the balance of power among the contending groups at some point in time (Cabbage et al. 1993).



Interest groups have traditionally been defined as an organization of individuals sharing one or more interests who try to influence decisions of government agencies, political representatives, or other policymakers (Cubbage et al. 1993). This definition assumes a formally organized association of individuals active in the policy process. It is also possible, however, to define other, *potential* interest groups. Potential interest groups capture the concept of the unorganized interest, the shared attitude that offers the possibility of organization and thus exists as some influence in the political process (Truman 1995). This concept has been previously discussed in the context of resource management under the term “stakeholder”. Stakeholders are those people who have a specific interest or concern regarding a resource issue (or issues), and may or may not be organized into formal groups (Decker et al 1996). This exploratory study of representation in prescribed fire policy attempts to access both types of interest populations, unorganized as well as organized.

### **Central Question**

Shindler and Reed (1996) conducted a study of public perspectives on prescribed fire and mechanical thinning, and found that many survey respondents felt forest management was too influenced by interest groups and politics. Though not necessarily true, these strong voices are often construed to reflect the views of the general public and may thus be instrumental in developing public policy for the management of natural resources. Highly decentralized institutions may result in the proliferation of interest groups as they have many more access points to policy. As government institutions and policies centralize (for example in the creation of national policy), the impact of

numerous interest groups often dissipates, which tends to squeeze out all but a few powerful groups (Zeigler and Huelshoff 1980). These concerns indicate a need to evaluate the current resource management policy in light of identified interest populations to determine which of the voices is reflected in management guidelines. Several different interests have a stake in prescribed fire activities and are directly impacted by the results of management strategies.

This study is an exploratory effort **to identify how these different interests view prescribed fire as a management strategy and how the current prescribed fire policy addresses those interests.**

The specific objectives are 1) to identify different perspectives regarding the use of prescribed fire as a management tool and the underlying concerns; and 2) to evaluate the consideration of these interests in the existing fire policy.

Policy evaluation is often described in the context of *outcomes* – the effectiveness of a policy in meeting stated goals or objectives (see Lester and Stewart 1996, Cubbage et al. 1993, Ellefson 1992). However, evaluation activities can be linked to various segments of the policy process (Ellefson 1992), including agenda setting, formulation, and implementation (Lester and Stewart 1996). According to Ellefson (1992), “evaluation can bring to the surface heretofore unknown problems and can thus stimulate interest in the formulation of additional, more appropriate options.” Rather than evaluate the outcomes and effects of the current prescribed fire policy, this study examines policy formulation; the development of acceptable courses of action to deal with public concerns (Cubbage et al 1993). It is this part of the process that defines the “what”, “how”, and “who” of public policy, and through which the balancing of interests takes shape. This

procedural or analytical approach to policy study is used to evaluate how policies are developed (Cubbage et al 1993); in this case, how different perspectives are represented in prescribed fire policy.

A Delphi exercise was conducted among identified interest groups to gather information on the type and intensity of interests. It is important to recognize that while some of the perspectives identified in the Delphi exercise are reflected in the current federal policy regarding prescribed fire, the application of policy may not accurately reflect those ideas. The scope of this study does not evaluate the policy in practice, which may vary from the principles expressed in the broad federal policy. According to Cubbage and others (1993), the content and effect of public policy may change greatly during implementation. In the case of prescribed fire, there are variations in administrative agency activities and missions as well as possible legislative and judicial involvement (Cubbage et al 1993) that can significantly impact the implementation of policy.

### **Thesis Organization**

The **second chapter**, entitled Evolution of Federal Prescribed Fire Policy, details the history of fire policy and the information and events that shaped the current management philosophy. It specifically addresses the introduction of prescribed fire as a land management tool, as well as the recent efforts at evaluating public perceptions of the practice.

The **third chapter**, entitled Methods, addresses the techniques used to gather and evaluate information. It describes the research approach using a Delphi exercise to gather

information, and relies on content analysis to evaluate the data gathered as well as the prescribed fire policy.

The **fourth chapter**, entitled Findings, details the themes and concerns that emerge from the Delphi exercise. It describes the broad picture of prescribed fire use identified by the participants and presents contradicting ideas about various segments of that process.

The **fifth chapter**, entitled Comparative Policy Evaluation, compares the findings of the Delphi exercise with the principles in the current, wildland fire policy statements. The comparative analysis highlights where themes converge or diverge, and emphasizes the representation of the Delphi themes and viewpoints within the current policy.

The **sixth and final chapter**, entitled Conclusions and Implications, offers possibilities for policy reform and recommendations for future research by identifying the primary gaps in knowledge and perspectives that may contribute to a more comprehensive and appropriate prescribed fire policy.

## **The Use of Prescribed Fire: Identifying Perspectives and the Resulting Policy Implications**

### **Chapter 2: Evolution of Federal Prescribed Fire Policy**

#### **The Roots of Fire Policy**

Natural resource policy was founded on the principles of technocratic utilitarianism, the idea that natural resources could and should be managed on the basis of scientific research and efficiency. In the early part of the 20<sup>th</sup> century, natural resources existed first and foremost to be used, but used efficiently with minimum waste (Cortner and Moote 1999, Hays 1959). It is in this philosophy that early perceptions of fire management are rooted. Debates about the way fire on public lands should be managed fell primarily to the Forest Service, and within the agency various perspectives emerged.

Early discussions included consideration of what was known as “light burning” as well as full suppression for achieving fire control (Husari and McKelvey 1996, Chambers 1987, Pyne 1982). These debates largely disappeared following the catastrophic fires of 1910 in the northern Rockies, only to re-emerge a decade later (Chambers 1987). Other debates emerged regarding to what geographic extent fire control actions should be implemented, and the agency struggled to develop a standard policy for addressing fire on public forests. Eventually, studies in the 1920’s demonstrated the ultimate logic and efficiency of suppressing all fires while small (Pyne 1982). By 1926, the economic philosophy of minimizing cost plus loss became the guiding philosophy in fire management (Husari and McKelvey 1996, Chambers 1987).

In 1933, the Tillamook fire burned 300,000 acres of timber in the Northwest. This event combined with the large availability of manpower in the Civilian Conservation

Corps (Chambers 1987) created an atmosphere where full fire suppression was not only desirable but also feasible on public forests (Chambers 1987, Pyne 1982). The result of these combined factors emerged in 1935 with the Forest Service fire policy that endured for almost fifty years – the 10 a.m. Policy.

*When immediate control is not thus attained, the policy then calls for prompt calculating of the problems of the existing situation and probabilities of spread, and organizing to control every such fire within the first work period. Failing in this effort each succeeding day will be planned and executed with an aim, without reservation, of obtaining control before ten o'clock of the next morning.*

*– 10 a.m. Policy, National Forest Manual, 1935-1978 (Pyne 1982)*

The 10 a.m. Policy presented a nationwide prescription, and stated that control of all fires should be achieved by 10 a.m. the day following the report of the fire. If the fire escaped control, plans would be made to control it by 10 a.m. the next day; if it escaped again, control would be planned for 10 a.m. the following day; and so on (Husari and McKelvey 1996, Pyne 1982). The policy standardized firefighting for the first time, and mandated that backcountry and frontcountry lands be treated as equal in stature (Pyne 1982). In doing so, the policy set explicit standards and relieved agency field personnel of uncertainty (Husari and McKelvey 1996, Pyne 1982).

The doctrine of fire control became intrinsic to the operations of public land agencies, and the Forest Service “came to dominate the national fire establishment by virtue of its mandated responsibilities (Pyne 1982)”; its disbursement of land transfer funds, its supervision of cooperative fire prevention, its control over the production of essential information and research, and its responsibility for fire equipment development and distribution (van Wagendonk 1991, Pyne 1982). So entrenched was the agency in fire suppression that when challenges to the policy appeared, contrary to the in-agency

debates that developed the 10 a.m. Policy, they came from outside the Forest Service (Pyne 1982). The Forest Service policy was not subject to a serious review until 1967, amended until 1971, and was not replaced by a new policy until 1978 (Husari and McKelvey 1996, Pyne 1982).

### **Era of Change**

As the environmental movement of the 1960's gained momentum, critics of the "prevention and control" philosophy of dealing with fire argued for uses of fire in wildland and forest management. The Wilderness Act of 1964 spawned questions about the proper goals for fire protection in new management units (Pyne 1982). The field of ecology focused scientific efforts on whole ecosystems as a functional unit of study (Cortner and Moote 1999). The Forest and Rangeland Renewable Resources Planning Act of 1974 and the National Forest Management Act of 1976 required that both the use of prescribed fire and the control of wildfire be part of land management planning (Chambers 1987). New legislation removed some administrative discretion and subjected fire policies to outside review. Fire policy had to contend with new areas of interest, like wilderness; with new means, like prescribed fire; with a new research emphasis, largely fire ecology; and with new standards set by environmental legislation and reviewed by outside agencies (Pyne 1982). The effect of this changing political and social context was the review and eventual replacement of the 10 a.m. Policy. Mutch (1976) described the necessity of moving from fire control to fire management, recognizing that fire should be regarded as an ecological process as well as a management tool. Components of successful fire management should include informing

the public, applying research, and an increased understanding of fire prevention and prescribed burning in total fire management (Mutch 1976).

Revisions to the National Park Service fire policies in 1968 permitted the use of fire as a management tool, and in 1978, the Forest Service fire policy was revised to provide for the integration of both protection from fire and the planned use of fire (Chambers 1987, Nelson 1979) in the form of “fire management programs”, in contrast with previous “fire control programs” (FMPRT 1988). In accordance with the 1978 fire management policy, two kinds of wildland fire were recognized: prescribed fire and wildfire. Prescribed fire could be ignited (or allowed to burn in the case of prescribed natural fire) under specified conditions to achieve established management objectives (FMPRT 1988). All other fire was considered wildfire, and appropriate management required suppression (FMPRT 1988). This policy was based on the understanding that fire has been an historic component of the environment, and an attempt to exclude fire leads to major unnatural changes in vegetation and wildlife (FMPRT 1988). It also creates fuel accumulations that can lead to uncontrollable wildfire (FMPRT 1988). The underlying premise of the policy was to use fire to encourage natural conditions while at the same time reducing the risk of fire damage.

In addition, the objective of fire suppression was changed from one of prompt control of all wildfires to one of minimizing fire suppression costs and damage consistent with land and resource management direction (Chambers 1987). Appropriate suppression strategies included containment, confinement, and control; and prescribed fire was reaffirmed as an approved management practice (Husari and McKelvey 1996, Chambers 1987). By 1983, fire management was based on an objective of minimizing



suppression costs and resource damage, both for determining appropriate fire suppression action and escaped fire suppression strategy (Husari and McKelvey 1996, Chambers 1987). In addition, the economic underpinnings of fire management were revised, incorporating both positive and negative outcomes of fire (Omi 1989). Analyses attempted to reflect the ecological benefits of fire, the cost of fire management, and the loss due to fire (Omi 1989). The combination of these factors helped create an atmosphere increasingly supportive of prescribed fire activity. However, this policy combined two fundamentally different assumptions; the previously held belief that “all fire is bad” versus the emergent recognition that “fire is an integral component of natural ecosystems” (Lee 1987), a tension that remains integral to discussions of prescribed fire.

The recognition in resource policy of natural fire’s role (expressed through prescribed natural fire) was commonly known as the “let-burn” philosophy, which held that natural areas, specifically wilderness and national parks, should be managed “to allow the unimpeded interaction of native ecosystem processes” (Omi 1989). In 1985, wilderness fire management was clarified, authorizing prescribed fires to meet the objectives of 1) allowing lightning fires to play their natural role (prescribed natural fire); and 2) reducing the risk of wildfire to life and property within wilderness, and life, property, and resources outside of wilderness to an acceptable level (Chambers 1987, FMPRT 1988). In 1986, the Wildland Fire Management Guideline was issued, outlining in detail the procedures and standards to be used to manage wildfires, prescribed natural fires, and prescribed burns (van Wagtnedonk 1991, USDI National Park Service 1986). By the late 1980s, land management agencies acknowledged and began providing for the natural role of fire in ecosystems, and cost efficient fire management programs consistent

with resource management objectives emerged (Chambers 1987). These objectives include the reduction of fuel loads, disposal of slash from harvest activity, preparation of seedbeds, thinning of stands, increased production of herbaceous plants, wildlife habitat improvement, streamflow management, and aesthetics (Ffolliott 1990).

### **Prescribed Fire Reaffirmed**

In 1988, the United States experienced an extreme wildland fire season, distinguished by the magnitude of the fires and the public attention drawn to fire policies (Omi 1989). Media coverage focused the nation's attention on the fires burning in and around Yellowstone National Park, where a total of 248 separate fires burned, 31 of which were initially designated and allowed to burn as prescribed natural fires according to explicit public policy objectives (Omi 1989, Wakimoto 1989). The fires brought into question some basic assumptions behind wildland fire management and science, spurred dialogue over strategies for maintaining the health of natural ecosystems, and raised concerns about the status of fire behavior and fire management research (Omi 1989). Public outcry, concern among natural resource managers, and the ensuing debate about the appropriateness of the land management agencies' fire policies resulted in an examination of the events of the 1988 fire season and a review of the current fire management policies.

In the fall of 1988, the Fire Management Policy Review Team (FMPRT) was convened in response to the 1988 fire season, specifically the Yellowstone fires (FMPRT 1988). The team found that prescribed natural fire programs allowing fires to burn under predetermined conditions were sound, however current fire management plans did not

meet current policies (Wakimoto 1989, FMPRT 1988). The 1988 report also reaffirmed the use of planned burning and firebreaks to help reduce risks of damage from both wildfires and prescribed natural fires (Wakimoto 1989, FMPRT 1988). While the ecological effects of prescribed natural fire were found to support resource objectives, in some cases the social and economic effects may be unacceptable, and the committee determined that there was a need for greater public participation in the development of fire management plans (Wakimoto 1989, FMPRT 1988). Specifically, the committee called for improving the dissemination of information before and during prescribed natural fires (FMPRT 1988).

The committee developed several recommendations to address these findings, including the reaffirmation of prescribed natural fire policies, a required review of all fire management plans to assure policy requirements are met, and a daily certification based on available resources that prescribed fires will remain within prescription (FMPRT 1988). The report also required agencies to develop contingency plans for constraining prescribed fires under extreme conditions and to consider opportunities to use planned ignitions to complement prescribed natural fire programs and to reduce hazard fuels (FMPRT 1988). In addition, the report emphasized the use of the National Environmental Policy Act requirements in fire management planning to increase opportunities for public involvement and coordination with state and local government (FMPRT 1988). Finally, the committee addressed the need to review funding structures for prescribed fire and fire suppression programs to improve program effectiveness, and the need for more information regarding weather, fire behavior, fire history, and fire information integration (FMPRT 1988).

The implication of these findings is first and foremost a call for “proactive intervention, primarily fuel hazard abatement” using prescribed fire or other techniques (Omi 1989). Second is the illustration of the limited available knowledge about fire behavior and fire effects, accompanied by the need for further research to reduce uncertainty (Omi 1989).

### **“Educating” Acceptance**

With changing management strategies for dealing with wildland fire, a concerted research effort was made to investigate public attitudes toward prescribed fire on public lands. The function of public policy is to serve the interests of the people, and uncovering perspectives is vital to developing and evaluating policy options. Accurate information about constituent preferences is essential to integrating the views of citizens into long-term management policies (Shindler and Reed 1996). It is important to recognize that the success or failure of resource policy often hinges on the public’s receptivity to that policy. The importance of assessing public views stems from the likelihood that management decisions will be made under adverse conditions and will face considerable scrutiny (Shindler and Reed 1996). When citizen response to agency activity is positive it helps ensure the overall support and success of management programs (Shindler and Reed 1996).

Public attitudes about prescribed fire have undergone considerable change in the last twenty-five years. Prior to 1977, fire suppression and aggressive fire-fighting efforts had nearly unanimous public support. With recent emphasis on the use of fire as a management tool, however, public attitudes have been shifting toward a broader

acceptance of fire in forest ecosystems (Shindler and Reed 1996). Relatively few studies have addressed social perspectives about prescribed fire – most have dealt with visual quality issues or the impact of educational programs on public acceptance (Shindler and Reed 1996). Attitude studies have been found to provide a variety of information about the public, including the public's willingness to accept or support new management strategies and effective means of changing public attitudes (Barro and Manfredi 1991). Several studies have thus focused on public attitudes and understanding of fire, with the implicit assumption that knowledge breeds acceptance – research has often been grounded in the common theme of “educating the public”.

Early studies indicated that public support or opposition is largely related to an individual's knowledge of the uses and impacts of fire (Shindler and Reed 1996, Shelby and Speaker 1990). Stankey (1976) found that while a majority of wilderness users favored fire suppression, 34% supported a natural role for fire in the forest. The results also indicated that as the respondent's level of knowledge increased, so did the likelihood that they would support the natural role of fire, identifying an opportunity to modify the complete suppression policy (Stankey 1976). Other research has focused specifically on public attitudes about prescribed fire. Carpenter and others (1986) found a high level of support for fire management activities initiated and controlled by resource managers, as well as indicated the ability of the public to differentiate between situations with beneficial versus negative effects. The authors also offered recommendations for fire information or education programs, including: addressing a broad audience, fire size and intensity, impacts on wildlife, beneficial effects, and a clarification of situations where suppression or management of fire is warranted (Carpenter et al. 1986). Taylor and

Daniel (1984, 1985) found that ratings of scenic quality were improved by light fires, but diminished by severe burns. The perceptions of recreational acceptability were more adversely affected by severe fire, while light fires enhanced scenic quality perceptions, indicating an increasing willingness to accept prescribed burning (Taylor and Daniel 1984, Taylor and Daniel 1985, Taylor and Mutch 1986). McCool and Stankey (1985) found that wilderness visitors were both more knowledgeable about fire effects and more supportive of fire management than the respondents in Stankey's 1976 study. The study also found that 50% of the survey respondents believed manager-ignited fires would be beneficial, while 16% thought they would be detrimental and 33% were unsure (McCool and Stankey 1985). Zwolinski and others (1983) found that survey respondents had confidence in forest managers' use and application of fire, attributed to the success of public information and education programs. A strong correlation was evident between knowledge and tolerance of fire (Zwolinski et al. 1983). However, other research conducted by Stine (1987) found that wilderness users had a good understanding of wilderness fire characteristics, and were more supportive of naturally ignited fires than those ignited by agencies. The author concludes that this weaker support for agency ignitions as well as the findings that user perceptions may conflict with fire management policies suggests a need for further educational programs (Stine 1987). Bright (1997) also found that individual knowledge is related to support for fire management activities, but also suggests that it is important for managers to improve their communication about the rationale for prescribed fire policies.

Taken together, these studies demonstrate a positive relationship between public knowledge and support for modified fire policies, i.e. support increases as public

knowledge about the role of fire in forest ecosystems increases (Stankey 1976, Gardner et al. 1985b). As such, other research efforts have focused on how educational programs might be more effective in garnering public support for these management activities.

Cortner and others (1984) found that while public acceptance and understanding of the benefits of fire management were high, modifications to fire education were recommended. Specifically, education should focus on local forest conditions as well as local knowledge and acceptance (Cortner et al. 1984, Zwolinski et al. 1983)). A national survey of forest user groups indicated a considerable amount of support for flexible fire suppression policies, as well as a willingness to accept the risk associated with the manager's use of prescribed fire (Gardner et al. 1985b). Level of education emerged as a significant variable in relation to fire knowledge, support for protection of high-value resources, recognition of beneficial effects, and rejection of strict fire suppression policies (Gardner et al. 1985b). This research effort also identified potential target audiences for educational efforts, based on user-group affiliation and demographic concerns.

Other research found that while prescribed or light burning may increase ratings of scenic quality and educational information about fire may increase knowledge and tolerance of fire, the acquired knowledge does not necessarily affect the perceptions of scenic quality or recreation acceptability (Taylor and Daniel 1984, Taylor and Daniel 1985, Taylor and Mutch 1986). Shindler and Reed (1996) found that personal observation was overwhelmingly the most common factor influencing opinions about forest conditions. In contrast to many of these results, Baas and others (1985) found that support for prescribed burning has in some cases increased, even while specific

knowledge about fire remained the same. The authors attribute this support to a gradual increase in awareness of prescribed fire as a management tool in the absence of specific education efforts (Baas et al. 1985).

These studies regarding educational programs that encourage the acceptance of fire on the landscape are efforts to increase public support for fire management activities. However, those management activities are in direct contrast to the highly successful educational programs of the previous five decades of fire policy. The Smokey Bear campaign of the Forest Service charged that fire prevention and control was the most responsible approach to fire on public lands, and the ability to control fire defined success for the land management agencies. This educational program was highly effective – so effective in fact, that land management agencies now trying to implement increasing prescribed fire activities face their biggest challenge in overcoming the perception that all fire is destructive and must be prevented whenever possible (Martin 1997). With the rise of prescribed fire comes the need not just to learn but to “relearn” appropriate management strategies. Achieving acceptance may as a result require a change in fundamental perceptions of risk and responsibility, not just knowledge.

### **The Wildland-Urban Interface**

The decades following the shift to a fire management perspective also coincided with an urban expansion into rural areas (Gardner et al. 1987), which presents another dimension in the discussion regarding fire management. Remote areas have been made more accessible, resulting in increasing wildland-urban interface areas (Bailey 1991). Riebsame (2001) describes “exurbs” and the “gentrifying range”, two land-use patterns



that reflect the interface areas. Exurbs exist where suburban and rural areas intermix, where open spaces meet suburban conveniences. The gentrifying range land-use pattern describes many interface areas more accurately; these are areas where the landscape is subdividing but is still deeply rural in character. It usually adjoins the large tracts of federal land of the American west, and marks a zone of tension between private and public land. People determined to live where they want and bring development with them often drive this changing geography in the west. These areas are growing considerably faster than metropolitan areas as people search for a quality of life based on open space, undeveloped landscapes, and intact communities of manageable size (Purdy 1999, Riebsame 2001). Tensions increase as development threatens the very appeal of rustic interface areas (Purdy 1999), and the new residents bring expectations about their own and government's responsibility regarding fire protection. As previously large parcels of land are subdivided and the number of residents and perspectives increase, resource management, and especially fire management, becomes increasingly complicated.

In interface areas, the probability of fires as well as the loss due to fires increases (Bailey 1991). In these areas especially, fire managers have been charged with simultaneously protecting public safety and using fire as a management tool (Beebe and Omi 1993). In 1986, the increasing fire protection concerns in the wildland-urban interface were recognized as being national in scope (Chambers 1987). A national initiative involving Federal, State and local fire protection agencies and related organizations was begun with the objective of reducing the loss of life, property, and resources from fire occurring in the wildland-urban interface (Chambers 1987).

The wildland-urban interface introduces special problems for fire managers and policy makers. A lack of action on the interface fire hazard has been attributed to a number of factors: including poor coordination and understanding among federal, state, and county governments (Cook 1995, Cook 1997); poor decision-making processes; low priority; and the unavailability of sufficient funds to deal with the threat (Cook 1997). More knowledge is needed regarding how fire managers can work effectively with local government to implement fire safety and risk reduction programs (Sommers 1988). Local government may have different priorities than state or federal agencies, making hazard mitigation difficult, even while residents respond negatively to inadequate suppression strategies (Greenlee 1992). Gardner and others (1985a) present five classes of mitigation: reducing the intensity, frequency, or magnitude of the hazardous event by physically changing the environment; limiting exposure to the hazard through land-use regulations; reducing the vulnerability of structures and people; and increasing awareness of fire through education; and taking care of those negatively impacted by wildland fire.

Technical factors often contribute to the difficulty in dealing with the wildland-urban interface concerns. Fire suppression can be complicated by poor access, poor addressing, little or no fuel management in new construction areas, steep slopes, wooden structures, poor water availability, and long response times (Perry 1985). Perry (1985) suggests a variety of strategies to contend with these complications, focusing on education the public about fire, fuels, prescribed burning as fuel management, and low flammability vegetation options. Other strategies include the development of a master fuel management plan and maintenance schedule, a fuel management budget, and prescribed fire training for fire personnel (Perry 1985). Walt (1989) also identified

imperatives for dealing with the interface concerns, which include the establishment of a centralized database, more thorough planning regarding the impacts of development pertaining to wildfire, addressing development patterns that result in narrow access, unsigned structures, and no reserve water supplies, and increasing residents' awareness of the threat of wildfire.

Several efforts have been undertaken by the Forest Service to inform the public about the potential risks and possible strategies to minimize risk in the interface, only to be met with little success (Magill 1992-93, Davis 1990). This may be in part attributed to the lack of study and understanding of social factors; for example, residents' perception of risk and motivation to participate in risk prevention programs (Davis 1990). Cortner (1991) points out that many issues in the wildland-urban interface are social-institutional, not technical; as such, it is important for managers to understand the preferences and attitudes of interface residents. Others point out that any policy action to mitigate this fire hazard depends not only on expertise but also on the public's receptivity (Magill 1992-93, Gardner et al. 1985a). Gardner and others (1987) found that interface residents had a low initial awareness of fire severity in the interface, assign low probabilities to occurrence, and prefer policy strategies that shift the responsibility of hazard management to managers.

Survey respondents generally seem reluctant to support programs for which they have to carry the burden of responsibility, giving low ratings to restrictions on where they can live and to programs requiring direct costs like mandatory insurance (Cortner et al 1990). Lavin (1997) points out, however, that in order for the risk to be managed, it must be undertaken as a shared responsibility. Risk reduction in the interface can only be

accomplished when landowners and residents cooperate with land management agencies at various levels of government (Lavin 1997). Agency personnel working and communicating directly with residents, landscapers, builders, and community leaders may be the most important and effective means of improving risk management in the interface. It is important that the message be clear, credible, locally reinforced, and specific as to the desired response. However, the wildland-urban interface issue often contradicts the notion that “education causes awareness causes desired behavior”; information sent may not be received, and if received, it is not necessarily followed (Magill 1992-93). Awareness and perception of risk are not equal, and as a result, agency policy and activities do not necessarily reflect or incorporate the perceptions of residents. Even as knowledge among citizens and residents increases, fire policy must be responsive to other values, concerns, and priorities not necessarily based on the current facts or existing knowledge.

### **The Current Social and Political Climate**

The dominant perception after several decades of fire suppression on public lands in the U.S. is that the risk of catastrophic and destructive fire events has drastically increased, threatening some natural resource values as well as communities adjacent to these public lands. It has become apparent to scientists and resource managers that it may be beneficial for forests and the surrounding communities to reintroduce fire to natural systems, based on studies of fire’s ecological role, historic fire regimes, and increased risk that results from fire suppression (Martin 1997, FMPRT 1988). Studies on social perspectives in the Blue Mountains of Oregon have found that public acceptance

and support of prescribed fire activities have increased, though many people still believe the practice presents a threat to nearby property (Shindler and Reed 1996). People are becoming increasingly aware of the benefits of prescribed fire and increasingly accepting of negative impacts (Shindler and Reed 1996). Survey results also indicated that a solid majority of people believe prescribed fire is a safe and legitimate management tool, and that overall benefits are worth the risks posed by using fire on the landscape (Shindler and Reed 1996). Fire management policies and agency priorities have been changed to reflect the need for fire on public lands (see van Wagtendonk 1991, FMPRT 1988); however, concerns about prescribed fire practices persist (Martin 1997, Smith and Clark 1994, Manfredo and Zinn 1993, Daniel 1990, Manfredo et al. 1990, Turpin 1988).

Although biological and ecological information may support prescribed fire policy, that alone is not sufficient justification for its implementation (Martin 1997, Manfredo et al 1990). Prescribed fire also has political and social components, and surveys have demonstrated the public to be almost evenly divided in its support (Smith and Clark 1994, Manfredo et al 1990). A number of concerns over the use of fire remain; as identified by Shindler and Reed (1996), the focus of these concerns has typically been on risk factors, aesthetic concerns, health issues, ecological effects, and economic impacts. Opposition to prescribed fire may be based on a lack of understanding regarding the ecology of fire and the natural geographic and time scale (Daniel 1990). Opposition also stems from the real and perceived risk that prescribed fire could escape and cause severe damage to people, property, and resources (Daniel 1990). Negative impacts of fire like aesthetic effects and smoke (often short-term) continue to cause concern about prescribed fire activities (Martin 1997, Daniel 1990). Some people simply

do not agree that the benefits purported to be associated with prescribed fire actually exist, and as such, negative consequences are without positive counterparts (Manfredo et al. 1990). After decades of fire exclusion teaching, prescribed fire is viewed suspiciously by much of the public (Martin 1997).

Turpin (1988) argues that concerns expressed should not be ignored or dismissed, otherwise negative perceptions may be amplified. Resource managers are thus faced with trying to understand opposing viewpoints as well as develop strategies that encourage support, cooperation, and acceptance. Shindler and Reed (1996) found that both the Forest Service and a large minority of survey respondents agreed that implementing successful prescribed burning programs requires effective forms of interaction. Though the importance of effective public involvement has been recognized since the 1970s, studies have found that participation seldom meets the citizen's goal of affecting decision-making or the manager's goals of obtaining support for a plan or project or of minimizing conflict (Cortner 1996). The 1988 fire season marked an increasing interest in fire management on public lands (Bright 1997) and with it an increased scrutiny of all fire management activities, including prescribed fire. Coupled with a rise in other controversy surrounding public lands issues (e.g. the Spotted Owl debate and logging concerns), the American public has demanded explanations and agency accountability regarding the management of federal lands. The resource management agencies are no longer trusted to carry out their responsibilities in the interest of the citizens; the public expects explanations regarding not only in what is being done, but why, how, and to what end activities are undertaken. At a national level, the public has asserted its right to be both informed and a participant in the decision-

making processes regarding natural resource management (Sample 1990). The public is becoming more involved in natural resource management and managers are being held more accountable (Jolly 1995), underscoring the need for public support and a persuasive rationale for prescribed fire policies (Bright 1997).

Opposition to prescribed fire activities remains, regardless of the emphasis on public education and communication, and the issue of acceptability has become increasingly complicated. Research has concentrated on understanding the mechanism of acceptability in a much broader framework; no longer is acceptance viewed solely as a function of education. Information exchange has been recently characterized as a two-way process, and educating the public does not necessarily result in changed beliefs (Taylor 1990). Attitude strength, issue salience, and need for information have been identified as important factors in effective communication between managers and the public (Bright and Manfredi 1995).

The effect of information on attitudes depends in part on how relevant the public perceives the issue to be; information has thus been found to have little influence over the direction of attitudes, but greater influence over the strength with which attitudes were held (Bright 1997, Bright and Manfredi 1995). Arguments to change attitudes and increase support for prescribed fire policies should target beliefs and perceptions while being supported by factual evidence (Bright et al. 1993). High quality information encourages careful consideration of the argument, and the credibility of the message source is an important factor in how messages are received (Bright 1997). Social acceptability of management is determined not only by existing conditions, but also by the causes and context of those conditions, and by the presence of feasible alternatives

(Brunson 1993). Fire management is now evaluated by an educated public, requiring a shift in focus from information and education to public involvement and dialogue (Martin 1997, Stankey and McCool 1995, Chambers 1992). Increased public support for fire management activities must be recognized as a function of trust and confidence in managers (Chambers 1992) in addition to technical understanding, and both play an essential role in ensuring the success of prescribed burning programs (Gebauer 1997).

Hurd (1995) has identified several realities directly related to the political challenges of prescribed burning. The first reality is that of increased news media coverage in real time (Hurd 1995). The information available to the public is no longer the tailored agency press release; it is the imagery and interpretation presented live and available 24 hours a day. Media communication may play an important role in public perception about fire management (Smith 1995, Apsey 1988). Fire management is not as simple as doing the job well, and using media communication to increase public understanding can foster public confidence in the fire management profession (Apsey 1988). The second reality facing fire management is the increasingly utilized public review process. Agency management activities and objectives are now, more than ever, subject to substantial oversight by citizens and organizations (Hurd 1995). The necessary plans and documentation exist as binding obligations with all the attendant litigation value for those opposed to any part of the plan execution or outcomes (Hurd 1995). The third reality addresses the routine challenge between the legislative and executive branches of government (Hurd 1995). Agencies are rooted in the executive branch, which may sharply contrast with legislative authority. As a result, “partisan gain,



political platforms, and constituency obligations may be interjected into support or criticism for fire management activities (Hurd 1995).”

Specific dilemmas that emerge from this context include the importance of integrating different agency mandates and activities to truly establish common fire management objectives, and the importance of prioritizing values; for example, natural process taking precedence over cultural or economic resources (Hurd 1995). These and other issues were addressed in a 1995 comprehensive national policy statement on the management of wildland fire – the Federal Wildland Fire Management Policy and Program Review report.

### **Mandated Cooperation**

The events of the 1994 fire wildfire season renewed awareness and concern among land management agencies and their constituents about the impacts of wildland fire (USDI et al. 2001, Zimmerman and Bunnell 1998). The Federal Wildland Fire Management Policy and Program Review was chartered by the Secretaries of the Interior and Agriculture to ensure that federal policies regarding wildland fire are uniform, with cooperative and cohesive programs (USDA and USDI 1995). The expressed purpose of the report is to provide a single, “umbrella” set of federal fire policies to enhance activities across administrative boundaries and unique agency missions (USDA and USDI 1995). The report, published in December of 1995 and reaffirmed in September of 2000, offers nine guiding principles and thirteen recommended federal wildland fire policies and applies to the five principal fire/land management agencies (the Forest Service, Bureau of Land Management, National Park Service, Fish and Wildlife Service,

and Bureau of Indian Affairs). The early review process included input from agency employees, national stakeholders, researchers, and the Western Governors' Association (USDA and USDI 1995). In accordance with the public review process, a draft report was published in June of 1995 for public comment. A total of 308 comments were received in response to the draft document, and were used in the preparation in the final report (USDA and USDI 1995).

The review effort was based on the premise that challenges and risks associated with wildland fire management are increasing in complexity and extent, as a result of past fire management actions and increasing protection concerns (Zimmerman and Bunnell 1998). It represented the next stage in the evolution of wildland fire management and recommended policy changes that associate suppression and management of fires into a single direction to achieve multidimensional objectives (Zimmerman and Bunnell 1998). The report reaffirmed two principles: 1) the necessary use of fire to “protect, maintain, and enhance resources”; and 2) the importance of allowing fire to, as nearly as possible, to function in its natural ecological role (USDA and USDI 1995).” The role of wildland fire is provided for as an “essential ecological process”, to be incorporated into the planning process in support of resource objectives (USDA and USDI 1995). Also emphasized were the concepts of risk management, economic viability, quality scientific information, health and environmental quality considerations, interagency coordination and cooperation, and the importance of standardized policies and procedures (USDA and USDI 1995). The overarching intent of the policy was to achieve balance between suppression for protection of life, property, and resources, and fire use to regulate fuels and maintain healthy ecosystems (Zimmerman and Bunnell 1998).

## **Federal Fire Policy Today**

*“...federal fire management activities and programs are to provide for firefighter and public safety, protect and enhance land management objectives and human welfare, integrate programs and disciplines, require interagency collaboration, emphasize the natural ecological role of fire, and contribute to ecosystem sustainability.”*

*Review and Update of the 1995 Federal Wildland Fire Management Policy (USDI et al. 2001)*

In response to the extreme fire season of 2000, fire policy and management has once again been subject to intense scrutiny. Prescribed fire activities have been the focus of much of this evaluation, due to the controversy over an escaped prescribed fire that burned large areas of a national monument, national forest, and several homes in Los Alamos, New Mexico. More acres burned in the 2000 fire season than in any year in the last fifty (USDI et al. 2001). In response, the Secretaries of the Interior and Agriculture prepared a report to the White House focusing on restoring landscapes and rebuilding communities, undertaking projects to reduce risks, working directly with communities, and establishing accountability (USDI et al. 2001, Glickman and Babbitt 2000). Congress expressed its support with substantial increases in financial appropriations for the Departments of the Interior and Agriculture, as well as direction for the aggressive reduction of risk in the wildland-urban interface (USDI et al. 2001).

The Interagency Federal Wildland Fire Policy Review Working Group, at the direction of the Secretaries of the Interior and Agriculture, was convened to review the 1995 federal wildland fire policy (USDI et al. 2001). This effort produced the Review and Update of the 1995 Federal Wildland Fire Management Policy, a report released in January 2001. The 1995 policy was found to be generally sound, continuing to provide a

strong foundation for wildland fire management activities of the federal government (USDI et al. 2001). Clarifications and revisions have been recommended, however, in the areas of collaboration, coordination, and integration across agency jurisdictions and various disciplines (USDI et al. 2001). This review and update of the 1995 federal wildland fire policy is intended to provide a “broad philosophical and policy foundation for federal agency fire management programs and activities...a strategic direction for a broad range of fire management related activities (USDI et al. 2001).” Among the principal conclusions, the working group found that while the 1995 policy remains sound, revisions are needed to address ecosystem sustainability, science, education, communication, and to provide for adequate program evaluation (USDI et al. 2001). The group also found that the complexity and hazard of fire exclusion and wildland-urban interface areas has been, until now, underestimated, underscoring the need for attention to these areas (USDI et al. 2001). Finally, an emphasis on program management, implementation, oversight, leadership, and evaluation at senior levels of all federal agencies is critical for successful policy implementation (USDI et al. 2001).

The implications of this policy statement are central to the study presented here. Fire hazard mitigation activities are being aggressively emphasized, and the U.S. Forest Service has proposed fuel management treatments (prescribed fire and mechanical treatments) of up to 3 million acres annually (USDI et al. 2001). The question remains, however: In light of increasing demands for public involvement and acceptability and agency accountability, is this policy responsive to the changing dimensions of management and the myriad of perspectives regarding prescribed fire?

## **Chapter 3: Methods**

This exploratory study was conducted in two parts, each directed at a specific objective. Information about perspectives on prescribed fire was gathered through a Delphi process. The current prescribed fire policy was then evaluated for its treatment of the identified perspectives. The study employs an inductive methodology, identifying and categorizing information as it emerges from text; and a comparative analysis in order to evaluate the current prescribed fire policy.

*Specific objective 1: To identify different perspectives regarding the use of prescribed fire as a management tool and the underlying concerns.*

The identification of perspectives regarding prescribed fire is the product of a Delphi exercise conducted during the summer and fall of 2000.

### **Delphi Process**

The Delphi technique attempts to tap into the knowledge of individuals and compile informed judgements using an iterative, systematic mechanism that collects and compiles individual responses to research questions and peer comments. The theoretical assumptions recognize that there is a gray area between *knowledge* and *speculation*, identified as informed judgement (Ziglio 1996). The methodological procedure aims at structuring and distilling information for which there is some evidence in order to improve decision-making (Ziglio 1996). The Delphi is characterized as a method for

structuring an effective group communication process that allows a group of previously unconnected individuals to deal with a complex problem or topic (Linstone and Turoff 1975). Delphi applications are designed for “the reliable and creative exploration of ideas or the production of suitable information for decision-making,” and are applied with the aim of generating new insights and future scenarios, assessing the desirability and feasibility of policy alternatives, and contributing to problem solving and informed decision-making (Ziglio 1996). The central element in conducting a Delphi is the lack of agreement of incomplete state of knowledge concerning either the nature of the problem or the components which must be included in a successful solution; and the process can be used to help identify problems, set goals and priorities, and identify problem solutions (Delbecq et al. 1975, Ziglio 1996). Specific objectives of Delphi studies include: 1) to explore or expose underlying assumptions or information leading to different judgements; 2) to correlate informed judgements on a topic spanning a wide range of disciplines; and 3) to educate the respondent group as to the diverse and interrelated aspects of the topic (Delbecq et al. 1975).

Benefits of the Delphi process as a group technique include the maintenance of anonymity; prevention of dominance by certain individuals, professions or interests; facilitation of participant equality; proactive rather than reactive responses; and generation of high-quantity and high-quality responses (Ziglio 1996, Needham and de Loe 1990, Delbecq et al. 1975). It is particularly advantageous when the individuals needed to contribute to the examination of a broad or complex problem have no history of adequate communications and may represent diverse backgrounds with respect to experience or expertise (Linstone and Turoff 1975). Drawbacks may include detachment

from problem-solving effort, lack of opportunity for verbal clarification, difficulties in communication and interpretation among respondents, and unresolved conflicting or incompatible ideas (Delbecq et al. 1975).

The mechanism for communication includes “some feedback of individual contributions of information and knowledge, some assessment of group judgment or view, some opportunity for individuals to revise views, and some degree of anonymity for the individual responses (Linstone and Turoff 1975).” The Delphi exercise is a group process, involving group thinking and interaction resulting from the iterative nature that allows respondents to know what other participants have said and to revise their responses (Needham and de Loe 1990). This study uses a conventional Delphi exercise where a group of individuals responds to a series of questions. The responses to those questions are then summarized and new questions are developed for the respondent group. The participants are usually given at least one opportunity to reevaluate their original answers based on an examination of the group response (Linstone and Turoff 1975).

The advantage of a Delphi method in evaluating complex questions regarding policy is its ability to identify and distinguish between a variety of perspectives. The Policy Delphi specifically seeks to generate the strongest possible opposing views, and allows respondents to react to and assess differing viewpoints through an iterative process. Rather than obtaining consensus, the goal of the Policy Delphi is to expose all the differing positions advocated and the principle arguments for those positions (Turoff 1975). The original Delphi design seeks consensus among a homogenous group of experts; however, the Policy Delphi recognizes that a policy issue is one for which there

are no experts, only informed advocates and referees (Turoff 1975). It rests on the premise that the group will not generate a decision, but will present all the options and supporting evidence for consideration by the decision-maker (Turoff 1975). A Policy Delphi is structured to facilitate the production of policy elements and options, and panelists have the freedom to present and challenge alternative viewpoints (Needham and de Loe 1990). For the purposes of this study, this method identifies the various perspectives on the role of fire in resource management and the arguments supporting those perspectives. As important as different viewpoints are the differences in the way various stakeholders understand the issue – the underlying arguments for some specified position (Kearney et al. 1999).

While most use of Policy Delphi efforts has been to identify options and proposals for constructing a policy (Turoff 1975), this study is relatively unique in its investigation of current fire policy and past policy decisions. This understanding of what has occurred is “often lacking and can lead to future mistakes in policy formulation (Turoff 1975).”

Delphi respondents are selected based on personal involvement in the problem of concern, pertinent information to share, motivation to participate, and perception of unique gains attributable to the Delphi process (Delbecq et al. 1975). Participants are then selected using a nomination process, based on the study objectives, identified target populations, and respondent characteristics (Delbecq et al. 1975). In identifying individual participants, target groups are first identified based on their likelihood to possess relevant information or experience concerning study objectives. Nominations of well-known and respected individuals are then solicited from members within the target



groups. It is also necessary in a Policy Delphi that informed people representative of the various sides of the issue are chosen as participants (Turoff 1975).

The Delphi process described above was conducted among various interest populations surrounding prescribed fire to identify existing perceptions of prescribed fire as a management strategy for public lands. The interest populations were identified through existing literature on prescribed fire and public perspectives, and communication with resource professionals and university faculty, and attempted to include the widest range of perspectives possible. Potential participants were contacted via telephone in order to describe the study and the Delphi process, and to solicit agreement to participate. This initial contact was followed by written correspondence, detailing the study procedures and participant responsibilities, and included an invitation to participate in the October 2000 workshop on the social acceptability of fuels treatments in Missoula, MT.

The issue of prescribed fire on public lands is highly complex, and in order to maintain the manageability of the Delphi exercise, participants from each interest population were limited. A total of 35 individuals agreed to participate in the Delphi exercise; 25 and 12 of these original participants responded to the first and second rounds of the Delphi, respectively. The list of participants includes affected residents, wildlife advocates, public affairs officers, tourism interests, environmentalists, political representatives, industry representatives, resource agency fire managers, smoke and health management agencies, water quality agencies, fire researchers, ecologists, and private-sector prescribed fire practitioners. Consistent with the Policy Delphi protocol, the fire researchers and managers are treated as informed, separate, and equal constituencies (Turoff 1975), rather than as experts in the traditional sense. In the context

of a Delphi study, experts are recognized along a continuum of closeness with the issue being considered, not necessarily as a function of formal knowledge (Needham and de Loe 1990). In order to consider the importance of location and proximity to natural resource management activities, responses emerging from the Delphi were evaluated with regard for both social (affiliation with interest populations) and geographic context (affiliation with specific place or location).

The questions developed for the Delphi interaction were produced using existing literature regarding attitudes toward prescribed fire, and were reviewed by University of Montana faculty members for clarity, relevance, and comprehensiveness. Once revised, the first round of Delphi questions addressed the following issues: why prescribed fire should or should not be used on public lands, when prescribed fire is an appropriate management activity, who should determine appropriate applications of prescribed fire, and what concerns exist regarding the use of prescribed fire on public lands (see Appendix A). These questions were broad and open-ended with the intention of generating original comments and ideas from the respondents, and in an effort to avoid prematurely identifying perspectives and concerns.

A Policy Delphi deals primarily with statements, arguments, comments, and discussion (Turoff 1975), which make it highly suited to a qualitative analysis approach. The results of the initial round of questions were compiled and evaluated using content analysis techniques to identify and categorize themes expressed by the respondents (a detailed discussion of content analysis techniques is presented in the following section). Based on these results, a second round of the Delphi process was initiated, and included a summary of the first-round results and additional questions designed to clarify the various

perspectives regarding the use of prescribed fire. These questions addressed three categories of information: goals, process, and outcomes. Specifically emphasized were priority areas for prescribed fire treatment, decision-making processes and appropriate involvement of non-manager interests, and the relationship between risks, tradeoffs, success, and responsibility (see Appendix B). The Delphi exercise resulted in a series of emergent themes or categories regarding prescribed fire, defined in the responses and comments of participants.

*Specific objective 2: To evaluate the consideration of these interests in the existing fire policy.*

The second component of this study is a content analysis of the current fire policy in the context of identified concerns and an evaluation of which perspectives are present or emphasized. The qualitative analysis of the contents of policy documentation can yield insight into the nature of stakeholder interest related to specific natural resource issues (Peine et al. 1999), as well as insight into the representation of interests in policy statements.

### **Content Analysis**

Content analysis is characterized as a research method that uses a set of procedures to make valid inferences from text (Weber 1990). It is an inductive process of discovering significant categories or classes of information and the properties that characterize them (Schatzman and Strauss 1973). This type of analysis generally begins with a data-reduction process in which passages of text are classified or coded into a

number of content categories (Babbie 1998, Weber 1990). These content categories are contained within the text being analyzed, and it is up to the analyst to find and define the categories or codes as they emerge. Open coding is thus defined as the “analytic process through which concepts are identified and their properties and dimensions are discovered in data (Strauss and Corbin 1998).” The analyst is then charged with finding relationships between these categories and possibly to some larger question. Where possible, both the manifest and latent content should be coded; manifest content is the visible, surface content, while latent content is the underlying meaning (Babbie 1998). Qualitative data analysis begins with an examination of the data, which may yield a general hypothesis (Babbie 1998). The next stage of the analysis involves searching the data for contradictions of that hypothesis and using those cases to revise or reject the hypothesis (Babbie 1998). Procedures usually consist of conceptualizing and reducing data, elaborating categories in terms of their properties and dimensions, and relating through a series of propositional statements (Strauss and Corbin 1998). Content analysis is fundamentally a process of discovering and building rather than testing.

The analysis of data was conducted with the aid of the qualitative research computer software *Nud\*ist Vivo 1.1, 1998-1999*. The analyst performs the identification of themes, categories, and properties; however, computer software offers tools for accessing and organizing text according to the categories and codes defined by the analyst.

The data-reduction process by which text is classified in content categories presents some concerns in content analysis (Weber 1990). One problem concerns the consistency or reliability of text classification, and this problem is usually the result of

ambiguity of word meanings, category definitions, or other coding rules (Weber 1990). Reliability results when repeated measures with the same instrument on a given sample of data yields similar results (Holsti 1969). Reproducibility as a form of reliability is a minimum standard for content analysis because it measures the consistency of shared understandings (Weber 1990). Reliability depends on the analyst's ability to formulate categories for which empirical evidence is clear enough to promote agreement among competent judges that certain items belong to a category while others do not (Holsti 1969). A second set of problems concerns the validity of content classification (Weber 1990). A content analysis category is only valid to the extent that it measures the theme or construct the analyst intends it to measure (Weber 1990, Holsti 1969). Content validity, or face validity, is established through the informed judgement of the investigator, based on the plausibility of results and consistency with other information (Holsti 1969). It is most frequently relied on by analysts and is normally sufficient if the research is purely descriptive (Holsti 1969).

For the purposes of this study, content analysis is used in an unconventional manner. The categories or themes used to evaluate the prescribed fire policy do not emerge from the policy itself, but from participants in the Delphi process. More conventional qualitative content analysis was used to evaluate the Delphi responses and develop categories. The policy text was then evaluated for its treatment and recognition of the identified themes. The result is an integration of the Delphi and content analysis techniques that allows the various participating interests (rather than the researcher) to define the issues of significance and evaluates the existing fire policy within that context.

Certain categories and themes emerging from the Delphi had greater significance than others did, including areas of strong agreement, strong disagreement, and important policy implications. Themes roughly followed the basic elements of policy – goals, process, and outcomes -- and the ideas emerged from the data as a model of management strategy for prescribed fire use. The Delphi concepts are discussed in detail in the “Findings” chapter (Chapter 4). Main categories of information are discussed using the distinct ideas or themes that emerged in each category; for example, the category on goals is subdivided by the three different types of goals recognized and their supporting arguments. Relationships between the main categories are also explained, using the connections identified by the Delphi respondents. By framing the data in a model, a large amount of information is consolidated and simply described, reducing the complex data set into a clear picture of respondent perspectives. This format made it possible to present a comprehensive picture of the data, with most of the Delphi concepts included in the discussion and few ideas left out. Some of the ideas presented by respondents are not presented as part of the findings or policy evaluation; these are the ideas that were mentioned rarely, inadequately explained, or absorbed into the larger concepts that are discussed.

This study is based on evaluating the current prescribed fire policy in relation to the constructs identified by the Delphi exercise, and those concepts that provide the framework for the use of prescribed fire are those that might be expected in the national policy. Current federal fire policy documents were read and evaluated to establish the concerns addressed and emphasized in national policy, with specific attention paid to

identifying the ideas emphasized in the Delphi. Policy themes were then compared to the concepts generated by the Delphi exercise.

The current federal prescribed fire policy is comparatively evaluated in chapter 5, “Comparative Policy Evaluation”. The policy is described in terms of the key points and particular areas of concern addressed in the policy text, with relationships to relevant Delphi concepts discussed. Highlighted in this evaluation are ideas that are conspicuously absent from the policy statements, positions that are in direct contrast to any identified in the Delphi exercise, and positions on a topic that favor one Delphi perspective over another. The policy evaluation is thus a narrowed discussion of the Delphi themes, and it focuses on potential discrepancies or sources of discord.

## **Chapter 4: Findings**

The Delphi exercise conducted in the summer and fall of 2000 yielded substantial information regarding perspectives on the use of prescribed fire. Study respondents addressed a variety of management dimensions that are presented here in four distinct categories: the process to identify goals, goals for the use of prescribed fire, geographic priorities and scale, and potential constraints. Each of these broad categories is described using ideas that emerged from respondent comments and are supported by examples from the data collected. Respondents expressed agreement on several of the ideas presented, but in other dimensions perspectives varied widely. Contradictions and dissent among participants are discussed within the context of the appropriate emergent concepts.

Several of the ideas and issues associated with prescribed fire that were identified through the Delphi exercise were expressed by a portion of the respondents, with no contrasting views emerging. These concepts are important to the discussion of prescribed fire as a management strategy; however, they are not presented as issues of either agreement or disagreement among respondents, simply as concerns raised in the conducting of the Delphi. Some information is provided regarding the proportion of respondents identifying a particular perspective, but the respondents are not a generalizable, representative sample. The purpose of the study was to identify a range of perspectives and concerns, and it is those ideas that are emphasized in the findings. This presentation of findings thus focuses primarily on the concepts and themes that emerged in the Delphi responses, rather than the concept of majority perspectives.



### **Process to Identify Goals**

The process to identify goals component of prescribed fire management focuses on the roles of different potential participants, primarily in different goal-defining strategies. A large emphasis in these processes is directed at the importance of knowledge and science as the basis for goal identification, and as a result, the appropriate role for scientists. Process concerns also emphasized appropriate public involvement and the authority of land managers in prescribed fire decision-making. In addition, respondents identified specific fire management plans as an important component of management and a specific guide for prescribed fire activities. These concepts are presented in this section according to dimensions of knowledge, participation, land management authority, and planning.

### **Dimensions of Knowledge**

Science and knowledge have historically played a central role in natural resource management strategies, and continue to be a powerful force in determinations of management. The importance of knowledge, and particularly scientific knowledge, emerged throughout the ideas presented by Delphi respondents. This Delphi exercise was designed to include scientists and the “scientific” perspective as one interest on equal par with the other perspectives; however, a range of interests specifically highlighted the importance of scientific information. Many respondents expressed that a certain level of knowledge is a prerequisite for participation in resource management. Half of the respondents, representing a range of interests, mentioned the importance of scientific information as the basis for sound resource management and prescribed fire application.

Several respondents stated goals for the use of prescribed fire should be “based on science” and research, and science was often expressed as the primary criteria for goals and decision-making. Science provides the foundation on which all other discussions about management activity should be built. For many respondents, the more “scientific” management activities are the better they are, and scientifically determined objectives take precedence over socially identified goals.

*“Goals for Rx fire use must include public and resource management specialist input, and should be based on sound science.” (Participant 13)*

*“Science and facts [should determine the goals for prescribed fire]...if those cannot be ascertained then public input should be sought with the idea of what would be best for the most amount of people (you will not please everyone).” (Participant 22)*

*“The Forest Service and other land management agencies need to clearly define and articulate the goals, which should, of course, be based on science.” (Participant 23)*

Some respondents, however, expressed concern about the reliance on scientific information, both because there is need for more research and because the existing knowledge is uncertain. Respondents expressed concern that the implications of prescribed fire activities are not fully understood, so the current level of knowledge about its effects and proper use may be insufficient.

*“The science is lagging behind with most of the federal agencies' emphasis being placed on on-the-ground implementation...The science and skills required to conduct a thoughtful prescribed fire program on federal lands is not there.” (Participant 25)*

*“And above all, let the public know that prescribed burning is not an exact science but from experience it does far more good than harm.” (Participant 17)*

At the other end of the spectrum, a few respondents discussed an important but limited role for science, recognizing that scientific information is only one of a

combination of important factors. Basing decisions on sound science may thus be an oversimplification of the decision process. While recognizing that scientific knowledge is important, these respondents may be less likely to place scientifically identified goals above those established through a balancing of different social values. Respondents in this perspective include a timber industry representative, a wildlife advocate, and a research ecologist.

*“As foresters have learned over the years, it doesn't make any difference if you have sound science behind a choice...some people just don't like it.”*  
(Participant 9)

*“At this point, society has to engage in a decision process that includes not just the science basis, but the realities and practicalities of individuals, communities and social values.”* (Participant 7)

*“...decisions are not based on purely technical, science information, but are made after combining science information with relevant policies, social values, and economics. Scientific information thus has only a limited, but still important role in these decisions.”* (Participant 14)

For Delphi respondents, the importance of scientific information is likely based on the presumption of objectivity. There is an underlying acceptance of scientific information as fact or unbiased knowledge, making it a credible source of information and perhaps giving it more significance than other factors in management.

Because scientific knowledge was highlighted so frequently in responses, it is important to examine the role of scientists in the management strategy outlined by respondents. Perspectives on the appropriate role for scientists ranged from high levels of involvement to a contribution much more removed from the management process. These roles included goal setter, a partner in the process, an educator, and a generator and

source of information. These different roles are described within the context of goal definition participation described in the following section.

## **Participation**

Participation in the defining of goals for the use of prescribed fire emerged as an important dimension of the management strategy. The concepts regarding whom should be involved in establishing overarching goals for prescribed fire activities can be subdivided into two types of process: exclusive and inclusive processes.

Exclusive: Exclusive processes identified by respondents are characterized by the allocation of authority in goal definition to a specific group of individuals.

For some participants, goal setting is the sole province of resource managers (4 out of 25); this perspective most closely reflects the current strategy for land management, and as a result, prescribed fire management. Three of these four respondents are affiliated with some government entity, and include a land manager, a scientist affiliated with a land management agency, and a city air quality specialist. The fourth respondent is a rural resident.

*“The forest service and other land management agencies need to clearly define and articulate the goals...a clear articulation of the goals is necessary to gain local and national support...”* (Participant 23)

*“The local land manager and his/her staff are the only appropriate ones to define goals...”* (Participant 18)

This position is supported in part by views regarding the system of federal government in the U.S. According to one participant, a rural resident, the public is ultimately, if indirectly, responsible for the definition of goals and the conduct of land management via

the election of representatives to Congress and subsequent congressional decisions regarding the direction and funding of land management through the appointed agency officials.

*“...we vote in our Constitutional manner to elect representatives to make certain levels of decisions for our collective good... Our representatives have seen fit to establish an Agency to carry out the work required to accomplish and fulfill the purposes of these National Forests. Now we want the general public to get into the act and be a part of the ‘decision making process’? Baloney!...Local people can, however, inform their congressional representatives as to their likes and dislikes.” (Participant 10)*

The role of scientists in this perspective is as a generator and source of knowledge. It removes scientists as a participant in the goal definition process and restricts them to an informant capacity that indirectly affects the determination of goals via the land managers. This indirect role is based primarily on the desire to maintain a level of objectivity and independence from management decisions.

*“Educating the professionals (through communication of research results, classes, and just meeting together) both while they are in school and in continuing education opportunities (partnerships, conferences, special meetings, classes). We academics don't track the realities of land management well enough to be decision makers - an academic that is pretending to be a land manager is probably coming up short in their academic roles: unbiased educator, objective researcher and service professional.” (Participant 3)*

*“The role for scientists to play is one of monitoring, testing new methods and technology and giving the managers results of research. I don't see this role changing from that of our Forest Service traditional past.” (Participant 18)*

*“The biggest role of scientists should be to provide information to decision-makers. They should be used to predict outcomes and analyze results. If given too much influence in decision making, they might tend to bend their science to match a predetermined outcome.” (Participant 9)*

These respondents express concern that increased involvement and participation in management strategies may compromise the objectivity of scientists and research.

However, given the level of importance placed on the information they provide and their

perceived objectivity by respondents, increased participation by the scientists themselves may improve the development of goals as well as offer insight into other perspectives that may further the pursuit of scientific knowledge.

In contrast to the distancing of scientists from goal and decision processes described above, the second exclusive process identified through the Delphi recognized scientists as the primary goal setter. One respondent, an environmentalist and rural resident, identified scientists independent of land management agencies and other interests, as the appropriate group to define goals for prescribed fire activities.

*“Scientists independent of the USFS and timber industry [should determine the goals for the use of prescribed fire].” (Participant 6)*

This perspective is based on the belief that independent scientists represent the most ecologically-oriented viewpoint, unaffected by economic incentive or self-interest. This respondent places ecological values above other values, and anticipates that scientists will be the most likely to define goals that prioritize ecological concerns.

Inclusive: Inclusive processes are those that call for involvement of multiple parties in goal setting. The identification of these types of participation spanned a variety of interest populations, and reflect the increasing attention that new means of participation have been receiving in recent years. Mounting dissatisfaction regarding natural resource management has prompted discussions about improved public involvement, and the inclusive processes identified by respondents reflect these growing concerns. The primary difference in the two types of inclusive process identified involves who is included.

The first type of inclusive process focuses on the involvement of citizens and resource managers. Most of the respondents (12 out of 25) identified citizens and resource managers as the primary participants in goal definition and broad planning processes.

*“Agencies and the public should work together, a process essential for public land management and required by NEPA, to determine the management goals of land areas.”* (Participant 23)

*“The public should be involved in setting some goals...”* (Participant 6)

*“...agencies, the public community at large and locally, plus prescribed fire practitioners need to all have a part in developing prescribed fire goals.”* (Participant 21)

*“Local people should be active participants...local people can bring a full range of social and cultural parameters to the decision process. Their involvement will result in a broader range of alternatives and, likely, better acceptance of implementation.”* (Participant 7)

As with the above, manager-focused exclusive process, scientists in this process are likely to act as educators and generators of knowledge. As previously discussed, knowledge and science are believed by respondents to be essential to any prescribed fire activity, and are important to any decision-making process.

The second type of inclusive process is notable for its wider range of identified participants. A few Delphi respondents, including a research ecologist, a wildlife advocate, and an environmentalist, commented that citizens, resource managers, scientists, and organized interests should define the goals for prescribed fire through open dialogue and partnership efforts.

*“...goals should be defined...by civic dialogue among managers, scientists, and the interested and affected public”* (Participant 14)

As a subset of this type of inclusive process, one Delphi participant, an environmentalist and academic, identified community-based stewardship as a strategy for prescribed fire management. Community-based stewardship differs slightly from the inclusive processes identified by other respondents; while most of the proponents for expanded involvement were focused on inclusion in goal definition, community-based stewardship broadens the scope of involvement to include implementation. According to collaborative stewardship, instead of being relatively restricted to developing goals, the inclusive participation of interested parties – citizen interests, political interests, scientists, and resource managers – should begin with goal definition and continue through specific decision making, implementation, and evaluation activities.

*“I’m acquainted with several US Forest Service projects that have demonstrated the viability of collaborative stewardship as a new approach to ecosystem and community sustainability. These give me some hope that we can begin to address some of the major forest health problems that the public land agencies cannot tackle alone, and for which they have not been able to gain congressional support. I have learned that public lands must become a civic responsibility, and that we in the community can not simplistically expect that they can be taken care of by the public land agencies alone..”* (Participant 5)

In this second type of inclusive process with a wide variety of participants, the role of scientists is as a partner and educator. Respondents identified scientists as individuals acting in a “collective” body that includes citizens, other interests, and land managers, contributing informed judgments and providing ecological information to inform the dialogue. This role requires a level of active participation by scientists and researchers with a variety of people as opposed to only land managers.

*“So it is the collective will of managers, scientists, and the public who should determine when prescribed fire is appropriate...Scientists should be able to provide information and informed judgements about the need for and the potential outcomes of using prescribed fire. Scientists also have an important*



*role in helping the public and managers assess and weigh the consequences of different actions. Scientists should not be making the decision about using or not using prescribed fire because they do not have the authority for making such decisions.” (Participant 14)*

*“Most important role for scientists is providing information, knowledge, and consequences of and about various fuel treatment regimens. Scientists should provide the substance of public dialogue and decision making in the context of resource/biological realities. This includes making the information understandable and available-i.e. being an educator ” (Participant 7)*

Few comments were made, however, identifying specific means of bringing these various participants together in inclusive processes. “Civic dialogue” between participants was mentioned, and other responses included references to general planning processes that currently exist in the framework of Land Management Plans.

*“ [goals should be defined by] the public through the Land Management Planning process”. (Participant 15)*

*“Information is provided to the public on what the professionals and experts decide once the goal/scope/location issues are settled in the standard existing planning process.” (Participant 3)*

It is important to point out, however, that the existing planning process generally involves goal and plan development by land managers prior to any public input. Existing processes do not as a result incorporate respondent ideas of inclusiveness in goal definition, though Delphi respondents failed to address that inconsistency.

As discussions about new means of public involvement have increased in recent years, concerns about which citizens should be included and which concerns are more relevant have emerged. The respondents in the Delphi exercise recognized differences between local and regional or national interests, and in some cases made specific comments regarding appropriate incorporation of these interests. Some respondents believed that local communities should take some precedence in public land issues, while

others emphasize national concerns. Respondents emphasizing local involvement include two air quality specialists, a land manager, a timber industry representative, and an environmentalist. Respondents emphasizing national interests include a fisheries ecologist, an environmentalist, and rural resident.

*“The restoration goals and prescribed fire plan should be developed by a team of public land managers and members of local communities, with appropriate involvement of relevant regional and national constituencies.” (Participant 5)*

*“Land regulatory agencies, the public community at large and locally, plus prescribed fire practitioners need to all have a part in developing prescribed fire goals. This would include and emphasize the immediate risk takers, land managers, affected land owners, and fire management officials.” (Participant 21)*

*“Public that should have more weight would be people who own land adjacent to the prescribed burn area.” (Participant 17)*

*“Needs of local communities should be integrated, where feasible, but only when they are consistent with national goals for management of federal lands.” (Participant 25)*

Few respondents actually expressed how the balance of interests should be designated, reflecting the ongoing uncertainty regarding how to address this concern in changing public involvement strategies.

A potential benefit of inclusive processes is the transfer of knowledge or learning that may result. The mechanism of interaction and dialogue may yield more creative options as well as build support for management activity on public lands.

*“If the public had more knowledge of prescribed fires they might accept them better ” (Participant 4)*

*“Without local knowledge, local involvement, and local support no federal fire program can have long term success...Assuming that they have knowledge and information provided by resource managers, local people can bring a full range of social and cultural parameters to the decision process. Their involvement*

*will result in a broader range of alternatives and, likely, better acceptance of implementation.” (Participant 7)*

*“These are times when the agencies badly need community support and assistance of various forms, if they are going to be able to do their work effectively or at all.” (Participant 5)*

The appeal of learning through involvement and dialogue is based in part on developing acceptability in natural resource management. The acceptability of options emerges as an important factor in decisions about implementing prescribed fire, and will be discussed in more detail in the “constraints” section of the chapter.

Those respondents identifying a manager-exclusive process as appropriate were also the primary respondents who raised concerns about public involvement in the decision-making process. Three respondents expressed a concern regarding extensive public involvement and collaborative process, based both on principle and on practicality. One respondent, a rural interface resident, argued that these types of processes contradict the principles of our democratic republic. The U.S. system of governance is based on the representation of the people via elected officials. This argument does consider it valuable to integrate local community concerns where possible but contends that the real authority for public land management lies with the federal agencies, which take direction from elected representatives.

Another argument against extensive public involvement emphasizes motives and mistrust. One respondent, an environmentalist and rural resident, feared that self-serving local interests would have too much power in decisions on public lands.

*“Definitely not as full partners. The nation does not need a sagebrush rebellion disguised as fire prevention. Too many local communities are in the grips of irrational greed and antiquated worldviews that are demonstrably running ecosystems into the ground. We can not afford to sacrifice the foundation of life*

*(ecosystems) to making a living off logging or to political showmanship at the county level.*” (Participant 6)

Finally, concerns about the practicality of such an approach surfaced. One respondent, an air quality specialist, believed collaborative approaches would make it impossible to actually implement any prescribed fire activity.

*“But professional land and fire managers cannot do their jobs and actually get anything accomplished if the public is asked for their opinion before, during and after every burn.”* (Participant 23)

Concerns regarding increased public involvement expressed by a few respondents also reflect a perspective common to a large proportion of the study participants. Most of the participants indicated that the land management agencies have a specific authority in managing resources and applying prescribed fire, and this perspective is described in the following section.

### **Land Management Authority**

The inclusive and exclusive processes described above (with the exception of community based stewardship) focus on participation primarily in the development of goals. While some respondents believe the inclusion of a variety of interests is important to goal setting, most respondents agreed that the responsibility of implementing prescribed fire and making specific determinations regarding its use on public land belongs with land managers. This perspective is based on the authority, expertise, responsibility, and accountability of public land and resource managers.

Almost 75% of respondents, spanning a variety of interests, identified natural resource managers as the appropriate party to make specific implementation decisions

and apply prescribed fire treatments. As previously discussed, many respondents described open and inclusive processes for defining goals in land management and prescribed fire use; however, specific decisions regarding implementation of actions were found to be the province of land managers acting in their assigned capacity.

*“An interdisciplinary team of resource management and fire management specialists needs to make the determination on the appropriate use of fire to achieve a stated desired condition. The decision to use Rx fire verses some other alternative is the responsibility of the appropriate line office (DFR or Forest Supervisor).” (Participant 13)*

*“...the U.S. Forest Service and the head or director of the prescribed burn unit with other forest service units that could help with input. The public should have some input that should be able to carry some weight but ultimately the decision [about when prescribed fire use is appropriate] should lie with the forest service.” (Participant 17)*

*“Technically and legally, the designated decision-maker or line officer has the authority and responsibility for making this determination... Ultimately, this determination about the appropriateness of prescribed fire should come out of a civic dialogue among managers, fire scientists and ecologists, and the public, working through the process to develop the Fire Management Plan. When a decision needs to be made, the fire staff then refers to the Fire Management Plan and offers a recommendation to the line officer that reflects the current situation, the Plan direction, and the results of the civic dialogue... Bottom line: the line officer makes the official determination that reflects the recommendations borne out of civic dialogue.” (Participant 14)*

The determination that land managers are granted the authority to make official and specific decisions about the use of prescribed fire is based on the concepts of expertise, responsibility, and accountability.

Professionalism and expertise are central to the idea of authority in decision-making, again highlighting the importance of knowledge -- at this stage specialized knowledge -- in resource management. According to respondents, it is these qualities

that give managers the ability to weigh circumstances, tradeoffs, and options in making decisions about prescribed fire activities.

*“Land management agencies with the responsibility, authority and expertise should be the first to determine when the use of prescribed fire is appropriate.”*  
(Participant 7)

*“A committee of professional land managers who can analyze the cost and risk of prescribe burning and who can determine/recognize the benefits of prescribed burning [would help ensure] that the fire is used effectively to meet the goals...”*  
(Participant 24)

However, a few respondents, including two land managers and a fisheries ecologist, also expressed concern that training and experience of land managers may be inadequate.

*“The system still works where the Prescribed Fire manager and the local land manager and interdisciplinary staff decide on the objectives, limits and opportunities for burning. We may need to be sure that the folks doing that planning are adequately trained and experienced.”* (Participant 18)

*“Field unit ‘Fire’ staffs are often recycled timber staff with little knowledge of even the latest science.”* (Participant 25)

Managers have a responsibility to adhere to policies, management plans, and prescriptions. Respondents (12 out of 25) both recognized this responsibility and indicated that resource managers should be held accountable for decisions in order to encourage responsible decision-making. This responsibility and accountability justifies in part the decision-making discretion and authority afforded natural resource managers. Respondents specifically identifying the responsibility and accountability of managers include two air quality specialists, a timber industry representative, a wildlife advocate, a rural resident, a county advisor, two land managers, an interface fire chief, two ecologists, and a prescribed fire contractor.

*“Agencies need to work with the public to set goals and, in that process, acknowledge where and when fire would be an appropriate tool. After a*

*decision is reached, managers should determine specific uses of prescribed fire; they should be held accountable for using fire within the framework of whatever the planning process produced.” (Participant 20)*

*“I may be naive, but feel strongly that the agency manager is still responsible and accountable for his/her decisions and that role cannot be abrogated nor re-delegated. That is part of the job and depends on meeting the criteria outlined in policy and direction and using well-qualified staff to build plans and prescriptions...Also related to this issue, making "no decision" is an abdication of the authority and responsibility. Making a decision to not burn an area such as a municipal watershed or major recreation area only postpones the inevitable. All forested ecosystems are fire dependent ecosystems.” (Participant 18)*

Accountability of land managers is relevant to both non-action and action decisions. Four respondents, two ecologists, an industry representative, and a wildlife advocate, identified some level of manager accountability for non-action decisions. However, the level of accountability for the outcomes that result of not implementing prescribed fire activities is difficult to determine, as are the repercussions of enforcing that accountability.

Presented here are a variety of perspectives regarding the accountability of non-action choices, which illustrate the difficulty in establishing a standard for accountability.

*“...and managers are responsible for implementing policies on the ground, and every manager I know of strongly considers the outcomes of non-action in the exact same light as the outcomes of action. In other words, not taking action has the exact same authority and accountability as taking action. And this is the exact reason why so many managers are itching to treat fuels because if they don't, their non-action will be held accountable for any negative outcomes that result.” (Participant 14)*

*“A tough question. Almost like telling the public to get flu shots in the face of an outbreak. Managers have responsibility for informing the public about risks and consequences. I understand that prior to Los Alamos fires, it was well recognized that such a risk existed. If the public was informed and managers could not take corrective action because of public sentiment, budgets, or man power issues, then I fail to see where a responsible manager could be held responsible for not treating an area.” (Participant 7)*

In making decisions about the application of prescribed fire, managers assume any risk that accompanies their choice, be it the risk of severe wildfire or continued ecosystem degradation without treatment, the risk of a prescribed fire escaping, public and staff safety, or the risk of unanticipated consequences with the application of fire. Respondents frequently alluded to this assumption of risk and the attendant complexity of decision-making. These concerns are expressed in a variety of comments, each touching on the uncertainty inherent in the determination to act or not to act.

*“...the use of RX fire where loss to irretrievable resources would occur could be questioned. For example the loss of cultural resources, or unknown effect on a limited supply of a threatened and or endangered plant species. The risk of withholding the use of prescribed fire to the very resources we are wanting to protect needs to be fully disclosed.” (Participant 21)*

*“[Prescribed fire is inappropriate] when it is too dry. When it is too close to residential areas. It also could be an area that would be too difficult to fight a fire if it got out of control.” (Participant 4)*

The balancing of risk is directly connected to the authority and responsibility allocated to land managers in applying prescribed fire. The reduction of risk is an important component in the goals identified for prescribed fire use (addressed in the “Goals” section), and the risk of escape is an important secondary constraint on the use of prescribed fire. In assuming responsibility for resource management, managers are also faced with accepting whatever risk accompanies their decision.

## **Planning**

Several respondents commented on the importance of having a specific plan on which to base implementation decisions. Plans should explicitly define site specific objectives and the appropriate circumstances for using prescribed fire, and should



prioritize different activities. Prescribed fire activities and plans should remain consistent with broad land management plans and objectives, and thus represent a combining of goals with specific physical parameters.

*“Ultimately, the Fire Management Plan should spell out exactly what the circumstances are for determining when the use of prescribed fire is appropriate and when it is not appropriate, and again, the circumstances for appropriateness will vary from one place to another, and over time... When a decision needs to be made, the fire staff then refers to the Fire Management Plan and offers a recommendation to the line officer that reflects the current situation, the Plan direction, and the results of the civic dialogue.” (Participant 14)*

These specific plans are intended to serve as a roadmap or foundation for decision-makers. The purpose of a plan is to have documented guidelines for the direction, appropriate parameters, and prescription for prescribed fire activities. However, respondents also identified the importance of flexibility in prescribed fire activities.

*“...provide more flexibility in the application of Rx fire implementation plans on the ground.” (Participant 13)*

How to reconcile these two ideas is a difficult prospect; it may be difficult to adhere to specific standards and prescriptions while still allowing for some manager flexibility. Comments were not offered regarding how flexibility might help improve management activities, and it may contribute to the individual manager’s balancing of risk, described in the “constraints” section. However, flexibility might also provide managers with an opportunity to more effectively address other management issues that emerge at the local level; for example, community concerns and approval.

## Goals for the Use of Prescribed Fire

The goals for the use of prescribed fire identified by Delphi respondents can be divided into three distinct types of objectives: ecological process, human benefits, and protection objectives. For the different respondents, these objectives provide reasons why prescribed fire should be used in natural resource management strategies. A large majority of respondents identified components of multiple goal types, recognizing a role for prescribed fire in addressing a number of different goals. Respondents who were concerned about ecological function also identified prescribed fire as a means to address protection concerns, and vice versa.

### **Ecological Process**

One of the goals identified for prescribed fire is the reintroduction of natural process. By applying prescribed fire to the landscape, the role of fire in ecosystems could at least be approximated if not replicated. Prescribed fire thus functions in place of natural fire in an attempt to achieve the associated benefits.

*“Generally, goals for the use of Rx fire are umbrellaed under the role of fire in maintaining or enhancing naturally occurring ecosystem processes...”*  
(Participant 13)

*“I believe the goal for the use of Prescribed fire must follow in line with the natural role of fire in the forest ecosystems. That is to maintain the cycle, the vigor, diversity and renewal of the cycle of life, growth, maturity, old age, death, birth and renewal in fire dependent forest stands.”* (Participant 10)

*“...when prescribed fire can be demonstrated to mimic the effects of wildfire as an ecological process.”* (Participant 7)

Another important component to the ecological process objective also emerged –the approximation of natural process should reflect the historic fire regime of the area.

*“I think we should reintroduce fire in all places where the ecosystem previously existed with it.”* (Participant 11)

*“...with the ultimate goal of a healthy forest of the 1890-1910 era.”* (Participant 16)

*“It is appropriate to use this tool to mimic natural disturbance processes within the historic range of the natural fire regime (season, intensity, frequency).”*  
(Participant 25)

Respondents described a recreation of the past role of fire; however, they did not explicitly recognize that both the physical and social context of fire on the landscape is entirely different or describe what parameters define historic conditions.

Respondents also identified the importance of some historic or more “natural” forest condition that is more desirable for public lands and serves to support and maintain ecological process. These desirable conditions are based on concepts of ecosystem or forest health and integrity. Over 70% of respondents commented on the potential for prescribed fire to be used to achieve healthy, sustainable natural systems on public lands. Forest health is a notably abstract concept that is difficult to define in specific terms. Indeed, respondents did not define terms like “health” or “natural” is, though this concept was overwhelmingly an important goal of management activity. This idea also incorporates the importance of achieving forest conditions that allow for a more natural fire regime – to enhance the ability of wildfire to function naturally in ecosystems.

*“The first and most important goal is to restore natural fire and its role in sustaining the ecological integrity of fire-dependent ecosystems and landscapes.”* (Participant 14)

*“Focus on areas where prescribed fire can safely move the ecological unit back to the acceptable range of natural variability.”* (Participant 21)

*“...minimal, targeted Rx fires to bring fuel load into range of being allowed to let wildfire take its course”* (Participant 6)

*“There is considerable country that needs to have fire re-introduced in a much more natural role than has been allowed in the past.” (Participant 18)*

Two of the respondents, an environmentalist and an ecologist, that mentioned aspects of natural fire and its function also expressed dissatisfaction with prescribed fire as a substitute for natural process.

*“I would like to see wildfire return to its natural role, which would obviate the need for prescribed fire...ultimate goal is to reduce fuel and conifer encroachment to a point where managers can back out and let nature manage the public forests. Managers can concentrate on managing people, recreation.” (Participant 6)*

*“For example, in most areas social risks to life and property will always be more important than the ecological problems caused by fire suppression. Further, in these areas prescribed fire will not be used in the same conditions under which a natural fire would burn, so the ecological effects of a prescribed fire will always be different from a natural fire.” (Participant 14)*

Forest health is also intertwined with the idea of restoration on public lands, the idea that these areas must be repaired and returned to some desirable, healthy condition. The premise, according to respondents, is that many of these lands are currently in an unhealthy state, a condition that has resulted from the fire suppression efforts of the first part of the century.

*“Reintroduction of a natural ecosystem process in the course of restoring or rehabilitating an area...” (Participant 3)*

*“...restore or improve the life of the forest which includes wildflowers, shrubs, trees, etc along with wildlife.” (Participant 24)*

One third of the respondents commented on the need to rectify the changes in the forest that resulted from previous management strategies, specifically the removal of fire from federal lands.

*“...compensate for past errors in fire management where natural fires were extinguished, thus eliminating their ecological role. . Prescribed fire is*

*appropriate when there is a risk of catastrophic fire due to unsustainable, unbalanced ecosystems. In such cases, fire should be utilized as a forest restoration tool. These conditions typically exist where fire has been excluded due to past management policy, and/or in areas where excessive fuel loading has occurred subsequent to inappropriate timbering, grazing, etc.” (Participant 5)*

Again, this perspective highlights the importance of fire performing its ecological function, and the use of prescribed fire to restore areas to more natural conditions.

### **Human Benefits**

This set of goals addresses the use of prescribed fire to alter the forest condition in order to provide certain benefits to people. Prescribed fire is identified as a tool for achieving certain objectives defined through the planning process. Specific short-term objectives or management targets include stand structure modification, seedbed preparation for regeneration, wildlife habitat improvement, watershed modification, and invasive species treatment. These goals are part of the overall land management, with prescribed fire a possible tool to address them. Over 70% of the Delphi respondents discussed the application of prescribed fire to achieve short-term specific objectives like those listed above.

### **Protection Objectives**

This category of goals focuses on protecting certain values from the threat of wildland fire. Concerns about wildland fire are grounded in ideas about risk and protection. According to respondents, uncontrolled or severe wildland fire poses a risk to people, property, and the natural resources themselves, and the build-up of fuel on public lands contributes to the potential occurrence and severity of wildland fire. A large

majority of respondents identified the reduction of those fuels as an appropriate goal for the application of prescribed fire.

*“Fuels reduction... to avoid or minimize stand-replacing events”* (Participant 3)

*“...reduction of fuels to inhibit spread or reduce severity of subsequent wildland fire”* (Participant 20)

*“If there is a lot of undergrowth a fire will burn much hotter sometimes scarring the land; also if a fire reaches these heavily overgrown areas they will lead to fires that can become uncontrollable.”* (Participant 8)

Fuel reduction is intended to reduce risk and protect certain values. Though there were concerns about the protection of natural and cultural resources (e.g. archaeological sites), the two most often mentioned concerns were for the safety of people and the protection of property.

*“...hazardous fuels reduction for the protection of high value resources, Forest Service improvements (structures, bridges, etc.), and the protection of neighboring private or other agency resources and property.”* (Participant 13)

*“The second goal, [after restoring the forest to conditions supporting natural fire] although not as important in my world-view, is to reduce fuel accumulations that currently impose a significant risk to human life and property.”* (Participant 14)

Though most of the respondents expressed concern about the risk wildland fire poses to property, two distinct points of view emerged regarding what the appropriate use of prescribed fire by federal land management agencies should be. Several people expressed that it should be used to reduce risk to property, including private property.

*“[Prescribed fire should be used] to reduce fire danger within the urban-wildland interface area (directly adjacent to homesites, power lines, historic sites and other high-value structures/areas.”* (Participant 2)

Others specifically expressed opposition to public land management activity that is intended to assist private citizens in reducing the threat of wildfire. Some respondents felt strongly that interface areas should not have priority, and their protection is not the function of federal land management agencies.

*"[Prescribed fire is not appropriate when] it is used to address unsafe conditions on private in-holdings and on the urban-wildland interface which should be the responsibility of county planning departments."* (Participant 25)

The tension described above between treatment or non-treatment based on private property concerns centers on the wildland-urban interface areas, where private property is so closely intermixed with public lands. Fundamental to this debate is the concept of responsibility in reducing the threat of wildfire to residents and homes, and several respondents, including a land manager, a fisheries ecologist, and an air quality specialist, pointed out that residents in the interface should be expected to share in the responsibility.

*"I'm also deeply concerned that we are creating an impression that we can control fire by our use of prescribed fire. And this impression creates a false sense of security and trust in the minds of the public. This false sense of security and trust in turn leads to people doing stupid things, like building homes in the middle of forests with tons of accumulated fuels or not wanting to take actions to fire-adapt their home, and then assuming that the agencies will "take care of the problem" when a fire is rampaging towards their home."* (Participant 14)

*"Additionally, I said at Los Alamos, fire is neither bad nor good,...fire is natural. That means that there is tremendous responsibility on the county commissioner, realtor, and ultimately the landowner/homeowner to be aware of fire intervals and anticipated intensities in a specific area. The homeowner must be prepared to protect his/her home from the time it is being built and not depend on government to take care of and protect them. If people really want less government,...then they individually and collectively must be willing to shoulder some of the responsibility of self protection and accept the costs of such."* (Participant 18)

*“In the wildland-urban interface, private landowners need to take responsibility for making their homes defensible, since they have chosen to live out in the woods - and they must accept the fact that their houses might burn (just as those living in the floodplain may be flooded.) Land managers need to be allowed to prioritize based on a bigger picture - which must look beyond potential damage to property. If that is all that we should be concerned with we might as well keep putting the dollars into fire suppression.” (Participant 23)*

These comments emphasize that federal land management agencies should not be responsible for the care and protection of private property. Wildland-urban interface areas may be priority areas for treatment activities, but residents are being called upon to accept responsibility and take action of their own.

Though most of the respondents identified more than one type of goal for the use of prescribed fire, some explicitly recognized that competing interests complicate the determination of appropriate goals. Various interests have different stakes in the application of prescribed fire on public lands, adding to the complexity of decision-making and evaluations of acceptable activities.

*“This is dependent on the mission of those who have developed and identified whatever they see as necessary for a burn. As you are aware there are a multitude of reasons, priorities, agendas, etc., for a prescribed burn. They cross public and private boundaries as well as government, commercial, business and industry, consortiums, Conservancies, etc. I have no idea how to answer this question or even begin to answer this question as there are many competing interests.” (Participant 16)*

One respondent, an environmentalist and rural resident, pointed out that deeply held worldviews may be a source of unresolvable conflict when it comes to management issues.

*“There will be a virtually insurmountable divide between people who want to control and manage nature and those who don't. It seems plain to see that we can not control nature, especially when looking at forest fires. It is equally plain to some of us that the attempts to manage complex natural systems wholesale and without humility will ultimately result in the death/extirpation/extinction of many life forms, possibly our own. This realization makes forest management*



*issues a question of life and death for some while for others it is simply aesthetic or economic. The stakes are hugely different for these different world views and will complicate efforts to reach 'compromise' or 'consensus'...and rightly so."*  
(Participant 6)

Competition between interests complicates the effort to design acceptable management activities. As previously noted, inclusive goal definition processes may contribute to improved acceptability of management decisions by providing an opportunity for learning and providing managers with exposure to other perspectives regarding appropriate or important goals.

### **Geographic Priorities and Scale**

The geographic priorities and scale component of prescribed fire activities addressed where prescribed fire is most important and what the scope of management activities should be. Respondents identified "priority areas" for prescribed fire treatment, and expressed concerns about the extent of prescribed fire application.

#### **Geographic Priorities**

Respondents identified areas prescribed fire activities should be concentrated or emphasized in the short-term, based on the recognition that all areas in need of treatment cannot be treated at the same time. Responses in this category are closely related to the different types of goals identified above, and though few respondents explicitly prioritized the different goals, the comments on which areas should be emphasized offer insight into which goals take precedence for different respondents.

Comments regarding where prescribed fire use should be emphasized ranged between two distinct points of view. On one side, people emphasized the application of

fire on areas with the greatest potential for loss of lives and property – the wildland-urban interface. It is safe to assume these respondents view protection considerations as the highest priority. Respondents include a rural resident, a county advisor, and an ecologist.

*“In our area they would be overstocked, at-risk stands and starting with those closest to homes.”* (Participant 11)

Other respondents identified priority areas as those where the ecosystem process or forest health concerns were greatest, indicating a prioritization of ecological goals over protection objectives. These respondents include a land manager, an air quality specialist, an ecologist, and a wildlife advocate.

*“From a personal standpoint, I think the priority areas should be the ecosystems where the fire cycle has been the most disrupted, and the buildup of fuels and impairment of ecosystem health is most dramatic.”* (Participant 23)

*“Unique landscape features that are in danger of continued degradation in the absence of fire...”* (Participant 3)

*“Areas with a known and well recognized dependence on fire as on ecological process. These areas are important because through fire protection these past 65 years, and resultant vegetative changes, they are most likely to go well beyond a normal range of change when fires do occur ”* (Participant 7)

The tension between these two points of view is captured in the following statement expressed by an industry representative, which reiterates the issue of resident responsibility in protecting private property:

*“I have mixed feelings about the emphasis being placed on fuel reduction in the urban interface. It is certainly important to protect human lives and property. However, despite warnings of the dangers involved, people have continued to build homes further and further into the forest. Fire cannot and should not be eliminated from the forest. Many of these homes are not defensible, yet we are spending precious funds to reduce fuels in developed areas.”* (Participant 9)

Another respondent, a land manager, called for a balance that focuses on both high-risk interface areas and more remote areas.

*“The priority treatment areas must have some balance between WUI (wildland-urban interface) and the ‘back 40!’ There is considerable country that needs to have fire re-introduced in a much more natural role than has been allowed in the past. The recent disasters may focus on the Wildland Urban Interface,...but it all goes back to ‘fire is natural in all forested ecosystems and will occur’. If we withhold fire visits and defer action,...then Mother Nature will even things up as was done this year in Los Alamos and Idaho-Montana, in the Northwest in '96, and Yellowstone in 1988.” (Participant 18)*

## **Scale**

Almost one-third of respondents commented on concerns about the scale at which prescribed fire activities need to take place, and in doing so, highlighted an area of mutually exclusive perspectives. Most comments supported landscape scale prescribed fire activities to aggressively address management objectives. According to respondents, who include land managers, a wildlife advocate, an ecologist, and a county advisor, extensive activities are necessary in order to address the concerns about severe wildfire and restoration objectives. Widespread problems require widespread action.

*“...that it be applied at a scale and frequently enough to demonstrate a landscape impact.” (Participant 7)*

*“My own observations, related to forest health and watershed condition, tend toward more use of fire, not less. Where we have done Rx fires on a landscape scale, streams flow and wildlife habitat has been drastically improved. Risks of catastrophic fires have been reduced and soils have been retained.” (Participant 18)*

*“From my perspective, many people do not realize the problems our forests now face, and that lack of management lies at the root of the problem.” (Participant 10)*

One respondent, an environmentalist, explicitly rejected the idea of widespread activity. This perspective was based not so much on opposition to prescribed fire as on opposition to extensive management and manipulation of natural resources.

*“Only temporarily, a stopgap measure, carefully targeted to areas where the fuel loading is unnatural (due to past fire suppression)...keep management of wild forests limited to the margins.” (Participant 6)*

Perspectives on appropriate scale appear to be directly related to beliefs about the function and extent of natural resource management. Limited activity reflects a desire for limited management that is more inclined to let nature take its course. Demands for landscape scale activities indicate an emphasis on the importance and benefits of actively managing public lands. In the examples above, the first two comments advocating widespread activity came from respondents that identified the importance of ecological conditions, as did the respondent interested in limiting management activities. The prioritization of goals is similar, but the perspectives on achieving the goal are contradictory. These conflicting viewpoints exemplify the difficulty and complexity in including multiple perspectives in policy and in resource management; mutually exclusive viewpoints present little opportunity for reconciling differences in beliefs and values.

Related to this issue of scale, or appropriate extent of management, is concern about the use of prescribed fire in wilderness areas. Approximately 25% of the respondents specifically mentioned wilderness in their comments, and of those respondents their positions were evenly divided. A few people felt prescribed fire had no place in the management of wilderness areas, while others believed prescribed fire would appropriately support wilderness goals. Those respondents that believed prescribed fire is inappropriate in wilderness include a research ecologist and two environmentalists, while those that support prescribed fire in wilderness include a research ecologist, a land managers, and a county advisor.

*“One major concern is using management ignited (prescribed) fire in wilderness areas. That is, should fire in wilderness be limited to naturally occurring fire? This question may need to be answered on a case by case basis, depending on ecological conditions. I would lean towards not using prescribed fire in wilderness areas, assuming they contain relatively undisturbed and natural vegetation systems.”* (Participant 5)

*“I do consider it [the use of prescribed fire] a valid goal, particularly for wilderness areas and nature preserves...”* (Participant 20)

Concerns also emerged regarding the overuse of prescribed fire. Some respondents were afraid that prescribed fire as a tool would become a panacea for all problems on the forest, resulting in its misapplication. These concerns were expressed by the two industry representatives, a rural resident, a research ecologist, and a fisheries ecologist.

*“My primary concern is about the potential abuse of a tool (prescribed fire) by applying it indiscriminately.”* (Participant 14)

*“Prescribed fire is not a panacea that can be universally applied to correct all forest health concerns.”* (Participant 9)

Many respondents point out that while prescribed fire serves certain purposes and is an important management tool, it is only one of a host of tools available for forest resource management. Additional tools included alternatives to prescribed fire to meet objectives, discussed in the following section on potential constraints to prescribed fire use.

### **Potential Constraints**

The potential constraints component of prescribed fire use focuses on factors that complicate the use of prescribed fire. Potential constraints are subdivided into two categories: application constraints, which are those factors that impact the direct application of prescribed fire; and secondary consequences constraints, which emphasize

how tradeoffs and consequences of prescribed fire activities may constrain the attainment of prescribed fire goals.

### **Application Constraints**

Application considerations include organizational factors, timing of prescribed burns, and the suitability of prescribed fire activities in a particular situation.

Organizational Factors: The organizational or agency factors that may constrain the application of prescribed fire are centered on concerns about agency structure, the availability of necessary resources, and funding structures.

Concerns about agency structure deal primarily with bureaucratic relationships and structures, both intra- and inter-agency. Respondents expressed concern about the need for agency support of managers' decisions and emphasized the importance of cooperation and communication between and within agencies.

*“Some one needs to be truly in charge who has political clout and backing. The fire program needs to be supported by ROs [Regional Offices] and the WO [Washington Office]. It seems that when anything goes wrong those individuals are held responsible yet things will go wrong. We need to support them in doing a tough job. We also need experienced, confident people out on the ground running these programs.”* (Participant 11)

*“Appropriate circumstances [for applying prescribed fire] include having: a qualified and experienced work force, on hand readily available contingency resources, adequate support services such as logistical, aviation, weather, public information etc.”* (Participant 21)

*“[We need] better communication between staffs areas; i.e., public affairs, fire, timber.”* (Participant 8)

*“The prescribed fire program within the federal land management agencies is not integrated with other programs.”* (Participant 25)

*“I believe it is essential for the land managers and air quality professionals to continue to work together to integrate our respective goals of protecting the air and managing our wildlands.” (Participant 23)*

The two respondents affiliated with the timber industry expressed concern that appropriate management is impeded by inconsistencies between land managers and the broader land management agency.

*“Federal agency decisions are being dictated more and more by bureaucrats thousands of miles from where the decision will be carried out. These bureaucrats don't know the land like the locals.” (Participant 9)*

*“Prescribed fire is a ‘sexy’ policy for bureaucrats and politicians, but a thorny technical problem for correct application that actually achieves intended management objectives.” (Participant 12)*

Concerns about these bureaucratic structures and relationships are directly linked to some previously discussed concepts. Agency support of local land manager decisions is directly related to concerns about providing some measure of flexibility in the implementation of prescribed fire plans and prescriptions, as well as issues of responsibility and accountability. Cooperation concerns and the integration of the prescribed fire program with other programs is necessary if prescribed fire is to be used as a tool in support of natural resource goals like natural process and forest health. The concerns raised regarding the disconnect between land managers and the agency bureaucracy emphasize the importance of expertise in using prescribed fire, a lack of which undermines the authority of land managers. The integration of prescribed fire is thus a key concern in its implementation.

With the exception of one landowner, concerns regarding the availability of resources were raised primarily by land managers in the Delphi. These concerns focus on

the need to have adequate, qualified workforce and contingency resources available when conducting prescribed fire activities.

*“Appropriate circumstances include having: a qualified and experienced work force, on hand readily available contingency resources, adequate support services such as logistical, aviation, weather, public information etc.”*  
(Participant 21)

*“[My concern regarding prescribed fire on public lands is that] personnel qualified to plan, and carry out prescribed burns will not be available for the size of the job.”* (Participant 10)

The funding of prescribed fire programs was also an important concern, mentioned by approximately 40% of respondents, including a county advisor, an interface fire chief, a congressional staffer, two land managers, environmentalists, a wildlife advocate, and an air quality specialist. Comments primarily focused on the need to change budget and funding structures to facilitate more effective use of prescribed fire. Respondents were frustrated with the limited funds and other resources for managing prescribed fire while suppression dollars have no ceiling.

*“Provide a steady stream of funding - avoid the peaks and valleys [to address funding concerns].”* (Participant 13)

*“Why not have a prescribed fire authorization that allows a unit to order in contingency and needed assigned resources when in prescription. In practice these resources might be suppressing fire in lower elevations and conducting burns in higher elevations, optimally all paid from the same dollars. We need to give management ignited prescribed fire the same funding and resource ordering status as unwanted fire and managed wildland fire from natural ignitions.”* (Participant 21)

*“While we will always have naturally caused fires, the human and material costs when they occur in overstocked stands is not sustainable. Indeed one can ask whether it is a responsible use of public funds when prescribed fire management is available as a tool with a lot more predictable outcomes.”*  
(Participant 7)



*“Eliminate the vicious budget cycle of continued fire suppression (and the virtually unlimited budget to fight fires) followed by Rx burning budget to correct the mistake of fire suppression. (This dream formula for growing the USFS budget will prove impossible for the USFS to voluntarily forego) ”*  
(Participant 6)

These comments focus on the way money is spent in fire management activities, emphasizing the difference in funding structures for prescribed fire and fire suppression activities. Though expense was identified as an important factor in evaluating tradeoffs (see secondary consequences) of prescribed fire, none of the concerns about funding called for a reduction in the money available for prescribed fire. Respondents are perhaps primarily concerned with the efficient and effective use of funds, rather than the total dollars spent. The allocation of funds may be more important than the budget itself.

Timing: The season or timing of prescribed burns presents another potential constraint to prescribed fire activities. Approximately one third of respondents, commented on the issue of timing, recognizing that the impacts of burning vary according to the season of burn. Most of these respondents, including an academic ecologist, a county advisor, two environmentalists, and a fisheries ecologist, strongly supported applying prescribed fire when fire would naturally occur on the landscape.

*“Given fuel accumulations and safety issues, we are tending to burn at unnatural times (seasons). This makes for a slightly different kind of fire than during presettlement times, with unknown ecosystem effects, and it generates lots of extra smoke during a bad time of the year (e.g., air inversions). It is like reintroducing flooding to dammed river system, but doing it much lower than the normal peak and in the height of the dry season.”* (Participant 3)

*“[Prescribed fires] should be burned during regular fire season NOT IN SPRING, when birds and small mammals are nesting and wildflowers and forbs are making seeds, and the ecosystem is evolved to race ahead of the natural fire season that shaped the forest for eons.”* (Participant 6)

*“It is appropriate to use this tool to mimic natural disturbance processes within the historic range of the natural fire regime (season, intensity, frequency).”*  
(Participant 25)

Other respondents described different priorities. One respondent, an air quality specialist, emphasized the minimization of risk and air quality impacts, or minimizing tradeoffs; another, a land manager, referred back to the idea of specific plans and prescriptions defining the criteria for applying fire, regardless of season.

*“It is not appropriate to use prescribed fire where human lives, private property, or air quality will be placed at risk...It means timing burns so they least affect the airshed, using best management practices to reduce the amount of smoke produced, and investigating alternative treatments to reduce the amount of fuel that needs to be consumed by fire.”* (Participant 23)

*“Time to burn is directly related to the objectives and the prescription. We should meet the weather and fuels criteria and limits set in the prescriptions and burn when conditions are best, at any time of year. PERIOD! I believe that it is well documented in research that Rx burns do not emit smoke and particulates near to the scale that wildfires do. That alone dictates that we do more Rx burning and begin to lessen risk and extent of damage from wildfires.”*  
(Participant 18)

In support of the former argument for “in-season” prescribed burning, several respondents expressed an acceptance of increased risk in order to achieve those natural process goals.

*“Both high risk and low risk burning have potential negative consequences. Are you asking if greater risk is acceptable to achieve higher, loftier goals? Yes, I think greater risks are acceptable for greater gains.”* (Participant 14)

*“YES, [higher risk is acceptable to achieve natural process goals] if we intervene into complex natural systems that are the keystones to our existence we should do so only with great temerity and humility. We should mimic nature as closely as possible. The forest and its inhabitants did not evolve with spring burning but with fire season burning.”* (Participant 6)

*“Yes, I believe the situation at hand warrants risk taking in order for changes to be made on the land. However, the public at large must be better informed as to the risks and consequences.”* (Participant 7)

This acceptance of negative implications or tradeoffs on the part of some respondents is in contrast to potential risk-averse behavior on the part of land managers, described in the following section on secondary consequences.

Perspectives about the appropriate timing or season of prescribed fire activities may also be linked to the prioritization of goals. Similar to how emphasis on certain geographic priorities reflects on what type of goals is most important, different perspectives on timing may indicate a preference for focusing on a certain type of goals. Those respondents more likely to emphasize air quality and risk implications may prioritize protection objectives, while those who insist on the value of “in-season” burning are perhaps more likely to emphasize ecological objectives.

Suitability: The final component to application constraints encompasses the physical and social factors outlined above and is based on using “the best tool for the job”. Decisions regarding the use of prescribed fire must consider how suitable the tool is for accomplishing the defined goals and objectives, and nearly half of the study respondents referred to this concept of suitability. Expectations of success in meeting goals and objectives are an important component in determining suitability; respondents commonly used words like “success”, “accomplish”, and “achieve” when discussing the appropriate use of prescribed fire.

*“Prescribed fire is a tricky management tool to use, it should be used with caution and only when conditions exist to ensure that management objectives will be achieved. There are many circumstances when it is imprudent to use prescribed fire as a management tool - certainly when other tools are available to more closely achieve the objective.” (Participant 12)*

*“It is appropriate to use prescribed fire when (1) it is the best tool-- or the only tool-- for accomplishing the stated goals...” (Participant 20)*

*“In a broad sense prescribed fire is proper in all fire dependent ecosystems where the resulting fire effects meet the burn area objectives.” (Participant 21)*

Judgements of suitability are influenced by two basic concepts – the recognition that prescribed fire use has limitations, and the identification of alternatives to prescribed fire. Respondents frequently mentioned that prescribed fire may be more appropriate in some circumstances than in others, and its use may be limited by existing conditions.

*“I believe that anyone would/should recognize extreme drought and/or extreme fire risk due to conditions extant. We must be better prescriptionists and take note of limitations whereby disasters may result from our lighting the match.” (Participant 18)*

*“...prescribed fire has serious limitations and cannot be applied everywhere... let's apply fire where we can get the biggest bang for our buck. Also, prescribed fire should be used only when it's advantages outweigh those of other methods, such as mechanical treatment.” (Participant 9)*

*“Research, case studies and associated education and public relations to show the limited applicability of fire introduction without mechanical treatment. There are cases and places where we can do that, and plenty where we can't. That message has to get out there.” (Participant 3)*

Respondents noted that features like topography, soils, fuel conditions, and weather are important to consider in making determinations about using prescribed fire, and applying prescribed fire may not be appropriate in all circumstances.

*“...the ground must dictate the actions.” (Participant 18)*

*“As a generality, prescribed fire can be used as a successful management tool (to achieve objectives and goals) when the following parameters exist: Fuels loading and arrangements, weather, topography, soil type, ecotype and many other parameters are such that the resulting fire intensity, spread and other variables will achieve the management objective or goal.” (Participant 12)*

Over half of the respondents recognized that there may be alternative treatments to just prescribed fire for different areas, and several (including a county advisor, ecologist, rural fire chief, land manager, a tourism specialist, a media affairs official, an air quality specialist, an environmentalist, and a timber industry representative) specifically identified mechanical treatment as one of those alternatives. Respondents expressed concern about an increased risk of damage due to prescribed fire activities, as well as concerns about forfeiting other social values when mechanical treatment is not integrated.

*“There are many circumstances when it is imprudent to use prescribed fire as a management tool - certainly when other tools are available to more closely achieve the objective.”* (Participant 12)

*“Prescribed fire should be a tool used in conjunction with other tools to attain whatever the goals are for an area. Goals are to reach a conclusion-fire is often a means to reach a conclusion, but may not be the only or even the best method to attain an objective.”* (Participant 24)

*“Mechanical treatments, harvesting, Rx burning or Fire Use fires are all alternatives. We should use all of them in any combination to meet the objectives of a healthy forest and minimize risks to private lands.”* (Participant 18)

*“...for example where people have built homes right in fire prone areas, we should use mechanical means to maintain those forests.”* (Participant 11)

With the discussion of mechanical treatment options also emerged concerns about the economic issues associated with thinning and burning. A few respondents expressed a desire to see economic opportunities taken advantage of where possible, reflecting a traditional utilitarian perspective. These respondents, however, did not identify economic gain as a primary purpose for the use of prescribed fire. Rather, they were concerned about wasting potential economic opportunity where it may accompany prescribed fire activity. These concerns were expressed by a resident, a tourism representative, and a timber industry representative.

*“It is appropriate to use a prescribed fire if the goal is to control “heat” or extent or a public good has been established. I would also add the criteria that the area would be too difficult or cause too much environmental damage for a company/individuals to be able to log the dead trees out...my feeling is we should get some economic advantage if it can be had.” (Participant 22)*

*“In the process of deliberately setting fires, merchantable timber is destroyed even as local forest products manufacturing facilities are closing their doors due to lack of raw material. Merchantable timber should be removed, when appropriate, before the match is lit.” (Participant 9)*

Other respondents, two environmentalists, a research ecologist, and a county advisor, voiced strong concerns that no economic incentives should be attached to public land management.

*“The process and implementation should be entirely free of any possible commercial incentive... There is too much opportunity for abuse by timber beasts and the USFS has a long record of taking full advantage of any opportunity to log more... There should be no possibility of fire salvage timber sales from areas burnt by prescribed fire or escaped prescribed fire.” (Participant 6)*

Based on Delphi responses, it is difficult to determine which of these two perspectives has a greater preponderance. Of the respondents that addressed the issue, they were almost evenly split on either side. However, only a fraction of the participants identified the issue at all. The disagreement over economic opportunity versus economic incentive presents another set of diametrically opposed perspectives. These opposing perspectives are strongly related to questions of acceptability and the competitions between interests and values. These comments also reflect the questions regarding the motives of land management agency activity, and the issues of trust that permeate the climate of natural resources. Concerns about trust and misrepresentation are presented in the following section on secondary consequences constraints.

## Secondary Consequences Constraints

Secondary consequences focus on the impacts of prescribed burning that complicate management activity. This category includes dimensions of expense, negative and potential effects, inherent risk, and acceptability. The central element linking all of these concepts and concerns is the evaluation of tradeoffs – the idea that benefits from prescribed fire cannot be realized without being accompanied by some cost. The balancing of these tradeoffs is at the heart of potential secondary constraints.

Expense: One potential constraint to prescribed fire use identified by respondents is the expense involved with treatment activities. For many respondents, the cost of management activities is an important component of implementation. Respondents described two considerations regarding expense – the direct cost of the prescribed fire activities as well as the reduction in expenses (incurred in suppressing wildfires) that accompanies the reduced risk of wildfire. One set of costs directly or indirectly offsets the other, though how to evaluate that offset may be uncertain. Respondents expressing these concerns include two ecologists, a rural resident, a prescribed fire contractor, and an environmentalist.

*“Increasing reliance on prescribed fire also leads the agencies down a slippery path of increasing costs.”* (Participant 14)

*“My main concern would be out of control prescribed burns or prescribed burns that were a waste of time and taxpayers money.”* (Participant 17)

*“[One primary concern about the use of prescribed fire is] that the fire reduces large wildfire cost.”* (Participant 24)

*“[One primary concern about the use of prescribed fire is] a lack of in-depth study of the comparative costs of fighting naturally caused fires, although recent*

*out of control fires in Colorado and New Mexico, etc, may be improving this situation.” (Participant 5)*

Expense is an important factor in evaluating the balance of tradeoffs; some respondents identified the importance of achieving the goals and benefits of prescribed fire, minimizing negative impacts, and minimizing monetary cost when choosing prescribed fire activities.

Prescribed fire impacts: The outcomes associated with prescribed burning activity were an important consideration for most respondents, and the idea of benefits versus negative consequences emerged in nearly every judgment about the use of prescribed fire. The consequences of burning are the realization of positive and negative tradeoffs, whether intended or unintended, anticipated or unforeseen. The intended effects (or objectives) of prescribed fire are an integral component of prescribed fire plans, which may also include anticipated negative tradeoffs. This discussion deals primarily with the negative impacts and potential effects of prescribed fire; the benefits derived are reflected in the achievement of previously discussed goals, or intended effects. Recognition of both positive and negative effects were common to the majority of respondents, regardless of interest affiliation.

*“[It is appropriate to use prescribed fire] where goals...are met and other values are not mortgaged.” (Participant 15)*

Negative impacts, the anticipated effects and tradeoffs, identified by respondents included air quality and ecosystem health concerns.

*“Other challenges of the use of prescribed fire as a management tool include the control of fire spread to adjacent areas (Los Alamos), smoke dispersion and atmospheric pollution, water quality impacts of atmospheric deposition, after*



*fire effects on basin hydrology (increased water yield and peak flows) and many other variable factors.*” (Participant 12)

*“Too many of the trees that need to be protected from conifer encroachment are getting burned.”* (Participant 6)

*“[Prescribed fire is appropriate when] undesirable indirect effects-- particularly health problems caused by smoke and increases in weedy species-- are unlikely or minimized.”* (Participant 20)

Potential effects, the unintended or unforeseen impacts, include consequences that may occur as a result of prescribed fire. Concern about potential effects highlights the lack of full understanding about the consequences of prescribed fire and the uncertainty inherent in decision-making.

*“The science is lagging behind with most of the federal agencies' emphasis being placed on on-the-ground implementation. In the agencies' rush to fix past problems, it may be creating another set of problems (more listed species under ESA)...Knowledge of potential effects from this program on other resource values is also poor or completely lacking.”* (Participant 25)

*“Prescribed fire should not be used when the risks and benefits are not fully understood and it's impossible to do an analysis of the tradeoffs of using prescribed fire versus not using it.”* (Participant 14)

*“[One primary concern regarding the use of prescribed fire is] what ecological questions or problems will arise 10 years from now as a result of our actions that we didn't know enough to ask or consider from the point we stand right now.”* (Participant 1)

Another potential impact that must be considered is the impacts on communities. Concerns about community health and sustainability are an important consideration for prescribed fire activities, and constitute a confounding variable when considering management activity.

*“There are some closer calls where the ecosystem drastically needs fire reintroduction, but they are where the environmental impacts of prescribed fires will create problems of community economic and social sustainability, such as in tourism communities.”* (Participant 5)

These potential, unknown effects are a substantial source of uncertainty in making prescribed fire decisions, and the potential repercussions are great given the significance of responsibility and accountability accompanying the decision to use fire. Unforeseen effects are an important factor in weighing not only the risk of treatment but the risk of non-treatment as well. Several respondents expressed concern that more information is needed regarding the impacts of prescribed fire in order to improve management choices. These concerns primarily surfaced in comments about “unknown effects”, and several comments called for additional research into more effective treatments and treatment combinations and smoke quantity and dispersal predictions.

*“...people tend to take the data from one area and extrapolate the findings to other areas, and fire is just too complex a phenomenon and too context dependent to extrapolate from one area to another.”* (Participant 14)

*“Continue to learn about specific relationships between fire and weedy species, and get this information to managers very efficiently...Continue to learn about management strategies other than prescribed fire and combinations of fire with other treatments, to obtain the benefits of fire and minimize the problems.”* (Participant 20)

Respondents also identified concerns regarding information dissemination, recognizing that the knowledge must be made more available in order to address uncertainty.

*“[My concerns about the use of prescribed fire could be addressed by] increased availability of scientific knowledge to tailor prescriptions to minimize impacts and maximize production.”* (Participant 15)

Concerns about improving the quantity, quality, and availability of information are aimed at reducing uncertainty in decision-making. Land managers have the responsibility to make appropriate, acceptable decisions about the use of prescribed fire

and are accountable for those decisions; reducing uncertainty in the decision-making process is essential to minimizing the risk of management choices.

Expectations of outcomes contribute to decisions about appropriate management strategies. Judgments about the success of prescribed burning or the attainment of goals create a feedback in the decision process, and the likelihood of achieving intended effects influences the decisions regarding the use of prescribed fire. The likelihood of success and the amount of benefit derived from decisions about implementation are part of the criteria for determining both current and future choices, but they are weighed against the anticipated negative tradeoffs and the unforeseen, potential negative impacts in decision making.

Inherent risk: Another potential constraint to the use of prescribed fire is the inherent risk that accompanies these activities. Respondents spanning a wide variety of interest populations recognized that applying fire to the landscape poses the risk of significant damage if that fire is not controlled. Some respondents specifically identified the Cerro Grande fire of 2000, the prescribed fire that burned part of the town of Los Alamos, New Mexico, as an example of the potential for escape. The decision to use prescribed fire thus requires an acceptance of the inherent risk.

*“This is risky business. If you don't believe it, ask the people burned out of their homes in Los Alamos...Feds need to limit use of fire to low risk situations.”*  
(Participant 9)

*“When the benefits...are out weighed by the possible consequences of an out of control prescribed burn.”* (Participant 17)

*“...fire can be prescribed when analysis has shown that the use of fire advances the accomplishment of the greatest number of short term objectives at an acceptable level of risk of escaped fire...”* (Participant 10)

Many respondents inferred the importance of “controlling” or “managing” prescribed fire in their comments about when it’s use is appropriate or inappropriate. This expectation of control emphasizes the responsibility of managers’ in making appropriate choices regarding the use of prescribed fire. However, some also commented that complete control is impossible, and one expressed concern that the expectations of control may be too high and unrealistic. Rural residents, an environmentalist, a county advisor, a timber industry representative, and an ecologist expressed these concerns.

*“...there is no such thing as zero risk of catastrophic spread and threat to non-target areas.”* (Participant 2)

*“I’m also deeply concerned that we are creating an impression that we can control fire by our use of prescribed fire.”* (Participant 14)

The recognition that complete control in the application of prescribed fire is unlikely can be linked to respondents’ recognition that managers are fallible – they make mistakes and errors in judgment. 10 out of 25 respondents in a variety of interest populations identified the potential for mistakes; all of the land managers participating in the study expressed recognition of fallibility.

*“[One concern about the use of prescribed fire is] one or more additional carelessly ignited or poorly managed prescribed burns escape and cause loss of life and property.”* (Participant 10)

*“[Prescribed fire use is not appropriate] when using fire is not well thought out and planned...when consequences are not evaluated and planned for.”* (Participant 1)

*“[My primary concern regarding the use of prescribed fire is] procedures gone awry.”* (Participant 19)

The potential for mistakes and the inherent risk of conducting prescribed fire activities not only presents a constraint to prescribed fire application, it may significantly alter management decisions. The responsibility of managers and the potential accountability for their choices may result in risk-averse behavior in an effort to avoid the inherent risk in applying prescribed fire. Two respondents, a rural resident and a county advisor, identified this possibility.

*“...they [fire managers] are very nervous about taking even the slightest risks. For example, one of our management objectives is to reduce gambel oak. In order to do this fire must be applied in the summer. We have yet to see that happen in 5 years now. The prescribed fire tends to happen in the fall and winter when it is safe and when things are slow...Right now people feel individually liable and afraid to take risks.”* (Participant 11)

Protection concerns are an important element of inherent risk. The values respondents identified as protected from wildland fire by using prescribed fire are the same values they are concerned may be damaged by prescribed fire activity. The protection of people, property, and resources is therefore both an objective and a potential complication of burning. The protection objectives identified as part of the goals for the use of prescribed fire concentrate on risk reduction, while the protection concerns described here are focused on managing risk inherent in the prescribed fire activity itself.

*“[One primary concern regarding the use of prescribed fire is] public and employee safety.”* (Participant 15)

*“[Prescribed fire is appropriate when] it can be conducted without direct injury to people or damage to property.”* (Participant 20)

*“Land managers have to evaluate each piece of ground to decide if prescribed fire will achieve the desired results without endangering private property or lives...It is not appropriate to use prescribed fire where human lives, private property, or air quality will be placed at risk.”* (Participant 23)

*"[Prescribed fire is not appropriate] where old growth or important other trees are at risk."* (Participant 6)

Respondents view the risk of potential escape and the potential damage that may result from prescribed fire as important considerations and possible constraints to using fire as a management tool. This risk is a significant component in evaluating tradeoffs associated with prescribed fire and the acceptability of those activities.

Acceptability: The issue of public acceptability is important to decision-making and was also identified as a potential constraint on prescribed burning. The importance of public approval was recognized by one-third of respondents, including air quality specialists, a rural resident, a wildlife advocate, an ecologist, an environmentalist, a public affairs officer, and a timber industry representative. Nearly half of the respondents in a variety of interest populations recognized the importance of implementing "acceptable" management activities. Respondents did not offer comments on how acceptability should be defined or measured, or specific reasons why it is important. Rather, they simply used the term as a qualifier for prescribed fire activity. Acceptability applies to both the consequences and inherent risk of prescribed fire activities described above.

*"[prescribed fire is not appropriate when] undesirable indirect effects cannot be reduced to levels that are generally acceptable."* (Participant 20)

*"when catastrophic risk is within acceptable parameters."* (Participant 24)

*"Obviously the answer has to be that fire can be prescribed when analysis has shown that the use of fire advances the accomplishment of the greatest number of short term objectives at an acceptable level of risk of escaped fire, as well as keeping smoke levels to a minimum, all at an acceptable level of cost."*  
(Participant 10)

It is anticipated negative results (described above) that are the primary focus of acceptability concerns. Theories of social acceptability center on the realization of and choice between alternatives; for example, accepting reduced air quality to accomplish ecological goals is accompanied by the recognition that unimpaired air quality, without ecological benefit is the alternative. Public acceptability of management decisions is centered on public acceptance of these anticipated consequences in order to achieve certain social values. Respondents recognized that the goals for the use of prescribed fire may have to be considered in light of other social values, though they did not offer comments about how possibly conflicting values might be weighed against each other or what the appropriate balance of tradeoffs might be. Acceptability of tradeoffs was emphasized in Delphi responses, but defining and measuring it was not addressed.

The second concept fundamental to judgments of acceptability is the perception of risk, both of damage by wildfire and damage by prescribed fire. In the previous discussion regarding the goals for using prescribed fire, an important component of protection objectives was the desire to reduce the risk of wildfire. As part of the acceptability dimension, the reduction of wildfire risk must be evaluated in the context of all management options in order to determine the most acceptable course of action. Respondents recognize the decision regarding implementation is accompanied by a necessary evaluation of the risk inherent in prescribed fire activity. As identified by respondents, the perceived risk of wildfire is weighed against the perceived risk accompanying prescribed fire activities, and both are weighed against the potential benefits.

*"[It is appropriate to use prescribed fire when] ...people understand the consequences and risks of using it and not using it." (Participant 1)*

*“Prescribed fire should not be used when the risks and benefits are not fully understood and it's impossible to do an analysis of the tradeoffs of using prescribed fire versus not using it.” (Participant 14)*

*“[Prescribed fire is not appropriate] when the benefits of the question above are out weighed by the possible consequences of an out of control prescribed burn.” (Participant 17)*

*“[Prescribed fire is not appropriate] when smoke dispersion is not likely and when risk to lives and property is in question.” (Participant 10)*

*“[Prescribed fire is appropriate when] it can be conducted without direct injury to people or damage to property... [it is not appropriate if] conditions are hazardous enough that injuries and property damage are likely.” (Participant 20)*

Also related to acceptability concerns is the issue of trust and misrepresentation. While respondents overwhelmingly identified managers as the appropriate party responsible for decision-making, they also pointed out that there is often a lack of confidence in these decisions. Respondents used words like “cynical”, “disillusionment”, “Trojan horse”, and “purportedly”, demonstrating lack of trust in management decisions and their motivating factors. These concerns were alluded to in the previous discussion of economic incentives, but they really come to the forefront when actual implementation of prescribed fire is contemplated. A variety of respondents expressed concern about the motives for using prescribed fire and the expectations that result.

*“[One concern regarding the use of prescribed fire is] that we build and sustain public trust (we carry through on what we say we can do) ” (Participant 1)*

*“[The goals for the use of prescribed fire are] purportedly? to reduce hazardous fuel loads. What they should be: to protect the resource rather than property. What they are: to create salvage perhaps.” (Participant 19)*

*“I'm afraid the more I see and hear about prescribed fire, the more cynical I become of the motives for it's use and the benefits of it's application. Our federal government is spending an extraordinary amount of time and money in the name of 'forest restoration'. I am not sure mechanical treatment of fuels is*



*getting a fair trial because prescribed fire has become so trendy and politically correct.” (Participant 9)*

*“An immediate rush to implement a fix will likely lead to wasted efforts and further public disillusionment.” (Participant 21)*

*“There are, I fear, a very few who would rather see huge forest landscapes burn in a stand replacement mode, than accept reasonable amounts of thinning. Some have already argued that forest restoration is a ‘trojan horse’, intended to maintain timber harvesting levels. Given the tremendous costs of forest restoration, such a claim surely has limited validity.” (Participant 5)*

In order for land management to be effective and successful, these issues of trust and public support must be dealt with. One means identified by respondents for addressing this is through improved public awareness and education about complexities, management activities, and decision justification. These efforts are the responsibility of land managers; it is their job to keep people informed and to create a more open management atmosphere. A majority of the study respondents identified the need for public communication in some form.

*“Good public relations. Let us know what your doing and why your doing it...And above all, let the public know that prescribed burning is not an exact science but from experience it does far more good than harm.” (Participant 17)*

*“Major concerns include a lack of public awareness about catastrophic fire risks...Many people do not understand how far behind the management agencies are on the fuel build up problem.” (Participant 5)*

*“...the situation at hand warrants risk taking in order for changes to be made on the land. However, the public at large must be better informed as to the risks and consequence.” (Participant 7)*

*“Here we have done a lot through the local paper and public meetings to educate people about fire and its role. If people know, then there is less resistance and fear.” (Participant 11)*

Acceptability may be one of the most confounding constraints on the use of prescribed fire. It is a complex and elusive issue in resource management, yet it is

essential to a successful prescribed fire program. Both unacceptable activities and doubts about agency or manager credibility may have substantial repercussions in efforts to apply prescribed fire, the success of which is dependent on reducing opposition and improving the level of public support. It may also be the constraint most likely impacted and addressed by the expanded participation strategies described at the beginning of this chapter. Those strategies are intended to incorporate a variety of perspectives in the initial design of prescribed fire activities, and provide an opportunity for learning about dimensions of tradeoffs and risk.

### **Concerns About Policy**

The following chapter provides an evaluation of current prescribed fire policy, therefore it is important to address the concerns about policy that emerged from the Delphi exercise. Many of the comments regarding policy simply recognized it as a source of broad goals and national directives for resource management, and as previously described, for some respondents it is the product of representative government that thus reflects the will of the citizens. Combined with laws and regulations, policy establishes a context in which the activities of land management, including prescribed fire, occur. However, some respondents expressed concern that the policy was removed from and inconsistent with management “on the ground” – the day to day situations faced by local land managers.

*“Resource professionals on the ground seem to understand the dynamics of fire and its benefits and limitations. However, policy-makers seem bent on burning our forests back to health, no matter what the current condition.” (Participant 9)*

*“Since our resource Agencies are now headed mostly by political figures and upper level decisions are often out of sync with needs on-the-ground, agency policy may simply preclude sensible management.” (Participant 10)*

The following chapter, Chapter 5, consists of a comparative evaluation addressing the representation of the previously presented findings in the current prescribed fire policy. It focuses on how the emergent ideas are reflected in national policy, emphasizing where policy differs from overwhelming agreement of Delphi respondents, as well as where the policy reflects a particular viewpoint or viewpoints when contrasting perspectives were identified in the Delphi exercise.

## **Chapter 5: Comparative Policy Evaluation**

The purpose of the Delphi exercise conducted as part of this study was to gather information and different perspectives on the use of prescribed fire. Highlighted in those findings, described in the previous chapter, were four principal components of prescribed fire use as a management strategy. The key concepts that emerged from participant responses included dimensions of involvement and participation, appropriate goals, priorities, and potential constraints. Public policy may be designed to address some or all of these ideas, and this chapter is an effort to compare which of the concepts identified in the Delphi are addressed in the current federal prescribed fire policy. The implications of this comparative evaluation are discussed in the following chapter.

The proportion of respondents with a particular perspective is not as important as the ideas themselves for two reasons. First, any emphasis on the policy reflecting a “majority perspective” is potentially misleading, as the Delphi was an exploratory exercise with a purposive, non-representative sample of participants. Second, many of the ideas that emerged from the Delphi were not addressed by all study participants; some dimensions may have only been identified by a few respondents. The emergence of those ideas in one point of view does not automatically preclude the possibility of other contrasting perspectives that simply did not emerge through this exercise.

The principal documents used in this comparison are the *Review and Update of the 1995 Federal Wildland Fire Management Policy* (USDI et al 2001), released in January 2001, and the *Federal Wildland Fire Management Policy and Program review*

*report* (USDI and USDA 1995), released in 1995. The *Wildland and Prescribed Fire Management Policy: Implementation Procedures Reference Guide* (Zimmerman and Bunnell 1998) was also used to further clarify the ideas and implementation of the guiding policy statements listed above. Each of these policy statements is the product of multiple federal agency contributions, principally those agencies with significant federal lands under their jurisdiction. These agencies include the five commonly recognized land management agencies -- the Forest Service, the Bureau of Land Management, the National Park Service, the Fish and Wildlife Service, and the Bureau of Indian Affairs. The 2001 policy update also includes the contributions and endorsement of the Geological Survey, the Bureau of Reclamation, the Environmental Protection Agency, the Department of Defense, and the Department of Energy in recognition of their land management responsibilities. This most recent policy statement is also endorsed by the National Oceanic and Atmosphere Association/National Weather Service, the Federal Emergency Management Agency, and the National Association of State Foresters due to their significant involvement in wildland fire management activities. The policy is intended to provide “a broad philosophical and policy foundation for federal agency fire management programs and activities... (USDI et al 2001).”

The 2001 policy update is the most recent and current statement of federal wildland fire policy; however, it carries forward most of the ideas and guidelines presented in the 1995 policy, making both documents an important source of policy positions. Unless expressly rejected by the 2001 review, the ideas in the 1995 policy statement are endorsed by the 2001 update and thus remain part of the current fire policy. These statements of policy are part of a comprehensive treatment of wildland fire on

federal public lands; prescribed fire is a component of that comprehensive treatment. This comparative evaluation uses policy ideas specifically targeted to prescribed fire activities, as well as broader ideas of fire management that reflect the current federal perspective. Because prescribed, or management-ignited, fire is a management activity subsumed under the larger topic of wildland fire management, prescribed fire activities are expected to reflect those broader perspectives and priorities. The ideas presented throughout the policy statements are thus helpful in describing the policy position on prescribed fire, and are used in the following comparison.

### **Comparative Evaluation**

The ideas, concerns, and perspectives presented in the policy statements address many of the major concepts identified in the Delphi exercise; however, the concepts and categories of concern are organized differently. The policy focuses on establishing the federal agencies' position and emphasis on certain topics and does not present the same kind of management "model" that emerged through the Delphi comments. Rather, it presents broad guidelines for how the federal land management agencies should approach and incorporate wildland fire management in land and resource management strategies. This chapter is presented according to key issues and concerns identified in the policy, which are accompanied by discussion regarding how they relate to the Delphi findings discussed in chapter 4. These principal topic areas have been determined using the stated "Guiding Principles" and "Key Themes" of the policy, as well as those ideas or concerns that are consistently referred to and emphasized throughout the policy text. Major areas of concern are: the role of science, participation and goal definition, ecosystem

sustainability, priority areas and scale, communication and education, planning, application considerations, organizational issues, and evaluation provisions.

The federal policy positions on various topics were determined using background information, findings regarding the state of fire management, statements of policy positions, and mandated implementation actions contained within the policy reports.

### **The Role of Science**

The federal wildland fire policy firmly asserts that all fire management activities must be based on the “best available science” (USDI et al 2001). Scientific information provides the basis for determining activities to achieve sustainable ecosystems, the overriding priority discussed in the following section on goals. According to the 1995 statement, *once the scientific foundation is established*, all partners must work together according to agreed upon goals for public welfare and healthy ecosystems and the incorporation of social values (USDI and USDA 1995, emphasis added).

Several areas where information needs exist are identified in the policy, and direction for research priorities is given. These areas of study include air quality and smoke management, interface fire hazard mapping, the relative effectiveness and consequences of different fuel treatments, the effects of post-fire rehabilitation, and social science implications of fire management activities (USDI et al 2001, USDI and USDA 1995). In addition to identifying a need for further research and more scientific information, the current federal policy also indicates a need for increased information availability. Scientific information that currently exists is often not available for use in determining fire management activities. Specifically, coordinated databases must be established to collect and compile consistent data among agencies. No system currently

exists to integrate data on cross-boundary concerns, for example, air quality impacts from a variety of fire sources on different jurisdictions. A consistent system is necessary in order to ensure that scientific study results are made available to managers in a timely manner, and assures the reliability and credibility of the information for its intended use (USDI et al 2001).

The current policy mandates the development of science programs by the federal agencies in order to address these information needs. Those programs are charged with ensuring information transfer to managers in a usable form and ensuring that appropriate results are incorporated and applied in management (USDI et al 2001). A clear link between scientists and managers is necessary to ensure that management needs are addressed and current science is incorporated in activities (USDI and USDA 1995).

The current fire policy concurs with the perspective of many Delphi respondents regarding the importance of scientific information in the use of prescribed fire. It clearly prioritizes scientifically determined goals and actions over the balancing of other social values in management. Science as a foundation for resource management was emphasized by some respondents in the study findings as it is in the policy; however, some study participants also expressed concern regarding the reliance on scientific information. This concern is based on the lack of knowledge and the uncertainty of existing knowledge. The policy statements also recognize a need for increased study and information availability, but recognition of uncertainty is absent. Further discord between the policy and study results is evident in the policy mandate to develop science programs to deal with the information gaps. According to Delphi comments, there is an expectation of objectivity – and for some, independence – that accompanies the emphasis



on scientific information, and the federal agency sponsorship of research may cause concern regarding that objectivity. In other words, the objectivity of research and the resulting conclusions is questionable when that research is influenced by federal involvement. These issues of objectivity and independence are not addressed by policy comments; all scientific knowledge is essentially equal in addition to being paramount to other social concerns.

The perspective on science as the foundation for all management activities and the role of science in validating the defined goals that is prevalent in the policy text and to some extent in the Delphi results may further complicate the issue of public participation. For most respondents, a certain level of knowledge is required to adequately contribute to goal-setting processes, and there is an expectation that participants will be knowledgeable. This expectation contributes to the overwhelming importance of knowledge, primarily scientific knowledge. It also contributes to an elevated status for scientists, as practitioners and dispensers of knowledge. The authority of science has been an integral part of public land management since its inception, and this status has been reinforced throughout the last century. Scientific authority is, however, complicated by concerns about scientific uncertainty, expressed by several study respondents but not addressed by policy. In recent years, community or locally based knowledge has begun receiving increased attention and merit, though acceptance of other forms of knowledge has not approached that of information generated through experimentation and the scientific method. Indeed, at least one study participant explicitly recognized the importance and availability of alternative knowledge, and clearly identified a role for that knowledge in prescribed fire management, though how alternative or local knowledge

could be evaluated and appropriately incorporated is not addressed. The inclusion of local knowledge raises concerns regarding how to evaluate the legitimacy of alternative knowledge in resource management, though these concerns did not emerge in this study.

### **Participation and Goal Definition**

The current fire policy offers a vague perspective regarding the appropriate participants in the management process, encouraging a range of “interested parties”. The 1995 policy statement includes more inclusive language which is absent from the more recent 2001 statement. However, discussion regarding the inclusion of different interests is not expressly rejected by the recent policy review, so though not re-emphasized, it remains part of the policy guidelines. According to 1995 language, the public is identified as a partner in the planning, implementation, and monitoring of fire management activities. Public participation is emphasized in the belief that it will increase public safety, reduce costs and losses, and foster a wider acceptance of the role of fire on public lands (USDI and USDA 1995). Cooperative approaches to management “involve all interests, including the public, scientists, resource specialists, and regulators throughout the planning process”, and continuous public involvement is required to achieve a balance of ecosystem and other societal goals (USDI and USDA 1995). All interested partners should work together to develop and implement management objectives (USDI and USDA 1995).

In more recent statements, inclusion remains an important component of planning. Compatible, ecosystem-based, multiple scale, interagency land management plans should be developed with the involvement of “all interested parties” (USDI et al 2001, USDI and USDA 1995). However, the extent, structure, and relative influence of this participation

are not addressed. Based on additional information presented in the implementation procedures guide, participation is most likely addressed under the standard implementation of the National Environmental Policy Act (NEPA) (Zimmerman and Bunnell 1998). NEPA requirements have typically been met through a public meeting process where alternatives and objectives have been established by the federal agencies and are then presented to meeting attendees for public comment.

In fact, the current federal wildland fire policy establishes that federal land management agencies set the objectives for the use and desired future condition of public lands (USDI et al 2001). Those objectives dictate that wildland fire will be used to protect, maintain, and enhance resources and will be allowed to function as an ecological process (USDI et al 2001). Agencies are responsible for establishing “fire management goals, objectives, and actions”, which are to be closely linked to resource management plans (USDI et al 2001, USDI and USDA 1995).

The strategy for participation and goal setting described by the current fire policy uses the language of inclusion, with words like “partners”, “involvement”, and “cooperative approaches to management”. The participants mentioned include a variety of interests, principally the same ones identified in the inclusive strategy for goal definition described by Delphi respondents. However, the mechanism for that participation is not specifically described, and based on implementation documents, that mechanism is essentially the same public meeting format that has been used since the advent of public participation. In effect, the policy closely resembles the exclusive strategy described by a minority of Delphi participants, and land managers are responsible for determining the multiple facets (goals, implementation, tradeoffs, etc.) of

prescribed fire use. As identified in the study results, these decisions can and should be informed by citizen concerns and perspectives while maintaining the authority of managers and a foundation of science.

The majority of respondents believe that a variety of interests, but most importantly citizens, should be a part of defining goals for public land and prescribed fire management. The policy, however, fails to recognize these issues in any significant way. The lack of policy elaboration on participation may reflect the existing uncertain environment regarding public involvement in natural resource management. Retaining the existing strategy of public involvement – the public meeting – offers some opportunity for agency disclosure and public input, but there is no obligation on the agency's part to use that information. The power over goals, priorities, and alternatives remains with the federal agencies.

The role of scientists in the policy perspective supports the perspective of some respondents who indicated that scientists act as an educator of agency personnel and a generator and source of information. Though described as an involved interest in one of the policy statements above, the relationship between scientists and managers is not described, other than to point out the necessity of a clear link in order to assure that management needs are met and scientific information is communicated.

Scientific endeavors build on previous discoveries, guiding which questions will be asked and directing the development of knowledge. Combined with the overwhelming status of science and scientists in today's society, the result is neglect of the multitude of other questions might be asked by other interests. These interests include citizens who are not part of traditional disciplines but who have an understanding

of the landscape and its processes as well as the human communities that are part of that landscape. Though still emphasizing science, many Delphi participants recognized the potential contribution of these interests, while the fire policy retains the cursory recognition that “public input is important” to successful land management.

The role of scientists in resource management and prescribed fire use is an important dimension of participation concerns as well. Scientists may be considered the most knowledgeable resource and fire concerns or impacts, making them a logical partner in expanded participation efforts. However, they are expected to maintain an independence and unbiased integrity, which should remove them from management or decision-making processes. Science has been so well marketed as the principal source of quality information that one study respondent even identified scientists as the appropriate decision-maker in prescribed fire activities. Others view objectivity as the most valuable asset in scientific efforts, a quality that would be threatened by involvement with the social process of goal definition and decision-making. Most of the study respondents saw scientists in an education role, generating and delivering information to goal-defining participants and continuing to place them in a position of particular esteem. However, objectivity is also threatened by the current policy approach, which advocates a strong link between management and science programs to ensure that the questions of management are addressed. Management thus influences research while research drives management. The result is a situation where science and scientists continue to have a great deal of authority in prescribed fire and resource management and little responsibility or accountability because they are not recognized in a decision capacity.

### **Goal: Ecosystem Sustainability**

The federal policy emphasizes ecosystem sustainability, which includes both forest and community sustainability, as the overriding goal of all fire management activities. Ecosystem sustainability encompasses interrelated ecological, economic, and social components (USDI et al 2001). Concerns include the role of fire as a natural process as well as the restoration and rehabilitation of burned lands. Rehabilitation and restoration efforts (when areas are not expected to recover through natural processes) are aimed at protecting and sustaining ecosystems, public health and safety, and community infrastructure (USDI et al 2001). Fire management efforts to mitigate risk, rehabilitate burned areas, restore ecosystems, and reduce fuels should all be conducted in support of the ecosystem sustainability goal, and will be designed to support ecological and socioeconomic sustainability (USDI et al 2001). This concept of ecological sustainability is addressed in two different sets of concerns: ecological concerns and protection concerns.

### **Ecological Concerns**

Fundamental to the sustainability concept is the importance placed on forest health and concern regarding the deterioration of fire-adapted ecosystems. Fuel management is integral to restoring and maintaining ecosystems, and these treatments can be designed to reduce the risk of wildland fire while improving forest health and providing economic benefits to communities (USDI et al 2001). Fuel management is a component of restoring public lands as well as rehabilitating areas following other management activities in order to achieve ecological health.

The role of fire as a natural process in ecosystems is also emphasized, and the federal policy insists that wildland fire must be incorporated into resource management and planning. The policy statements recognize that past fire exclusion and suppression practices have altered the fire regime in many areas, and have dramatically changed and often worsened the forest fuels condition, increasing the potential for severe fires (USDI et al 2001, USDI and USDA 1995). To address those changes, efforts must be made to understand and accept fire's natural role, and to integrate fire as an essential ecosystem process (USDI et al 2001). As nearly as possible, wildland fire is to be allowed to function in its natural ecological role (USDI et al 2001).

The policy perspective regarding the appropriate response to wildland fire offers further insight into the emphasis placed on returning fire as a natural process to the landscape. The current fire policy clearly states that any response to wildland fire will be based on Fire Management Plans, regardless of ignition source or location of fire (USDI et al 2001). The type of ignition is irrelevant to fire management, and response to fire is based on ecological, social, and legal conditions and consequences of the fire (USDI et al 2001). This perspective emphasizes the primary goal of returning fire to landscape to achieve the expected benefits and objectives regardless of the fire source.

The ecological concerns described by the federal policy reflect the same concerns identified by Delphi respondents in describing the use of fire to restore natural process and forest health. The policy also emphasizes allowing fire to function in its natural role as much as possible. Though similar to the perspective of respondents that emphasized the return of natural fire, policy provisions would allow "natural" fire only under strictly

managed and predetermined circumstances. Respondents who favored natural fire, on the other hand, were more inclined to favor limited or reduced management involvement.

The forest health concerns presented in the policy recognized that past management strategies, as well as current activities, require intervention to restore or rehabilitate forest conditions. Many Delphi respondents specifically emphasized this point. The current fire policy thus reflects the perspective of a majority of Delphi respondents; prescribed fire is appropriately applied to address ecological health and process concerns. However, as in the study comments, definitions of “natural” and “health” are absent.

### **Protection Concerns**

The first and foremost consideration of any fire management activity is the safety of firefighters and the public (USDI et al 2001). Protection of human life is the first priority of fire management, and safety considerations explicitly recognize the inherent danger or risk posed by fuels treatment and rehabilitation/restoration activities (USDI et al 2001). That established, other protection priorities among community infrastructure, other property and improvements, and natural and cultural resources will be based on the values to be protected, safety, and protection costs (USDI et al 2001).

Protection concerns are primarily addressed through fuel reduction and risk mitigation activities. The worsening fire hazard situation on federal lands is referred to often in the federal fire management policy, reflecting the problems posed by increasing fuel accumulations (USDI et al 2001, USDI and USDA 1995). The hazard identified by policy concerns poses a threat to both forest health and wildland-urban interface areas.



Because of fuel accumulations, the probability of large, intense fires has increased, and these severe fires pose a threat to the ecological condition of public lands as well as humans and property (USDI et al 2001). Concerns about protection expressly recognize that social and economic well-being is directly tied to the condition of public lands, not just the condition in interface areas.

Wildland-urban interface areas are specifically addressed in the current fire policy, with direction for aggressive implementation of fire management activities to reduce the risk of wildland fire to those areas (USDI et al 2001). These areas are described as a major fire problem due to fuel accumulations, continuing migration to these areas, and resident perceptions of risk and expectations of emergency services (USDI et al 2001). Specific challenges to fire protection in interface areas include legal mandates, zoning, fire and building codes, fire protection infrastructure, grading and rating systems, and environmental concerns (USDI et al 2001).

Current policy calls for immediate action and criticizes deferred decision-making, comments that emphasize and prioritize protection objectives. Community sustainability is dependent on addressing the fire hazard in interface areas, in terms of both public safety and community infrastructure and socioeconomic well being (USDI et al 2001). The policy also points out that the potential for fire starts increases in the interface, increasing risk to natural resources and further supporting aggressive treatment of fuel accumulations (USDI et al 2001).

Responsibilities in the wildland-urban interface: The current wildland fire policy identifies the misconception by elected officials, agency managers, and the public that

interface areas are solely a fire service concern (USDI et al 2001, USDI and USDA 1995). The responsibility for mitigating fire risk in interface areas must also be assumed by communities and homeowners. Federal, state, tribal, and local fire protection agency roles and responsibilities regarding structural fire protection must be clarified and consistently implemented; structural fire protection and suppression is not the sole responsibility of the federal land management agencies (USDI et al 2001).

The policy on the wildland-urban interface recognizes a role for land management agencies in protecting structures, but not suppressing fires in them. The roles for federal agencies as partners in the interface are wildland firefighting, hazardous fuels reduction, cooperative prevention and education, and technical assistance (USDI et al 2001). Structural fire suppression is the responsibility of tribal, state, or local governments. Federal agencies may, however, assist in structural protection activities under formal Fire Protection Agreements that specify mutual responsibilities (including cost sharing) of partners (USDI et al 2001).

Federal agencies do not recognize a responsibility for private property, nor do they have legal authority on those lands. As a result, state and local governments are responsible for identifying areas that lack structural fire protection and organizing efforts to provide that protection (USDI et al 2001). Though the responsibility of protecting structures and communities lies with property owners and local governments, federal agencies may provide assistance based on a community sustainability rationale. The current federal policy differentiates between property, which may represent isolated structures, and community infrastructure that provides the social and economic fabric for

rural areas (USDI et al 2001). Structural protection is thus no longer an obligation of the federal agencies, however, it is not eliminated from the range of activities.

The concerns described above reflect the respondent recognition of protection objectives as an appropriate use for prescribed fire. There is clear agreement on the potential application of prescribed fire in order to reduce risk, especially in interface areas where people and private property may be threatened by wildland fire. The policy takes a clear stand on the federal agency responsibility for private property. Federal agencies have no responsibility or legal authority regarding private property in the interface, and that responsibility is clearly shifted to property owners and local governments. This policy position echoes the respondent perspective that interface residents must at least share in the responsibility. The policy, however, highlights the importance of reducing risk in these areas and calls for “aggressive” fuel treatment implementation. These comments serve to prioritize interface areas for management activities, so even though federal agencies are not responsible for private property, they continue to use its protection as a significant factor in management. By emphasizing community sustainability in its treatment of protection concerns, the federal policy shifts the focus from private property to community infrastructure protection. In principle, these two categories are different, in terms of practicality the policy fails to describe how management will recognize that difference. If in practice developed areas and private improvements are afforded protection based on the community sustainability rationale, the agencies will essentially continue to use property protection as fuel treatment justification. This reflects the perspective of many respondents, though specifically contradicts the perspective that private property concerns should not be a factor in

resource management. The policy creates an ambiguous approach to dealing with fire management activities in interface areas, and avoids dealing with concerns about the relevance of private property in decision-making by introducing the community infrastructure concept and combining it with ecological concerns under ecosystem sustainability. In doing so, the policy sidesteps the issue of ecological versus human benefits.

### **Priority Areas and Scale**

Priority areas: According to current policy, priority areas for the reintroduction of fire are to be determined based on identifying areas where fire does not need to be reintroduced, where fire is unlikely to succeed (appropriate, ecologically sound alternatives are determined), and where treatment with fire is essential or potentially effective in improving resource conditions or reducing risk and hazard (USDI et al 2001, USDI and USDA 1995).

Federal lands adjacent to wildland-urban interface areas, based on values to be protected, have been identified as high-priority fuels management areas (USDI et al 2001, USDI and USDA 1995). Values to be protected will be defined by federal agencies working with non-federal organizations and public users (Zimmerman and Bunnell 1998).

In the study findings, the identification of priority areas served to highlight those goals that respondents considered of higher priority. According to statements above, policy dictated prioritization criteria can be based on resource conditions *or* hazard and risk reduction, making it difficult to determine whether agencies are more focused on the

ecological or protection concerns described above. In fact, by combining ecological concerns and protection concerns (via community sustainability) in one overriding, ecosystem sustainability goal, the policy effectively avoids placing priority on either one. Ecological concerns and the role of fire on the landscape are used as the primary justification and impetus for integrating fire into resource management and for determining the scale and timing of activities, while the federal role is distanced from protection concerns via the shifting of responsibility. However, the interface areas continue to receive emphasis as “high priority areas”, and managing and minimizing risk is identified as the foundation of fire management activities. The vague language of balancing “values to be protected” further muddles the issue because the policy lacks clarity on how those values are to be determined and balanced against each other. There is no guidance offered by the policy to aid in making determinations about how potential ecological benefits are to be “valued” in relation to risk or hazard reduction, primarily human benefits.

Scale: Current policy describes the recent, significant increases in the use of wildland fire and other fuel treatments as still far short of the treatment necessary to ensure ecosystem sustainability. The 2001 fire policy requires fuel management treatments to be applied on a landscape, “ecologically significant” scale, with the expressed goal of achieving long-term restoration of landscapes (USDI et al 2001, USDI and USDA 1995). The acceleration of fuel treatment efforts is encouraged, both by continuing to increase treatments by the principal federal land management agencies and by encouraging efforts by other, non-federal organizations (USDI et al 2001). Implementation of prescribed fire

needs to be expanded, including the application of landscape-scale prescribed burns (USDI et al 2001, USDI and USDA 1995).

Most of the Delphi comments on scale are in agreement with the above policy position. Several respondents support landscape scale prescribed burns and aggressive management, though one specifically rejected widespread prescribed fire activity. The policy requirement of widespread activity and aggressive implementation of prescribed fire neglects concerns expressed by respondents that prescribed fire may be overused as a panacea for forest problems. In fact, the overwhelming emphasis on integrating fire with all resource management activities (see program integration, under Application Considerations) also indicates an increasing emphasis on using prescribed fire to address the policy defined goal of ecosystem sustainability. Prescribed fire is indeed becoming more relied upon to address the deterioration of and risk associated with public lands, and the policy does not recognize respondent concerns that this emphasis may be somewhat rash and unsupported by existing knowledge.

### **Communication and Education**

The federal fire policy recognizes the need to improve communication and education efforts, both among agency personnel and the public. These efforts are expected to improve understanding of the role of fire in natural systems and the consequences of its use and exclusion, the benefits of prescribed fire, the tradeoffs associated with prescribed fire activity, and the inherent risk of prescribed fire and the risk associated with non-action.

Ultimately, education efforts are expected to increase acceptance and support of federal wildland fire programs and policies (USDI et al 2001, USDI and USDA 1995).

According to policy statements, many people continue to believe that fires should be immediately suppressed, and implementation of the current policy depends on a well-educated public and agency workforce. Education efforts aimed at emphasizing the natural role of fire in ecosystems as well as a consistent communication strategy are necessary to eliminate mixed messages (USDI et al 2001). A comprehensive message that clearly conveys the desired balance of avoiding fires with adverse effects while increasing ecologically beneficial fire is necessary (USDI and USDA 1995).

Another focus of public education efforts is increased awareness. This includes public awareness of activities, with policy implementation of prescribed burns requiring public notification (Zimmerman and Bunnell 1998); and increasing the risk awareness of building and living in the wildland-urban interface (USDI et al 2001). The ultimate purpose of these efforts is encouraging people to mitigate fire risks on their private property.

Education and communication efforts are intended to foster open dialogue with both internal and external constituents in an effort to reduce polarization among conflicting interests regarding the use of fire (USDI et al 2001, USDI and USDA 1995). Efforts should be made to build public trust and obtain public opinion through television, magazine, newspaper and public meeting outreach efforts (USDI et al 2001, USDI and USDA 1995).

This perspective and discussion of communication and education needs touches on some of the concerns identified by study respondents. In particular, respondents identified interest conflicts, public trust, public acceptability, public notification of management activities, and public awareness and recognition of the interface risks and

responsibilities. These concerns, however, were not necessarily effectively addressed by the “outreach” efforts described above. Current policy continues to advocate the communication strategy that has been the hallmark of agency education efforts and is characterized by one-way information exchange. Education efforts are structured around the assumption that increased communication combined with a consistent and convincing message will result in increased public support for resource management. In contrast, Delphi participants not only recognized a role for this model of communication, but also identified terms like “dialogue”, “learning”, and “collaboration”, indicating a need to establish two-way communication strategies and encourage managers to listen as well as talk.

Of specific interest to this study is the concern about interest conflicts, which are generally based on a belief that certain concerns are being overemphasized or under-addressed in management activities. In this study alone, there emerged potential conflicts about appropriate levels of involvement, the prioritization of goals, the emphasis and extent of prescribed fire activities, the allocation of responsibility, the timing of prescribed fire application, economic gain, and judgements of acceptable tradeoffs. While many study respondents as well as the policy recognize the importance of education, one-way communication efforts do not necessarily change basic values placed on natural resources, nor do they effectively address the issues of trust that have become so important to effective and successful management.

While only 20% of respondents specifically commented on mistrust, none mentioned a specific trust in land management agencies. However, a certain level of confidence is implied by the continued vesting of authority in resource managers. Most



of those respondents identifying mistrust as an issue also expressed a belief that managers do have the ultimate authority in prescribed fire application, and those respondents who expressed concerns about adequate training were not the same respondents that identified issues of trust, making this is a difficult dimension of prescribed fire use to understand. The policy emphasis on one-way communication strategies is unlikely to address some of the most conflict ridden and management-hindering issues facing potential prescribed fire activities. Open learning and two-way communication processes are more likely to increase understanding of these potential conflicts, and have potential to foster greater trust in the efforts and decisions of land managers.

### **Planning**

The importance of developing and documenting planned management activities was emphasized throughout the federal policy. Fire management programs and activities, including prescribed fire must be conducted in support of overall land and resource management objectives (USDI et al 2001) established through land management planning. Fire Management Plans are required for all areas with burnable vegetation and must be integrated with land management plans. These plans are the foundation for all fire management activities and decisions and are essential for policy implementation. They are strategic documents and are supported by operational plans (USDI et al 2001); for example, prescribed burn plans which specify acceptable weather conditions, desired fire effects, and the resources required to manage the fire (USDI and USDA 1995). Emphasizing the importance of Fire Management Plans is their role in determining management response to wildland fire –the absence of a plan immediately requires

suppression activities, regardless of ignition source, while the presence of a plan offers other management opportunities (USDI et al 2001).

Fire Management Plans must address resource management objectives as well as anticipated effects of activities. However, preparation of plans is impeded by inconsistent and incomplete guidance on how anticipated impacts like public health and environmental concerns are to be considered. These plans are to be developed and implemented across agency boundaries to ensure consistency, emphasizing the need for interagency cooperation described in a following section. Plans must also provide for safety considerations, discuss management strategies, tactics, and alternatives, and be consistent with environmental laws and regulations (USDI et al 2001). All prescribed fire projects must be consistent with land and resource management plans and prescribed burn plans (USDI et al 2001, USDI and USDA 1995). However, the policy also advocates a reevaluation of prescribed burn planning and execution requirements to ensure “adequacy of direction without unnecessary constraint” (USDI et al 2001, USDI and USDA 1995).

Delphi participants placed an essentially identical importance on the use of plans to provide direction on objectives, appropriate parameters, and prescription for prescribed fire activities. Some respondents also identified the need for some measure of manager flexibility in applying prescribed fire; this issue is alluded to in the above statements about unnecessary constraint but the policy falls short of explaining this directive. This tension between procedure and plan compliance and flexibility is no better resolved by the policy than in the Delphi findings. The policy thus provides very broad, general guidelines for the use of fire in resource management, but offers no specific guidance for

translating these directives into “on-the-ground” decisions. This specific disconnect between the bureaucracy and implementation of prescribed fire was expressed by two Delphi participants, a concern that is likely to endure given the ambiguity of the current policy.

### **Application Considerations**

The following section on application considerations deals with issues identified by the policy as relevant to how and when prescribed fire is applied, who applies it, the consequences of applying it, and factors that influence the ability to apply it. Many of the topics are similar to those discussed in the Delphi findings as part of the process and constraints components. These topics include authority and expertise, scope, tradeoffs, risk management, and agency support.

#### Authority and Expertise

Authority and Accountability: Perspectives on authority addressed in current fire policy focus on the responsibility and accountability of agency personnel in conducting fire management activities. Specifically, the current fire policy recognizes the authority of federal agency personnel in implementing and conducting prescribed fire projects (Zimmerman and Bunnell 1998).

The explicit recognition of agency authority in conducting prescribed fire activities further supports the limited external participation position discussion previously, but reflects an area of widespread agreement among Delphi respondents. The study results found that though many respondents believe goal definition processes

should be inclusive, virtually all respondents agreed that land managers are the appropriate authority in making application and implementation decisions.

Policy also requires a clear and concise system of accountability that is based on standard job performance requirements reflecting the complexity and scope of responsibilities (USDI et al 2001, USDI and USDA 1995). Accountability concerns expressed in the policy focus primarily on the implementation of policy directives; however, this may have implications for prescribed fire application similar to those brought up by Delphi respondents. Policy dictates that agency administrators should be held accountable for failures in adopting Fire Management Plans, making employees available for fire management activities, minimizing suppression costs on large fires, and in resolving differences among agencies and disciplines. Policy mandates also require an expanded, aggressive prescribed fire program; if managers are to be held accountable for not implementing policy directives, this may open up the issue of non-action accountability addressed by some of the Delphi comments. Some respondents agreed that managers failing to act (apply prescribed fire) based on negligence should be held accountable, but were unsure of the level of accountability that should be attributed. The policy touches on the concern that managers may choose not to apply prescribed fire in a negligent, risk averse manner, recognizing a perception that agency administrators can give fire-use activities “a low priority without being held responsible for the consequences (USDI and USDA 1995).”

Non-action accountability is not specifically addressed in the federal policy, and only a brief mention of accountability for failed prescribed fire activities was mentioned. Briefly addressed in the 2001 implementation actions is concern regarding the difference

between agency liability and personal liability resulting from prescribed fire (USDI et al 2001, USDI and USDA 1995). In contrast, accountability was an important concern for respondents, who viewed accountability as both an assurance of responsible decision-making and as justification for the authority and discretion afforded natural resource managers. Approximately half of the respondents, in a variety of interest populations, addressed concerns about accountability and expressed the belief that managers should be held responsible for their application decisions. The policy, however, emphasizes accountability for implementing the procedures dictated therein. It includes little mention of accountability for unintended and serious impacts of prescribed fire activity such as escape and damage to private interests. Concerns about accountability for escape and damages are of particular salience, given recent high-profile and devastating prescribed fire escapes like the Cerro Grande fire; it is these potential consequences that were emphasized by the Delphi respondents and are virtually unaddressed by the policy. By emphasizing accountability for policy implementation, the emphasis is on manager accountability to the agency itself, while respondents were concerned about manager and agency accountability to the public. This is a fundamental difference in the issues addressed by policy, and indicates a myopic focus on the concerns of the agency rather than the public interest.

Expertise: The importance of a qualified workforce is consistently emphasized throughout the federal fire policy. Expertise is an important component of these qualifications, though concern exists regarding the need for new skills and capabilities in order to address changing priorities and complexities in fire management (USDI et al

2001). As such, new mechanisms for increased training in prescribed fire, decision-making, and support programs are required. Also, the mix of skills required to accomplish a range of fire management activities is not fully understood and needs to be analyzed (USDI et al 2001).

The policy identifies means to address potential gaps in expertise or capability -- interagency prescribed fire qualification and certification standards must be complied with, and a qualified and adequate workforce must be maintained (USDI et al 2001, USDI and USDA 1995). Consistent and adequate training must be provided to administrators and employees according to their roles and responsibilities in fire management activities (USDI et al 2001, USDI and USDA 1995).

Both the emphasis on expertise in prescribed fire management as well as the concern that expertise may be insufficient reflect points specifically identified by Delphi respondents. As previously discussed, the potential lack of expertise has important consequences, given the authority and expectation of responsible management vested in land managers. It also has serious implications for issues of trust identified by study respondents. Though recognizing the importance of qualifications and expertise, these broader implications are not addressed by the policy.

### Scope

In applying prescribed fire, the scope of fire use should be consistent with historic fire regimes, including extent, timing, and risks and consequences (USDI et al 2001, USDI and USDA 1995). To provide the optimal ecological benefit, the timing and intensity of prescribed fire should resemble natural occurrence (USDI and USDA 1995).

Policy comments describing the appropriate scope of prescribed fire activities address two concerns identified by respondents; the historic fire regime and the timing of prescribed burns. Respondents, particularly those who prioritized the ecological objectives of prescribed fire programs, agreed that burning should reflect the historic fire regime of an ecosystem. However, the respondents and the policy both fail to address how this criterion may be impacted by the significantly different physical and social context of fire on the landscape today, and neither define or offer guidelines for determining what “historic” means.

Concerns about the timing or season of prescribed fire activities were also identified in the Delphi exercise. Some respondents believe that timing is not as important to application as other concerns; for example, air quality impact or risk minimization. Others, however, fully agreed that the timing of prescribed burns should reflect fire’s natural occurrence on the landscape. Further, respondents expressed a willingness to accept the attendant negative tradeoffs and risk that may accompany in-season burning. However, these indications of acceptance of tradeoffs imply the potential for non-acceptance; though not specifically expressed by respondents, there likely exists potential disagreement with this perspective that increased risk is worth increased ecological benefit. The policy perspective on whether the ecological benefits take precedence over negative impacts is unclear. As described in the following section on tradeoffs, prescribed fire activities must work to achieve both ecological integrity and minimize negative consequences as well as minimizing cost, but the appropriate balance between these benefits and costs is not indicated.

## Tradeoffs

Balancing the tradeoffs of prescribed fire application is a difficult task; fuels may be treated to achieve the greatest land management benefits at the lowest cost, however, those may not be the areas of greatest risk (e.g. the wildland-urban interface) therefore risk reduction objectives may not be achieved (USDI et al 2001). As a result, some goals may have to be prioritized over others. Programs must strive to maintain the long-term integrity of natural resources and minimize the undesirable effects of fire (USDI et al 2001, USDI and USDA 1995). The probability of success and/or failure associated with the use of prescribed fire and an evaluation of positive and negative consequences are necessary in determining appropriate action, and the effects of not conducting the project must also be evaluated (USDI et al 2001, USDI and USDA 1995). Wildland fire activities must be reconciled with other goals, for example, maintaining species habitat, producing commodities, and environmental consequences. Tradeoff concerns specifically addressed in the current policy are impacts or consequences, expense considerations, and risk management.

Impacts: Fire management plans and activities must incorporate public health and environmental quality concerns that may result from activities. Tradeoffs include anticipated effects on public health, air and water quality, and endangered species (USDI et al 2001). Other impacts include potential effects, impacts that are unknown or unanticipated (USDI and USDA 1995). Potential negative consequences are complicated by lack of agreement regarding the effect of fire on specific resources, including air and



water quality, cultural resources, and certain plant and animal species (USDI and USDA 1995).

Delphi participants also identified the anticipated and potential impacts described above as important tradeoff considerations. In particular, the concern about potential effects was expressed, specifically the lack of existing knowledge regarding what those impacts might be. Another dimension that emerged in the Delphi discussion of tradeoffs was the concept of acceptability, which the policy does not address. Public acceptability of management activity is centered on anticipated consequences, as well as the willingness to accept the costs of activity and the risk of unknown effects.

Expense: The current federal policy identifies expense is an important consideration in determining fire management activities, and activities must be economically viable based upon values to be protected, costs, and resource management objectives. Fire management activities should be designed to increase efficiency and reduce costs. Investment in fire management activities must be evaluated against other resource management programs in order effectively accomplish overall objectives (USDI et al 2001). Economic efficiency is emphasized, and prescribed fire programs must demonstrate a return in improved or restored ecosystems and/or reduced suppression costs (USDI and USDA 1995).

Respondents also incorporated considerations of cost into their perspectives on prescribed fire. Comments emphasized the direct expense of prescribed fire activities as well as the offset of costs related to potential suppression activities. The policy perspective above addresses both of these expense considerations, and requires that

activities strive for economic efficiency by reducing these costs and/or demonstrating a net gain in ecosystem goals.

Risk Management: According to the current policy perspectives, managing and minimizing risk is the foundation of all fire management activities. The risks and uncertainties related to prescribed fire must be understood and managed in terms of the cost of either doing or not doing an activity. “Net gains to the public benefit are an important component of decisions, and emphasis should be placed on identifying consequences of failure (USDI et al 2001, USDI and USDA 1995).” Current fire policy recognizes the risk assumed by managers in implementing prescribed burn activities, as well as the aversion to risk that exists for some managers (USDI and USDA 1995).

These policy statements recognize the importance of managing risk inherent in prescribed fire application, as well as explicitly recognizing the non-action alternative and its attendant potential risk. Respondents identified this balancing of risk also, describing dimensions of damage due to escaped prescribed fire, the potential for uncontrolled wildland fire without treatment, and the unknown effects that may result from either. Risk-averse behavior was also identified as a dimension of the non-action alternative. Respondents attributed risk aversion to manager concerns about accountability for prescribed fire outcomes; however, if non-action accountability becomes a factor it may change the dimensions of risk aversion.

There is a significant complexity in evaluating tradeoffs that is not addressed by the current policy. It simplifies the idea of balancing positive with negative by

mandating a “maximize ecological benefits while minimizing negative impacts” approach. However, this simple position on tradeoffs may require the coordination of mutually exclusive directives. Maximizing ecological benefits while minimizing consequences and risk may be physically impossible; more importantly, those objectives may be mutually exclusive based on the nature of how negative impacts and risk are defined. Many people may be willing to accept some scientifically based perspective regarding ecological benefits, but most of those people also have highly personal views of what negative consequences and unacceptable risk are, making the minimization of such tradeoffs very difficult. Individual perceptions are a significant component of balancing tradeoffs, and the current prescribed fire policy does not include mechanisms or guidelines for dealing with this complexity.

Acceptability is fundamental to the tradeoff discussion, and in recent years has received substantial attention as a potential means to understanding the source of conflict in natural resource management debates. In the context of this study, acceptability is only expressly mentioned by Delphi respondents, not in the policy. According to study responses, acceptability, or appropriate use of prescribed fire, is determined in part by the inclusiveness of the management process as well as the scientific underpinnings discussed above. Acceptability is closely related to dimensions of public education and awareness, as well as tradeoffs.

As described in Chapter 2, previous efforts at educating the public have been targeted at increasing support for activities judged important or appropriate by the federal land management agencies. The federal policy, in recent years, has been working to change the message about wildland fire. Over the last three decades, the federal agencies

have moved from the suppression era belief that fire is detrimental to public lands to the belief that fire is only detrimental if unintended, while managed fire is beneficial to the public lands. This second message was the flagship of prescribed fire education efforts, emphasizing management and generating support for prescribed fire activities. In recent years, the message has shifted again with efforts to convince different interests that fire on public lands is beneficial, even if unintended, due to its necessary function in natural systems. In the span of 30 or 40 years, federal land management has virtually reversed its position on fire, and is now trying to encourage others to do the same via education efforts.

In an Oregon survey, Shindler and Reed (1996) found that most survey respondents agreed that prescribed fire was useful in reducing the chance of wildfire and excess fuels, but a small majority of respondents saw the practice as a possible threat to nearby property. These concerns also emerged in this Delphi exercise, and through these comments, respondents have highlighted one of the biggest difficulties in using prescribed fire. The decades-long emphasis on suppression and prevention for protection still resonates with people, especially those living in the wildland-urban interface. Agencies now have a different philosophy about their function as stewards of public land and the role of fire on the landscape. For many people though, the reasons prescribed fire is needed – protection of property and resources, restoring the natural function of fire – are the same reasons prescribed fire is feared. It may threaten those same protection concerns, or if escaped, may contribute to unnatural processes on public lands. This is the tension between the existing risk on vast acres of public land and the inherent risk of treating that land with prescribed fire, and an important dimension of risk perception.

The recognition of tradeoffs, the balancing of positive and negative consequences, is also recognized by Delphi participants and in the statements of policy. Concern is expressed in discussions about anticipated negative effects, potential unknown impacts, as well as the balancing of risk.

The primary issue that emerges from the discussion of tradeoffs is that of acceptability and how it might be determined. The current policy does not mention acceptability, but the Delphi respondents frequently referred to “acceptable” consequences and risk. The study and theory of social acceptability has become increasingly important in resource management over the last decade, and by not addressing it, the policy fails to recognize the complexity of public perspectives as well as issues of conflict from external concerns. In turn, this perspective makes the agencies ineffective in avoiding conflict and in dealing with protests and complaints about management activities. The question that is not addressed in the policy is what if the activities and tradeoffs are unacceptable? In effect, many study respondents believe that prescribed fire activities must have some measure of acceptability in order to be appropriate. In addition, the notion of public trust was only briefly mentioned in the policy, but trust in agency activities is an important component of these conflicts. Concerns about motives and misrepresentation must be more effectively addressed if the agencies are going to embark on an expanded program of prescribed fire.

Respondents identified interaction, combined with learning and agency disclosure, as a potential means to address and increase acceptability of prescribed fire activities and improve public and agency relations. The current fire policy emphasizes

increased education efforts to increase public support, which presents little change from the traditional agency perspective on generating support.

### Alternatives

Where fire cannot be safely reintroduced or applied due to fuel conditions, some form of pretreatment must be considered, particularly in wildland-urban interface areas (USDI et al 2001).

The advocacy of alternative treatments by the current policy reflects Delphi-emergent concerns regarding the suitability of activities, possible alternatives to prescribed fire, and the economic issues associated with those alternatives. The policy does not detail possible alternatives or “pretreatment” strategies, which were primarily recognized by respondents to be the use of mechanical treatments like thinning. The policy also avoids discussion of the economic issues specifically related to those activities, identified by respondents as economic opportunities or economic incentives. Study findings found that these two perspectives were mutually exclusive, either in support of or in opposition to potential economic gain from these management activities. As described in the findings chapter, it is difficult to know what the “majority opinion” of this issue is given the small percentage of respondents that addressed the issue, however it is important to recognize the potential for contention surrounding economic gains. Yet the policy fails to explicitly address either of these perspectives. The previous discussion of “community sustainability” as a component of ecosystem sustainability may, however, provide federal land management agencies with a justification for providing economic opportunities – which in turn rejects concerns that economic incentives corrupt resource management activities.

## Resource Availability

Concerns about the availability of both human and monetary resources for fire management activities are also identified in current federal policy.

Human resources: These concerns include references to “downsizing” and reductions in available personnel, compromising the capacity of agencies to meet staffing requirements (USDI et al 2001). To some extent, these concerns can be addressed through interagency cooperation and pooling of human resources. Agency administrators are responsible for ensuring adequate training, certification, and availability of employees to participate in the wildland fire program. Employees with operational, administrative or other skills are required to support the wildland fire program as necessary. A broad cross-section of employees are to be trained, certified, and available for fire management support – every employee should be so qualified, though only fire management personnel have any responsibility to respond to wildland fire activities (USDI et al 2001).

The availability of human resources corresponds to the same concern identified by respondents and described under the organizational factors in decision criteria. These concerns were nearly identical to those addressed by policy, and were offered primarily by the agency participants in the study. Participants identified the need for an adequate, qualified workforce as well as contingency resources, both of which are addressed by policy stipulations on employee training and availability.

Monetary resources: Funding is another dimension of available resources, and according to policy, increases in funding are required to achieve effective hazardous fuel reduction objectives (USDI et al 2001). Budget structures have been changed to allow more

flexibility in using funds; prescribed fire activities now have funding authority identical to that for wildland fire suppression. This change was influenced in part by the argument that fire management planning and activities must recognize both fire use and fire protection as inherent parts of natural resource management, and ensure adequate fire suppression capabilities and support fire reintroduction efforts (USDI et al 2001). Fire use and suppression resources and activities must be managed to achieve the accomplishment of both programs concurrently (USDI et al 2001, USDI and USDA 1995).

However, the policy states that overall funding levels are insufficient (USDI et al 2001, USDI and USDA 1995). Adequate funding for non-federal organizations is also identified as necessary to ensure cooperating fire organizations are able to implement the fire policy consistently (USDI et al 2001). The current fire policy clearly states that any response to wildland fire will be based on Fire Management Plans, regardless of ignition source or location of fire (USDI et al 2001). Eliminating the ignition bias is intended to minimize the use of different personnel, qualification systems, and resource allocation based on the “type” of fire (USDI et al 2001).

Nearly half of study participants identified funding as a source of concern, focusing on changing budget and funding structures. Respondents indicated a need to have steady funding and a desire to see the inequality between prescribed fire and suppression dollars addressed. The policy addresses these concerns; funding structures have been changed to eliminate discrepancies between suppression and prescribed fire activities. However, program allocations are still subject to annual appropriations, which may complicate the need for steady funding streams. Policy calls for an increase in



funding in order to implement the necessary activities; though this is not concurred in the study findings, respondents did not identify a reduction in budget as a priority either.

#### Agency Support and Program Integration

Another application concern addressed by the policy is the importance of a supportive organizational climate where employees who implement a properly planned fire reintroduction program are supported by the agency administration (USDI et al 2001). This includes those activities that have unfavorable outcomes (USDI and USDA 1995). A related issue is one of employee compensation, which is based on the type of work performed; employees engaged in fire management activities are treated comparably regardless of ignition source or location (USDI et al 2001, USDI and USDA 1995).

Fire management programs must be better integrated into land management activities in order to support land management objectives and achieve desired future conditions. Currently, the relationship between fire management activities and other resource management efforts to achieve sustainability is unclear. Fire management must be effectively integrated with other activities (USDI et al 2001), and treatment of fuel hazards by resource management activities is required (USDI et al 2001, USDI and USDA 1995).

These concerns are largely discussed in the organizational factors influencing prescribed fire action or application in the Delphi findings. A couple of respondents expressed concerns about organizational support for land managers even when things go wrong and the policy specifically addresses those actions with unfavorable results. This

policy directive may have implications for the accountability and risk aversion concerns discussed previously, potentially alleviating some of the accountability repercussions.

Also identified in Delphi comments was the issue of program integration and concern that prescribed fire is insufficiently integrated with other resource management activities.

One related concern identified in the study was possible inconsistencies between the agency bureaucracy and land managers, emphasizing the contention between policy-makers and the actual on-the-ground implementation (see the “planning” section of this chapter). This concern is not identified or addressed in the current policy.

### **Organizational Imperatives**

The issues described in this section are concerns identified by the policy authors regarding improvements to organizational structure and relationships. These improvements are expected to facilitate more effective program development and policy implementation, and include interagency cooperation and standardization directives.

Interagency cooperation: Repeatedly emphasized throughout the federal policy is the need for interagency cooperation in fire management. This cooperation and coordination includes activities within federal agencies, among federal agencies, and between federal and non-federal organizations. Federal land managing agencies as well as those agencies with supporting or related programs (e.g. National Weather Service, Environmental Protection Agency) are to act as full partners in fire management activities and programs. Cooperation is essential for fire management activities that cross agency boundaries and

jurisdictions, including jurisdiction and responsibility in the wildland-urban interface (USDI et al 2001). The 2001 policy mandates that all fire management programs under the federal agencies comply with its principles in an effort to integrate fire management activities under a single policy direction. Cooperation is expected from the senior policy level to the operational level through expanded participation of different organizations (USDI et al 2001).

The policy directives described above address an issue unidentified by study respondents. Though respondents were concerned about prescribed fire program integration with other programs, the above issue is focused on the development of a cooperative fire program that effectively connects all federal as well as non-federal fire management organizations. The interagency cooperation directed by policy is ubiquitous in the policy text and dictates a foundation of cooperation for all fire management activities.

Standardization: Standardization of terminology is an important dimension; the proliferation of similar terms based on ignition source, land use designation, and funding structures has caused confusion within agencies and among partners, cooperators, and the public (USDI et al 2001). Consistency in terminology is essential to interagency cooperation (USDI et al 2001).

Also related to concerns regarding interagency cooperation are policy demands for standardization of policies and procedures for virtually every element of wildland fire management among federal agencies (USDI et al 2001). Agencies are to use compatible planning processes, funding mechanisms, qualification requirements, hiring and

contracting procedures, operational procedures, values-to-be-protected prioritization methods, and public education programs for all fire management activities (USDI et al 2001, USDI and USDA 1995). Consistency provides a necessary basis for cooperation and integration of fire management activities (USDI et al 2001).

This standardization directive is intended to help integrate fire management across agency jurisdictions, however, it is unclear how such broad and inclusive standards will impact application considerations. Flexibility in implementation and on-the-ground familiarity were identified by Delphi participants as important prescribed fire application considerations; the only mention of those concerns in the policy is an obscure reference to the elimination of “unnecessary constraint”. Increasing standardization as well as accountability for those standards may, for all intensive purposes, move decision-making further away from the dictates of the land, a specific concern identified by two respondents. It may also complicate the desire to improve agency support of land managers; by emphasizing standards, the agencies may provide themselves leeway in backing managers decisions, supporting only those that appropriately comply with standards. However, the vague nature and language of the policy may present significant obstacles to meeting standards and requirements; there are no clear guidelines about essential factors in decision-making, for example, goal prioritization and defining unacceptable consequences.

### **Evaluation Provisions**

Included in the policy are directives for program evaluation and oversight. These directives include the need for leadership and oversight of coordinated interagency and

interdisciplinary fire management; an effective means must be developed to oversee the implementation of fire policy, especially across agency and program lines (USDI et al 2001). The purpose of evaluation is to ensure accountability, facilitate conflict resolution, and identify resource shortages and agency priorities.

Program oversight: The mechanism for program oversight must address the following concerns: provide a forum for raising and resolving issues across agency and disciplinary lines; provide strategic direction and leadership for overall implementation of the federal fire policy; provide evaluation of the program effectiveness; and provide a focal point for consolidating funding and workforce requirements (USDI et al 2001). Primarily, program oversight and evaluation should facilitate the interagency cooperation mandates around which the federal fire policy revolves.

Policy evaluation: Evaluation of the current federal fire policy requires clear performance measures, mechanisms for collecting and analyzing data, and the tracking of accomplishments. Policy evaluation should occur on a three to five year cycle, rather than according to specific fire events (USDI et al 2001).

Program and policy evaluation concerns were not addressed by Delphi respondents; however, program oversight in particular carries with it implications for evaluating implementation and increasing accountability. At what resolution these evaluations are to be conducted as well as responsibility for carrying them out is not established.

## Summary

The comparative evaluation presented above contains a reasonably complete discussion of principal issues addressed by the current federal fire policy; some minor points were left out in an effort to focus on major areas of concern and their relationships to the Delphi findings. The policy text emphasized the topics presented here, and those Delphi concerns that are not compared (e.g. overuse of prescribed fire, acceptability, scientific uncertainty, and trust concerns) were not addressed by the policy. The policy discussion of the role of science, participation and goal definition, goals, priority areas, communication, and application concerns parallels the emergence of these issues from the Delphi exercise, though the ideas and the issues involved were presented and addressed somewhat differently.

The policy emphasis on interagency cooperation, consistent interagency fire management policies and practices, the significance of approved fire management plans, accountability for adherence to procedures, and providing for sufficient resource availability is in part a reaction to the single most publicized fire event on public lands in the summer of 2000 – the Cerro Grande fire. The 2001 policy review was the federal government response to the 2000 fire season, and was heavily influenced by the investigation of the escaped prescribed fire at Cerro Grande in New Mexico. That investigation found that the prescribed fire plan for Cerro Grande was not adequate, a lack of interagency communication and coordination existed, contingency resources were not provided for, critical deviations from the prescribed fire plan and standard fire practices occurred, and concerns about the qualifications of personnel emerged (Fire Investigation Team 2000).

The policy heavily emphasizes evaluation and the organizational roles and challenges, particularly interagency cooperation. Study participants did not give these concerns distinct emphasis, and this discrepancy is likely linked to agency authorship of the policy statements. The result, however, may be a narrowed presentation of the issues surrounding prescribed fire activities. Potentially, the lack of recognition of other concerns reduces the comprehensive address of fire management and fails to acknowledge external perspectives. Another notable difference is the emphasis on cooperation and collaboration between agencies and disciplines detailed in the policy, with little discussion of these strategies involving external interests. Delphi comments, on the other hand, specifically recognized the value of these external interactions. The intent of this study was to evaluate the representation of a variety of concerns in the current policy, using the Delphi to determine some of those external as well as internal perspectives. The premise for conducting the evaluation is the role of public policy and prescribed fire policy in reflecting public will and social values. These broader concerns, based on study results, are addressed in the following and final chapter, entitled “Conclusions and Implications”.

## **Chapter 6: Conclusions and Implications**

This final chapter summarizes the reflection of Delphi themes in current policy, highlighting broader concerns and potential policy implications.

As described in Chapter 1, the function of public resource policy is to establish an approach to managing natural resources on public land. The use of prescribed fire is one component of resource policy, applied under the guidance of principles and perspectives established in federal fire management and prescribed fire policy. Prescribed fire has been established as a means to address certain societal goals; as identified in this study by the Delphi exercise and the policy itself, those goals include ecological concerns of natural process and forest health, and protection concerns that emphasize fuel reduction. These potential broad goals for prescribed fire did not emerge in this study as the focus of debate, and there was no rejection of prescribed fire as an appropriate management tool. However, the potential involvement of different interests in addressing specific, place-based objectives within the broad purposes of prescribed fire, the priority placed on those goals, and some aspects of prescribed fire application did emerge as possible sources of contention.

A summary of study findings is presented below, according to the familiar categories of information described in previous chapters. Following that summary is an overall critique of the current prescribed fire policy and future research questions.



## **Process Issues**

One of the most significant disparities between the Delphi results and the current federal policy is the treatment of involvement and participation in the establishing specific, local objectives. In fact, many of the other concerns and differing perspectives that emerged in other dimensions of prescribed fire management may be addressed by the functions of participation strategies. In focusing on the representation of interests in prescribed fire policy, the issue of public involvement is of particular significance. The involvement processes described by Delphi participants are centered around establishing objectives for the use of prescribed fire; objectives which in turn form the basis of management decisions and effectively set the stage for management activities. As a result, inclusive public involvement provides management with the opportunity to incorporate different interests and consider socially acceptable priorities and tradeoffs. In not recognizing the inclusive processes identified by a majority of study respondents, the federal fire policy effectively cripples the ability of policy and implementation to address areas of contention that emerge in other dimensions of management.

Citizens, who have traditionally been excluded from the definition of local objectives for resource management, are trying to establish a stronger voice in public land management activities. This is evidenced in the number of lawsuits, complaints, and protests regarding the decisions of land management agencies. In this study, the same concerns about increased and improved public involvement strategies were expressed through respondent perspectives on the scope of participation in objective definition. The policy, however, neglects to incorporate expanded participation strategies, reflecting instead one of the “exclusive” strategies identified by a few respondents; the traditional

model of agency goals and alternatives development, based on scientific recommendations, and presented for public comment.

The role of science and deference afforded to scientific knowledge is similar in both the policy and Delphi perspectives. Some Delphi respondents, however, specifically identified the uncertainty of scientific information, injecting a note of caution into the dialogue. That recognition is absent in the policy, which emphasizes the use of scientific information as justification of prescribed fire management activity. The policy manages to both recognize the political and social nature of resource management by using terms like balancing “values to be protected”, while at the same time proposing to base management on science. Science, however, is not charged with evaluating the relative values of prescribed fire objectives – that is a purely social endeavor.

The allocation of authority and expectation of responsibility in implementing prescribed fire activities is also reflected in both the Delphi and policy perspectives. The accountability of managers, however, differed substantially between the two. Delphi respondents emphasized the accountability of managers to the public and external interests, while the policy focuses on accountability to internal expectations.

Planning considerations were virtually identical between the Delphi and policy perspectives, emphasizing the importance of a documented set of parameters for prescribed fire activities. The issue of manager flexibility, raised by study participants, was not addressed.

## Goals

The policy is ambiguous in its treatment of goals and the prioritization of those goals. Delphi participants tended to express multiple broad goals in their responses, goals which include ecological process, human benefits, protection objectives. The policy identifies nearly identical goals, subdivided by ecological and protection concerns but lumped together under one overriding goal of ecosystem sustainability. In combining different types of goals to create a single primary goal, the policy attempts to avoid potential conflicts between human and ecological interests. However, in areas like the urban interface, it may not be possible to address both ecological and protection considerations simultaneously. How those concerns are to be balanced and according to what criteria are not addressed by policy.

The protection concerns addressed by the policy present another ambiguity. Federal responsibility in addressing hazards on private property is specifically rejected, yet the community infrastructure rationale is used to support fuel reduction efforts in interface areas. The policy thus continues to provide for private interest protection, these activities are now to be conducted in the name of community sustainability. This perspective recognizes some respondent concerns that resource management is not responsible for interface risk reduction efforts, while at the same time supporting the perspective that resource management is appropriately used to treat areas posing a significant risk to communities. In effect, the policy argues both sides without clearly stating a position on this issue.

### **Priorities and Scale**

The policy is also vague in its treatment of priority areas, emphasizing both ecological health and hazard reduction, with priority dependent on values to be protected. As previously discussed, there is no clear explanation of how those values are to be evaluated against each other, and the policy fails to reflect an explicit priority. However, the policy position regarding the appropriate scale of prescribed fire activities is clearly stated. It emphasizes a landscape scale approach to resource management and prescribed fire application, a perspective also identified by several Delphi respondents. It does not address the concerns of other participants that management of natural resources should be limited. Given that the policy is authored by the federal agencies, a reduction in management is unlikely to receive much attention. Nevertheless, it is point of view represented in this Delphi and likely many other citizens that see reduced management as important to the public interest.

### **Application Constraints**

The potential organizational constraints identified by Delphi participants included the need for agency support of manager decisions inter and intra-agency cooperation, concerns about the availability of human and monetary resources, and adequate funding structures. All of these concerns are addressed by the current policy; only concerns about the inconsistency between agency bureaucracy and local managers were not addressed.

The policy explicitly agreed with several respondents that timing or season of prescribed burns should coincided with fire's natural role in the ecosystem, emphasizing ecological benefits. Another perspective emphasized the limiting of risk and tradeoff

implications, while another focused on compliance with plan criteria, regardless of season. Implicitly, the policy recognizes the other two emergent perspectives by emphasizing the minimization of risk and consequences and adherence to plans and prescriptions. The policy position on timing may focus on ecological process concerns, but it is unclear at what point those concerns are superceded by negative impacts or prescription criteria.

In regard to the suitability considerations identified by respondents, the current prescribed fire policy recognizes the presence of alternatives to prescribed fire, but does not address the debates over possible economic gain that were identified by study respondents.

### **Secondary Consequences Constraints**

Both the Delphi respondents and the policy identify the importance of reducing the expense associated with prescribed fire, also identifying the offset of suppression costs that may be achieved with prescribed fire expense. Negative and potential impacts of prescribed fire were also identified by both study participants and the policy statements. The recognition of inherent risk in prescribed fire activities was also affirmed in the current policy. Escape or limitations on control are not specifically mentioned, but the policy does address dimensions of risk assumption and aversion on the part of managers that emerged in study responses. In emphasizing the management and minimization of risk, the policy addressed respondent concerns about protecting safety, property, and resources from prescribed fire.

The concept of social or public acceptability – the balancing of prescribed fire impacts and risk against the intended benefits – is not addressed by policy. A substantial number of respondents identified dimensions of responsibility, and noted the importance of public approval and trust in successful prescribed burning programs.

### **Communication and Education**

The emphasis in the policy on improved communication and education reflects some of the dimensions identified in the Delphi, but essentially disregards the identification of new communication strategies. Traditional approaches may be effective in distributing information and increasing awareness, however, they are inadequate in the current natural resource climate. With increasing disputes over management in the face of increased education efforts, the resource management is faced with re-evaluating the education technique. According to comments in this study, two-way communication strategies may prove much more effective in understanding and possibly reducing conflict. In addition, these strategies can encourage a greater representation of interests in prescribed fire activities and increase the acceptance of management, a concept that was stressed by the Delphi respondents and recognized in the policy statements.

### **Policy Critique**

In offering a critique of prescribed fire policy based on these study findings, it is prudent to revisit the concerns expressed by study respondents regarding the role of policy. Comments regarding policy identified it as a source of broad goals and national directives for resource management. Some participants see policy as the product of

representative government that reflects the will of the citizens, and establishes a context in which prescribed fire occurs. Some also expressed concern that the policy was removed from and inconsistent with management “on the ground” – the day to day situations faced by local land managers. These perspectives are, interestingly, directly related to the two most apparent characteristics of the current policy. First, it does not necessarily reflect the will of citizens; rather, it is dogmatic in its treatment of prescribed fire issues, focusing on agency perspectives and roles. Second, the policy is ambiguous in its directives for management, complicating the translation of policy guidelines into implementation “on-the-ground”.

The current prescribed fire policy, while the result of cooperation, is primarily an expression of federal agency collaboration. As such, it focuses on those dimensions of prescribed fire that reflect agency concerns. The study respondents identified a wide range of concepts and a multitude of perspectives on the use of prescribed fire, while the policy emphasizes issues of particular salience to the agencies themselves. Policy statements expound on the relevance of science to management activities and specifically note the relationship between managers and science, yet minimally address the issue of public involvement. Instead, the traditional exclusive model of goal-setting and decision-making is implicit with little regard for the increasingly important concerns surrounding expanded participation. The authority of agencies and land managers is asserted, along with attendant dimensions of responsibility, and to some extent, accountability.

Nearly all of the organizational concerns identified by respondents are addressed in policy, and constitute a substantial portion of policy considerations. In addition, the policy addresses some of the dimensions the other application constraints, again

emphasizing the province of the agencies. Secondary consequence concerns are also addressed by the policy, but the dimension of acceptability is conspicuously absent. This concept was substantially important to study participants and offers a context for evaluating the impacts and consequences of prescribed fire. It is, however, a principal component of perceptions *external* to the federal agencies.

Many of the policy statements focus on the internal dilemmas faced by agency personnel. However, concerns exist that involve those interests external to the agency. By concentrating on organizational issues and emphasizing agency roles and responsibilities, the federal fire policy neglects to identify how the policy positions reflect the will of the public. Regarding issues of public land management, those lands managed for the citizens, the public might be expected to have considerable recognition in national policy.

As previously discussed, the significance of scientists' contribution to management decisions may inhibit the expression of other interests in prescribed fire activities. Study respondents emphasizing inclusive goal-setting processes were particularly concerned about the incorporation of multiple interests in management, which would be potentially precluded by the policy position delegating all such authority to the managers. One respondent stated that the public interest is expressed, albeit indirectly, by this management strategy through representative government. However, with a policy designed by agency and administration appointees, there is reduced access to resource management via elected representatives. Indeed, though prescribed fire and other fire management has remained contentious, potential concerns or opposing points



of view are not acknowledged. While broad statements are made within the policy, the perspective is essentially narrow.

The implementation of policy becomes especially significant in evaluating the prescribed fire policy due to the vague nature of the policy statements. In examining the policy, it is difficult to determine how it is translated operationally without examining how it is being implemented at the local level. The current fire management policy, in an effort to encompass the broad dimensions of policy, ends up being unclear on many issues.

The use of prescribed fire is an issue of both local and national significance. National guidelines must be translated into local activities, but the 2001 policy review leaves that translation ambiguous at best. The difficulty in matching broad national management directives to multiple areas has become clear through the increasing contention over appropriate public land management. The dynamics of the dispute and the issues in question vary, and are dependent on both the ecological and social dimensions of local areas. The policy has effectively avoided conflict by either not addressing it (e.g. the dispute over economic benefits of management activities) or by refusing to establish specific perspectives on potentially contentious issues (e.g. the prioritization of goals within the ecosystem sustainability directive). Other potentially difficult or messy concerns – for example, acceptability and scientific uncertainty – are left out of the discussion.

In regard to process and participation, the extent, structure, and relative influence of public involvement is not addressed. The policy essentially incorporates these ideas

through the use of phrases like “all interested parties” without offering any concrete ideas about addressing expanded participation concerns. The language of the policy focuses instead on traditional strategies of involvement, though avoids explicit and clear position statements.

The goals identified within the policy coincide well with the goals identified by study respondents, however, the nature of those goals is ambiguous. Terms like “natural”, “health”, “sustainability”, and “community infrastructure” have yet to be clearly defined, and as such, are subject to individual interpretation. As goals, these terms capture some abstract ideal or concept, while in reality they complicate the ability of policy to offer specific guidance to the people charged with implementing it. Policy statements also complicate protection objectives, with directives for protecting community infrastructure and sustainability while at the same time emphasizing the absence of federal responsibility for protecting private interests in the interface. The policy elaborates a distinct difference between the federal agencies’ role in the interface and their responsibility, but that difference is subtle and potentially obscured when it comes to implementation. This difficulty in operational understanding of goals is further complicated by the grouping of all objectives under one large goal of ecosystem sustainability, which is not only difficult to define but neglects potential situations where either ecological concerns or protection concerns must be emphasized.

Though recognizing essentially the same range of goals identified by study respondents, the policy does not explicitly define the priorities for those goals. In terms of the public interest, the policy treatment of goals is effective in recognizing the range of goals, and by leaving the prioritization open to interpretation, it allows for multiple

expressions of public will. However, by only vaguely referring to how those priorities will be determined, there remains uncertainty about how the “values to be protected” are evaluated in management activities. The policy states that areas where prescribed fire will improve resource conditions or reduce hazard will be prioritized, but with limited funding, which of these areas should be treated first? Which objective is really the most important? These types of questions are not addressed, yet it is these dilemmas faced by local-level management.

The issue of accountability is of particular relevance to land managers responsible for implementing prescribed fire activities, but other than expressing the need for accountability, this issue is not addressed. The risk assumed by managers in decisions about implementing prescribed fire may be a substantial factor in their choices, which in turn is impacted by issues of accountability for those choices. The concern here is for accountability when fire activities do not go as planned and result in substantial damage primarily to external interests. The policy does not address this accountability, focusing instead on accountability for implementing policy directives, leaving the question of implementation responsibility and repercussions ambiguous at best.

The balancing of tradeoffs is addressed in the policy by identifying the importance of maximizing benefit while minimizing negative effects and expense. Again, however, the policy fails to give any particular guidance for on-the-ground implementation regarding how that balance is to be attempted and oversimplifies the complexity of management tradeoffs.

Ambiguity may provide land managers with a measure of flexibility in implementing policy, allowing them to consider local physical and social dimensions in

their decisions. However, the policy text does not express this intent; rather, it uses language of logical, if/then choices in which priorities and decisions are based on some established table of weighted values (e.g. “values to be protected”). The relative importance of different values is never actually established, again leaving room for individual interpretation. An element of flexibility may actually be desirable, given the complexity and variation of management options regarding prescribed fire; however, the policy is very explicit about expectations. The emphasis placed on standardization and accountability for failing to implement the policy principles contradicts the possibility of flexibility. As a result, the current policy offers little specific guidance while at the same time requiring strict compliance. Operationally, the result may be an awkward set of directives on which to base management decisions. In a natural resource climate where managers are often faced with defending their decisions, the lack of clear direction may further complicate justification.

The current wildland fire management policy used to construct this study evaluation is explicit in its intention to provide a “broad, philosophical and policy foundation for federal agency fire management programs and activities”, and essentially succeed in presenting these broad ideas. However, the difficulty is in translating those philosophical positions into implementation, a translation that is highly ambiguous. The policy attempts to be responsive to some areas of increasing concern in natural resource management; for example, addressing ecosystem sustainability and including human community sustainability in that dynamic, and at least recognizing the multitude of interests in fire management issues. However, it is narrow-minded in its treatment of different perspectives, demonstrating a bias toward the perspectives and concerns of its

agency authors. In its ambiguity, it further reflects the concerns of the broader land management agency bureaucracy, leaving the local land managers themselves with a difficult set of management directives.

### **Future Research**

As an exploratory study, the findings presented here serve to identify potential areas of further research. First, the perspectives emerging from the Delphi exercise are certainly not exhaustive, and do not constitute generalizable conclusions about the whole population. However, the concepts that were identified are potentially useful in designing a broader scale study to evaluate the presence of these perspectives in a larger sample. The contribution of exploratory techniques like the Delphi method is in generating ideas regarding potential areas of concern or conflict in natural resource issues, and in offering insight into how different dimensions of management influence perceptions. Those ideas can then be used to design interview or survey questions that offer a deeper understanding of specific concepts. Potential questions emerging from this study include the following:

Process: Why is expanded public involvement so important? What are the different conceptions of these expanded strategies? What are the potential mechanisms for increasing public involvement in management? What are the fundamental concerns of the land management agencies in incorporating expanded involvement -- why are these strategies not included in directives for management? Is the reaffirmed relationship between scientists and management appropriate given concerns about objectivity and mistrust? What precedence should scientific information be given over other social

values, given the potential uncertainty in inadequacy of that knowledge? What do land managers consider their authority and accountability to be, and how does that impact decision-making? How could authority and responsibility be allocated in expanded participation strategies?

Goals and Priorities: How are the concepts of “health” and “sustainability” understood by natural resource interests (including managers, citizens, scientists), and how do those conceptions compare? At what point do protection concerns outweigh ecological concerns, or vice versa? Should risk and hazard faced by adjacent communities impact the management decisions on public lands?

Constraints: What opposition to prescribed fire activities exists in the broader public, and what are the reasons? How are the different dimensions of risk understood and weighed against each other and intended benefits of prescribed fire? How is scientific information relevant to judgements of acceptability, and to what extent does the source of that information matter?

Policy: What is the level of public understanding and awareness regarding current policy positions; for example, what is the level of awareness regarding responsibilities in the wildland-urban interface? Do specific policy positions reflect some specific segment or portion of the public interest? What are the primary differences between interests that support or oppose specific positions? Are managers concerned about the implementability of the policy directives, and if so, how might those directives be improved?

## **Concluding Remarks**

The Delphi exercise conducted in this study served to identify a variety of dimensions related to the use prescribed fire, and in some cases highlighted specific differences in respondent perspectives. By accessing those perspectives, the purpose of this exploratory study was accomplished, though the potential generation of ideas and arguments may be incomplete. The 2000 fire season and the time required to collect all responses, even using an e-mail contact format, complicated efforts to conduct more than two rounds of the Delphi, and the time between contacts may have contributed to the decrease in response rate. However, the Delphi format did allow a variety of interests from widespread geographic locations to “dialogue” about the dimensions of prescribed fire use in a structured format. The result is the generation of prescribed fire perceptions that capture much of the inherent complexity, a clarification of some potential areas of conflict, and a focus on the specific issues surrounding prescribed fire.

## The Use of Prescribed Fire: Identifying Perspectives and the Resulting Policy Implications

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## **The Use of Prescribed Fire: Identifying Perspectives and the Resulting Policy Implications**

### **Appendix A: Delphi Exercise, Round 1**

Attention: Project participants

Thank you for agreeing to participate in this project identifying perspectives on prescribed fire policy. This study is intended to identify existing concerns regarding the use of prescribed (manager-ignited) fire on public lands. The emerging viewpoints will then be used to evaluate the current prescribed fire policy on its ability to represent the diversity of interests that surround prescribed fire management. Implications for this study include both the evaluation of current policy and suggestions for policy revision.

The management of forests on public lands in the Western United States remains an issue of great interest to the people of the United States. These forests provide multiple benefits to people, such as clean water, recreation opportunities, and supplies of natural resource commodities, as well as significant habitats for a broad range of wildlife species. In the past decade, there has been a renewed interest in the role of fire in western forests. Presently, managers of National Forests and Bureau of Land Management lands are considering a more active program of fire management in western forests, including the re-introduction of fire through carefully applied, “manager-ignited”, or prescribed fires.

We are interested in knowing what you think...

The following is the first set of questions in a Delphi process. This process consists of several “rounds” of questions; each successive round will be based on an analysis of the responses previously received. In using this method, we hope to discover the range of viewpoints surrounding prescribed fire, and develop major categories where different interests diverge. You will have the opportunity to both respond to the other participants’ comments as well as review and amend your own responses in light of other viewpoints as part of this process. It is not necessary to limit your responses to the space provided. All comments will remain anonymous, and participants will be kept confidential.

We appreciate your prompt response, and would like to gather all responses to this first round by July 10, 2000. Please direct your responses to Michelle Byington via email or fax (406/xxx-xxxx, Attn: Michelle Byington). Michelle can also be reached for questions at 406/xxx-xxxx.

Questions (Round 1 of Delphi process):

What do you consider are the goals for the use of prescribed (manager-ignited) fire?

Who should define the goals for the use of prescribed fire?

Under what circumstances is it appropriate to use prescribed fire?

Under what circumstances is it not appropriate?

Who should determine when the use of prescribed fire is appropriate?

What are your primary concerns regarding the use of prescribed fire on public lands?

How could your concerns be addressed?

What have been the major influences on your perceptions regarding prescribed fire?

## **The Use of Prescribed Fire: Identifying Perspectives and the Resulting Policy Implications**

### **Appendix B: Delphi Exercise, Round 2**

#### Response to Participants in the Prescribed Fire Delphi

Thanks to each of you for responding to the first round of e-mail Delphi questions regarding the use of prescribed fire. Due to the complications of this fire season, it took a bit longer than anticipated to get all of the responses, but we greatly appreciate your efforts to provide such complete and thoughtful comments. We received a total of 25 full responses (out of 35 total requests, or a 71% response rate), and considering the circumstances, this has been a highly fruitful exercise. In fact, we received so much feedback in the first round that we believe that a second round of the Delphi will be sufficient for our purposes.

We ask that you review the attached summary/synthesis of the first round of responses and provide answers to the short set of follow-up questions at the end of this message. Much like the first round of the Delphi, your responses will be consolidated to gain a fuller understanding of the issues surrounding the application of prescribed fire. Please note that the final question is a rather open-ended request for any final thoughts on the use of prescribed fire, since we anticipate that many of us have been reflecting anew on fire's role in the West as a result of the recent fire season. Again, we understand the circumstances of the fire season to be a restriction on your time, but we would appreciate your final responses by October 15.

A synopsis of the concepts that emerged from your first responses is provided below. For those that wish to see the full set of responses, we will be happy to share that data, although we will protect the confidentiality of respondents. There were areas of strong agreement in a few areas across all respondents, and there were other areas where points of view diverged. We have attempted to organize your comments from the first round of the Delphi around a series of repeated themes, including different dimensions for how prescribed burning activities should be developed as well as expectations for the results of those activities. It is important to recognize that virtually all of the comments received about prescribed burning occur within the larger context of risk and tradeoffs – the recognition that the occurrence of fire poses the threat of damage to people, property, and resources; and that these risks and tradeoffs must be reasonable.

As we mentioned at the beginning of this study, the ideas developed in this Delphi process will be used to evaluate the current federal policy on prescribed burning. In order to further that goal, the synopsis and second round of questions is designed to address the basic elements of policy. The purpose of public policy is to provide direction for activity (goals), develop the means for implementation and achieving goals, and establish some anticipated result from the policy recommendations. The information presented here is

thus organized within the same framework: goals for prescribed burning, process for goal setting and implementation, and outcomes.

## **Results of the first round**

### ***Goals:***

The responses from the first round of the Delphi highlighted two broad goals for the use of prescribed fire. The first is the restoration or maintenance of natural ecosystem structure and function. This concept includes ideas regarding the recognition of historic fire regime and a desirable natural state for public land ecosystems. However, for our purposes, further development of this goal is problematic for several reasons. There is still a great deal of debate about how to determine fire regime information, as well an acceptable definition of “natural”. And finally, most of the responses identified prescribed fire as a tool for achieving management objectives -- by making prescribed fire a necessary ecosystem function, it becomes a goal in and of itself rather than a tool.

For the purposes of this study, we would like to focus on the second goal identified in the responses. This goal is centered on the principle of fuel reduction with protection objectives – the idea that prescribed fire should be used to reduce the threat of damage to people, property, and resources. There were differences in responses, however, regarding how these different values should be prioritized for protection and treatment. Some comments put human safety first, others the condition of the natural resource.

There was not agreement among respondents about the relative preferences for areas treated and spatial distributions of treatments i.e. Where should the threat be reduced? With emerging interest in the U.S. Congress in expending “restoration” funds on the urban-wildland interface, a coherent pattern of treatments would seem sensible. Several of the respondents identified the need to develop in the goal-setting process an integrated plan for using prescribed fire, tailored to specific situations. Frequently, comments indicated that prescribed fire is not necessarily the best or most appropriate approach to achieving management objectives on public land.

Responses consistently reflected an awareness of the context in which treatments would be applied, both in terms of physical and social/economic characteristics. The extent and amount of prescribed burning remains controversial. Several respondents mentioned the danger of overuse, criticizing the view that prescribed fire is a panacea for solving natural resource problems. Others expressed concern that prescribed fire would not be applied broadly enough. Implicit in this discussion of suitability, as well as explicit in many responses, is the recognition that alternative methods for achieving goals exist and should be considered. Mechanical treatment or thinning was the most often mentioned alternative, either as a single strategy or used in concert with prescribed fire. The mechanical thinning discussion also highlights another area of disagreement among the respondents. Some of the submitted comments included support for making the most of economic opportunities that may exist as part of fuel reduction, while others argued that economic incentives associated with treatment options are inappropriate.

***Process:***

Respondents repeatedly stressed the significance of the process surrounding decisions to apply fire on public lands, addressing questions such as who is involved in setting goals, who implements activities, who remains accountable, and how are procedures established and carried out? Defining the goals for prescribed fire also includes several elements: the consideration of knowledge (of the natural physical system), potentially affected parties, and the social and institutional context of the area to be treated. Several possible partners in the goal setting process were identified, including the public at large, affected or adjacent communities, scientists, and managers.

The level of involvement for each of these identified groups was highly variable across respondents. There were several variations in defining the level of “public” involvement, with the most frequent comments focused on greater engagement of “local” populations. People who live in or near forests could have a role as limited as consumers of publicized information on management goals and intentions to be realized via prescribed fire. Other respondents emphasized that public input should be encouraged in setting goals and analysis of tradeoffs. Finally, a few comments advocated that local people act as full collaborating partners in the planning, implementation, and evaluation process.

Scientists were specifically identified in different comments as educators, decision-makers, and sources of facts or knowledge. These results were widely distributed among respondents, and the role of scientists remains unclear. On the other hand, public land managers were commonly identified as experts in resource management, and singled out as the ultimate decision-makers regarding prescribed burning activity on public lands. There is a common perception that the professional managers in the land management agencies have the training and experience that enables them to determine an appropriate course of action. This decision-making power is accompanied by the risk of errors in judgement and in application, highlighting the idea that managers are susceptible to a degree of fallibility in their choices. The concept of accountability emerges with decision-making power; specifically, the managers with the authority for decision-making should be held accountable for adhering to the principles and procedures determined in the goal-setting process. To further break down these dynamics, respondents identified that the public enter the process primarily at the goal-setting stage, while managers and to some extent scientists retain the authority to determine specific courses of action.

Other considerations emerged from the responses regarding the implementation of prescribed burning activities. Several respondents expressed concern or dissatisfaction with the limited access to funds for prescribed fire activities while wildland fire suppression efforts receive higher priority and operate on an unlimited budget. Other respondents recognized that burning during spring or fall yields different results and different tradeoffs. Several comments reflected a concern that spring burning does not effectively represent fire’s natural role in the ecosystem and causes excessive air quality problems. Finally, respondents identified the lack of cooperation within and among agencies as an obstacle to prescribed burn implementation.

**Outcomes:**

The final dimension of prescribed burning is the outcome attained through its application – do we achieve what we intend? The concept of outcomes emphasizes the tradeoffs inherent in prescribed fire activity. Success is in part defined by controlling negative effects and keeping them within identified limits. For example, if all other conditions for a successful burn are met (fuel levels reduced, no escape of the fire to surrounding lands, etc.), the specific implementation may not be a success if the smoke causes health concerns. The potential to achieve this universal success is a large part of determining whether or not prescribed fire is appropriate.

Responses also highlighted the importance of human error, since prescribed fires have an inherent risk of escape, even if all procedural steps are followed. Decisions about when and where prescribed fire is implemented may turn out to be overly cautious, since mistakes resulting from poor judgment can easily be seen with hindsight. On the other hand, there was a recognition that decision makers need to be somewhat insulated from liability if all steps and procedures are dutifully carried out.

Some respondents expressed concern that knowledge of prescribed burn effects is limited, and long-term effects of a large-scale program cannot be anticipated. Also important in the discussion of prescribed burn results is the expense accrued in burning activity, particularly in comparison with the cost of wildfire or suppression efforts.

**Follow-up questions:****Goals:**

Where are the priority treatment areas to apply prescribed fire? Why are these areas the most important?

**Process:**

What role should local people play in decision-making concerning fuel treatments? As a consumer of information provided by experts? As a participant in goal setting? Or as a full partner in decisions from goals through implementation and evaluation? Why?

What is the single most important role for scientists in applying fuel treatments? As a decision maker, a source of knowledge about potential cause/effect relationships, or as an educator? Why?

**Outcomes:**

Is potentially higher risk activity (summer/fall season burning) more acceptable to achieve broader goals (natural process) than lower risk activity (spring burning) with its attendant negative consequences (lower quality treatment and impaired air quality)?

If the presumption of expertise gives managers authority and accountability, to what degree is it appropriate to hold them responsible for *non-action* decisions as well as decisions to apply prescribed fire? In other words, what is the responsibility associated with the risk of not treating an area?

Any additional thoughts or comments on the use of prescribed fire?