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**FIRE-RELATED EXPENDITURES
1970-2001**

Prepared by the Academy Staff
in Cooperation with
Ervin G. Schuster, Project Director,
Suppression Cost Prediction Model, Missoula, Mt

National Academy Of Public Administration
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FIRE-RELATED EXPENDITURES¹, 1970-2001**METHODS/METHODOLOGY**

Yearly Forest Service fire expenditure data from 1970 through 2001² were analyzed in three broad fire-related categories –Preparedness/Fuels (P/F), Suppression (S), and Total Fire-Related Expenditures (P/F + S). Comparable data for the other land management agencies are not readily available. The question of how applicable results from Forest Service fire expenditure data are to the total federal wildland fire program is analyzed in the section below, “How applicable are these results to the entire federal wildland fire program?” The finding is that the results from the analyses of these Forest Service expenditure data are applicable to the entire federal wildland fire program. The Appendix provides additional information on methodology and data limitations.

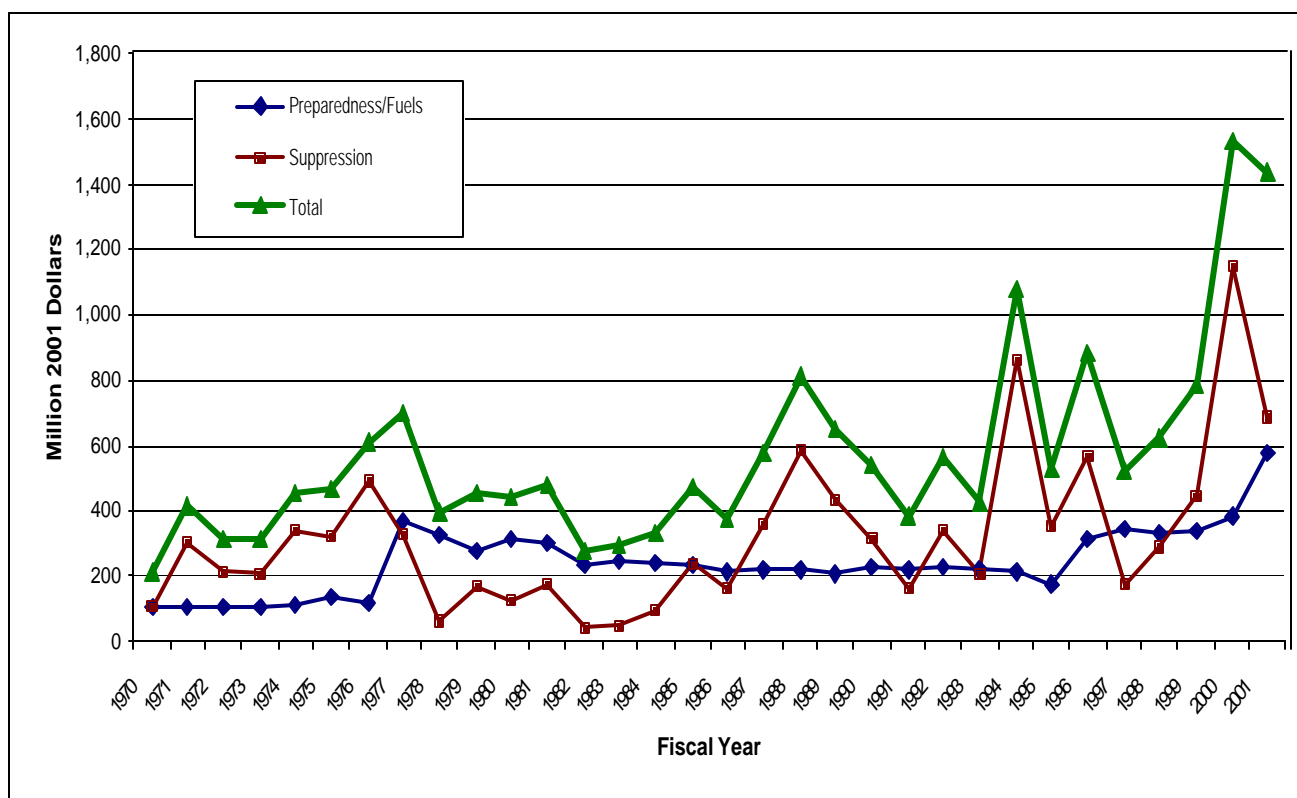
Summary of Results: Are Fire-Related Expenditures Rising?

Yearly inflation-adjusted fire-related expenditures (Forest Service) are shown in Figure 1. Clearly, expenditures have risen rather dramatically (albeit erratically) in recent years, but overall, this time-series does not resemble a program that is either “soaring” or “spiraling out of control.”

¹ The convention followed here is to use the term “expenditures” rather than “costs”. This reflects generally accepted economics terminology. “Expenditures” reflects payments for goods and services, whereas “costs” implies a broader concept based on the economic notion of opportunity cost (pecuniary and non-pecuniary). This distinction is made explicitly in Schuster, Cleaves, and Bell (Ervin G. Schuster, David A. Cleaves, and Enoch F. Bell, *Analysis of USDA Forest Service Fire-Related Expenditures 1970-1995*. Pacific Southwest Research Station, Research Paper PSW-RP-230, March 1997 (29p)).

² Schuster, et al. (1997) contains data only through 1995. That study was updated through 1998: Ervin G. Schuster, *Analysis of Forest Service Wildland Fire Management Expenditures: An Update*, in: Proceedings of the Symposium on Fire Economics, Planning, and Policy: Bottom Lines, USDA Forest Service, Pacific Southwest Research Station, General Technical Report PSW-GTR-173, April 5-9, 1999, San Diego, CA. The senior author provided further updated data through 2001 to the Academy for this paper. While Schuster (1999) reports results in both nominal and real dollars, this paper reports results only in real dollars.

Figure C-1. Forest Service Fire-Related Expenditures, 1970-2001
(in millions of constant 2001 dollars)

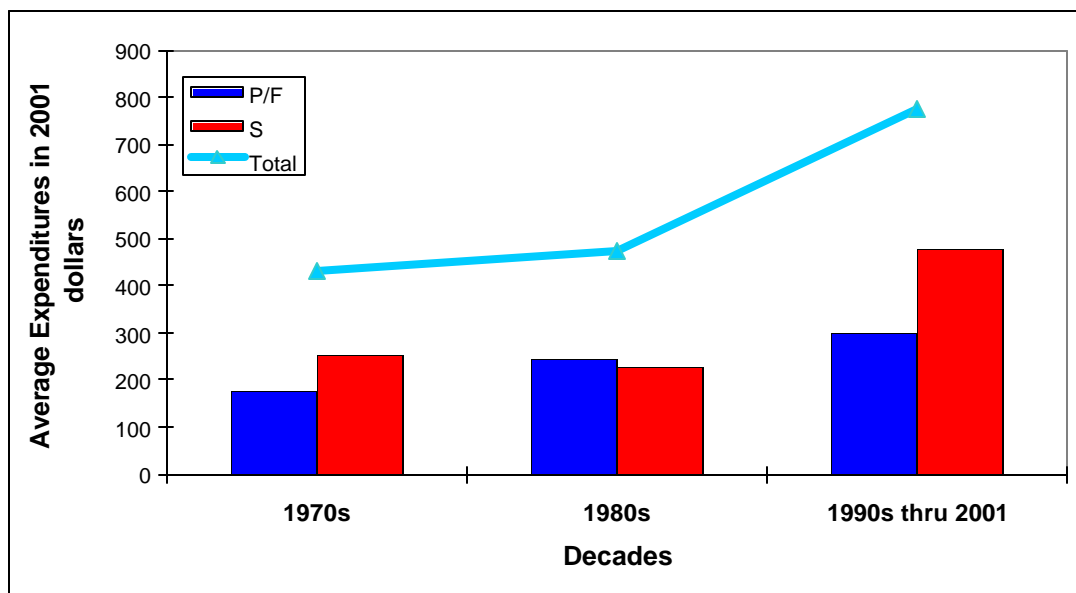


Nevertheless, growth rates over the entire period (1970-2001) are notable. Annual compound growth for total Fire-Related Expenditures is 3.4 percent; for Suppression, the rate is 3.0 percent; and for Preparedness/Fuel, it is 4.3 percent. Figure 1 illustrates that these growth rates are driven, primarily, by fairly recent expenditures, notably 1994-2001. It is important to note, however, that these rates likely overstate the situation because both the end points are statistical outliers (i.e., the early 1970s were “good” fire seasons and the last few years were “bad” years).

For further insight, yearly expenditure data were aggregated into decades³. Figure 2 and Table 1 summarize the findings.

³ The third “decade” – the 1990s – contains 12 years (1990-2001).

**Figure C-2. Forest Service Fire-Related Expenditures, Average by Decades
(in millions of constant 2001 dollars)**



**Table C-1. Fire-Related Expenditures
(in millions of constant 2001 dollars; Forest Service data⁴)**

Time Period	Category	Average Annual Rate of Increase (\$ mil/yr)*	Aver. Annual Expenditures (\$ mil)	Statistically Significant??
1970-2001	P/F+S	20.8	573.1	Yes (High)
1970-'79	"	29.0	432.7	No
1980-'89	"	36.8	471.9	Yes
1990-'01	"	74.6	774.5	Yes
1970-2001	S	13.9	329.7	Yes (High)
1970-'79	"	2.0	254.6	No
1980-'89	"	46.8	228.2	Yes (High)
1990-'01	"	49.0	476.8	No
1970-2001	P/F	6.9	243.4	Yes (High)
1970-'79	"	27.0	178.1	Yes (High)
1980-'89	"	-10.1	243.7	Yes (High)
1990-'01	"	25.6	297.7	Yes (High)

*Average annual rates of increase are the slopes of the (linear) regressions.

? Note on statistical significance: Linear regressions were run with expenditures as the dependent variable. "Yes (High)" means statistically significant at the 99% confidence level (two tails); "Yes" means statistically significant at the 95% confidence level (two tails).

⁴ As noted earlier, Forest Service expenditure data is from Schuster, et al. (1997) and from Erwin G. Schuster, Pacific Southwest Research Station, USDA Forest Service.

Total (fire-related) Expenditures (“P/F + S” column in the table). Total fire-related expenditures have been rising in inflation-adjusted (constant 2001) dollars. These expenditures rise in successively larger amounts in each decade (though the trends in the 1970s and 1990s are not significant statistically and the trend from 1990 through 2001 is barely significant owing to very high year-to-year variations). Specifically, they rose on average \$29 million each year in the 1970s, \$37 million in the 1980s, and \$75 million in the “1990s”(constant 2001 dollars).

Suppression (“S” column in the table). The expenditure pattern for suppression is similar, but less straightforward than total fire-related activities. Suppression expenditures rise hardly at all in the seventies (\$2 million), jump by \$47 million per year on average in the 1980s, and then rise on average \$49 million each year from 1990 through 2001. While the overall suppression expenditure trend is highly significant statistically, the trends in the 1970s and 1990s are not (again, owing to very high variability that primarily ties to underlying weather patterns).

Preparedness/Fuels (“P/F” column in the table). In contrast to suppression, average annual preparedness and fuels (treatment) expenditures did not rise in each decade. While they rose \$27 million per year on average throughout the 1970s, they actually fell \$10 million per year in the 1980s, before rising again (\$26 million per year) in the “1990s”. As shown in the table, decade-to-decade trends, as well as for total Preparedness/Fuels over the entire period, are highly significant statistically.

Fuels Alone. Expenditure data for the “Fuels” budget category are available only from 1977. Distinct expenditures for hazardous fuels programs prior to 1977 are not available and are, presumably, subsumed in the pre-1977 Forest Fire Protection or FFP budget data. Fuels expenditures generally rose from 1977 through 2001, but the trend is not statistically significant. Excluding Fuels from Preparedness (i.e., “P/F”) makes no difference, statistically, compared to the Preparedness trend (1970 – 2001) alone.

How Applicable are These Results to the Entire Federal Wildland Fire Program?

As noted, data used for these analyses are for the Forest Service only. Comparable data are not readily available from the Department of the Interior. Nevertheless, for the following reasons, the results likely apply to the overall federal fire-related program:

- (1) The Forest Service has always had the largest part of the federal wildland fire program, generally equaling or exceeding two-thirds of total budgetary resources (though the proportion has slipped in recent years to just below two-thirds);
- (2) While there are some differences in the “mix” of funding between agencies (e.g., the preponderance of air tanker-related resources is appropriated to the Forest Service) and activities, they are sufficiently similar for the broad purposes here.
- (3) Although federal agencies do not bill each other for suppression costs, the direction and net magnitude of this practice may be assumed to be minor and proportionate to agency funding.

Appendix: Methodological and Data Issues and Related Studies

Need for Transforming Budget Data

Basic fire expenditure data are not always good indicators of on-ground activities (Schuster, et al., 1997). As a result, it is desirable to modify raw budget data in order to develop a data set that better reflects fire-related activities.

The principal challenge presented is to place relatively narrow budget expenditure categories into necessarily broader categories – such as “P/F” and “S” above. The reasons for this have to do with oddities or changes in the budget structure and/or definitions of budget categories or activity codes. Schuster, et al. (1997) and Schuster (1999) explain the significant methodological challenges in detail with respect to Forest Service fire-related budget data and describe how they transformed the data in light of several constraints, including missing data. Importantly for purposes here, their published data has been updated through FY 2001 and made available to the Academy.

Schuster and his colleagues chose to ignore possible impacts arising from the 1976 transition quarter (when the federal government changed the start of its fiscal year from July 1 to October 1). We explored various statistical treatments of the transition quarter and found no impacts that were statistically significant.⁵

Defining Expenditure Categories

Data limitations (discussed above) make analyses of narrower categories than used here dubious, at least for the broad purposes here. Expenditures for hazardous fuels work (“Fuels”) are combined with Preparedness because (1) the basic purposes of the two are essentially the same (namely, to reduce suppression costs), and (2) until quite recently, expenditures to reduce hazardous fuels are small relative to Preparedness⁶ (and an even smaller portion of Suppression expenditures). As a point of information, combining Fuels expenditures with Preparedness does not change any statistical results.

The Preparedness/Fuels category used in this study aligns closely with the broad budget category “Fire Preparedness” (previously “Forest Fire Protection” or FFP); likewise, the Suppression category used here is similar to the current “Fire Operations” budget category (previously “Fighting Forest Fires” or FFF). The adjustments we made follow the methodology of Schuster, et al. (1997) and Schuster (1999) for the purpose of making the budget categories comport more realistically to on-ground activities. For example, expenditures for hazardous fuels, which are funded through the Fire Operations appropriation, are shifted into the Preparedness/Fuels

⁵ Specifically, we ran regressions with all of the transition quarter expenditures in 1976, all in 1977, and half in 1976 and half in 1977.

⁶ Outlays for hazardous fuels work are generally only about 10 percent of total preparedness expenditures, 87 percent of which are for “Presuppression”, which focus on supplying the personnel, equipment, and management and administrative support required for actual firefighting (i.e., suppression).

category. We also adjusted expenditure data for the fact that in the official budget accounts, “Fuels” was part of FFP from 1977 through 1997, after which it was moved to FFF.⁷

Related Studies

As noted above, the Schuster, et al. (1997) report is the principal research on fire-related expenditures. Indeed, it appears to be the “backbone” of several subsequent policy-oriented reports. It is an analytically and quantitatively robust study. The Academy is indebted to the authors not only for the basic data set and for generously providing updated data (through 2001), but also for documenting the various adjustments they made to the basic (raw) budget data.

While the authors of that study found that overall fire-related costs “have not increased significantly since 1970” (in real dollars), their conclusion is based on data only through 1995 and excluded 1994 from their analysis precisely because that fire season was anomalously high in terms of fire-related expenditures.⁸ Schuster updated the 1997 study (1999; full cite in footnote # 2) using data through 1998 and including the 1994 fire season and obtained results similar to the findings reported herein (which are based on data that was further updated through 2001 and provided to the Academy by Schuster).

Other studies of fire expenditures have tended to use raw budget expenditure data, perhaps in part owing to the methodological challenges and sheer tedium of transforming budget data to better reflect fire program activities. In the studies examined, we found that does not change the conclusions. Those studies generally cover fewer and less current years than the Schuster, et al. (1997) study. Two studies – one by Schmidt and one by Brown⁹ – used untransformed budget data and came to conclusions similar to Schuster et al’s and those of this study.

Schmidt examined Forest Service “emergency suppression activities” from 1977 through 1994, and concluded that, “Emergency fire suppression expenditures are increasing” (in inflation-adjusted dollars), although it is unclear what is meant by “emergency fire suppression expenditures.”

Similarly, in a non-technical, non-peer-reviewed outlet, Brown reports a “disturbing rise in both total suppression costs and the cost per acre burned” for 1980 through 1999 (also in inflation-adjusted dollars, and also based on Forest Service fire budget data). This trend is fairly obvious from the data presented, which may explain why the author did not report a statistical analysis.¹⁰ Unfortunately, his report is no clearer than Schmidt’s with respect to the precise source of his data.

⁷ While there were expenditures for hazardous fuels treatments prior to 1997, they are not available as costs distinct from FFP.

⁸ In fact, the exceptionally high expenditures of the 1994 season actually led to their study. Excluding the 1994 fire season, they found that real fire-related costs rose at an average annual rate of just 2.3 percent which is not statistically significant.

⁹ R. Gordon Schmidt, *Emergency Fire Suppression Expenditure Trends in the Forest Service*, Appendix A in: “Fire Suppression Costs on Large Fires: A Review of the 1994 Season”, USDA/Forest Service, August 1, 1995; and Brown, Hutch, *Reducing Fire Suppression Costs: A National Priority*, in: *Fire Management Today*, Vol. 61, No. 3., Summer 2001.

¹⁰ Just to be sure, we ran a regression and found a statistically significant rise, thus confirming Brown’s conclusion.

Both Schmidt and Brown report rising per-acre suppression expenditures, which should not, in and of itself, be taken as indicative of rising suppression expenditures (even though the two are correlated over time). Rising per-acre fire expenditures may actually indicate greater suppression efficiency, but a more in-depth study would be required to resolve this question.

**SUMMARY OF WILDFIRE-RELATED ISSUES
AND RECOMMENDATIONS**

**IDENTIFIED BY OTHERS IN PRIOR STUDIES AND
REPORTS**

Staff Paper

National Academy of Public Administration
Washington, DC

VIEWS OF STATE FORESTRY OFFICIALS ON FIRE-SUPPRESSION COST CONTAINMENT

A Survey
Prepared by the Academy Staff
in Cooperation with
the National Association of State Foresters

National Academy of Public Administration
Washington, DC

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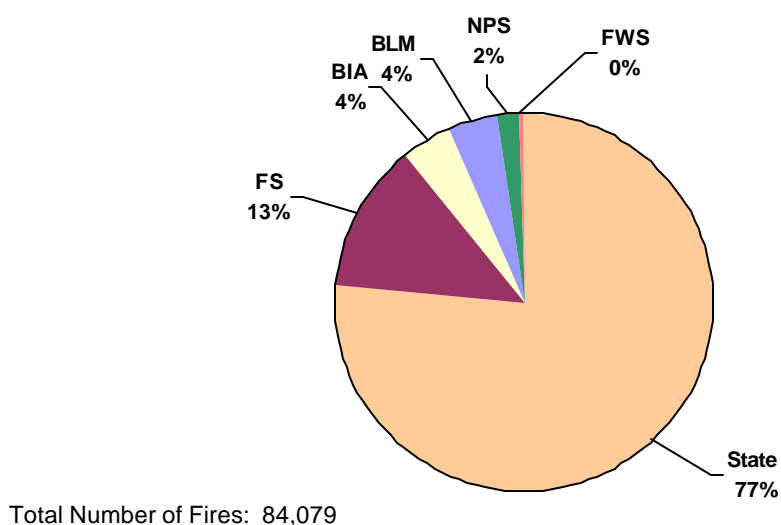
VIEWS OF STATE FORESTRY OFFICIALS ON FIRE-SUPPRESSION COST CONTAINMENT

BACKGROUND

The Academy complemented other research in this project with a survey of state forestry officials. This survey was conducted in cooperation with the National Association of State Foresters (NASF) to obtain state views about containing wildfire suppression costs. It also updates a similar survey of state forestry officials conducted by NASF in 2000. The 2002 survey was sent to state foresters in 50 states and seven U.S. territories, with a request to pass it along to knowledgeable persons on their staffs for response. Responses were received from 105 officials in 44 states. The results are presented in this appendix.

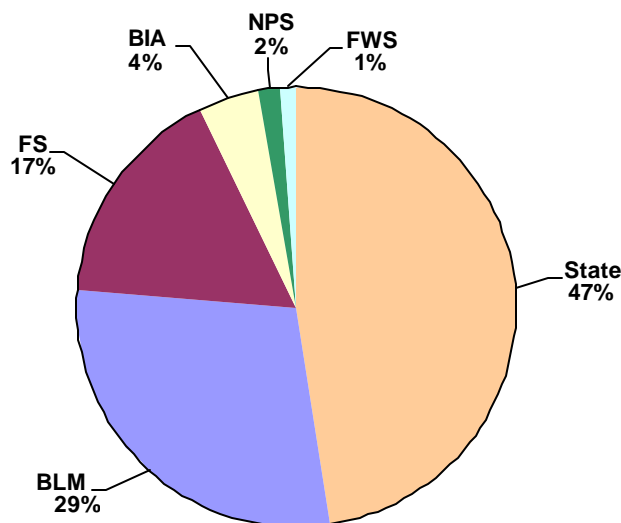
The Academy Panel and staff considered state perspectives about controlling wildland fire suppression costs essential for several reasons. In particular, most wildfires are not located on federal land and are under state (and/or local) jurisdiction (Figure E-1). Although state and local fires tend to be smaller in size than federal fires, about 47 percent of the total acres burned in 2001 were on non-federal lands (Figure E-2). In addition, it is increasingly recognized that several governmental entities often have important authority and jurisdiction over wildland fires that can span multiple land ownerships and involve various fire organizations, particularly if located near community interface areas. As a result, it is important to consider federal and state wildland fire programs together. Almost all nation's state foresters (48 of 50) have wildland fire under their jurisdiction, and it is the largest program managed by some of them.

Figure E-1. Number of All Reported Wildland Fires in 2001



Source: <http://www.nifc.gov/fireinfo/2001/stats.html>

Figure E-2. Jurisdictions of Acres Burned by Wildland Fire in 2001



Total Acres Burned: 3,570,911

Source: <http://www.nifc.gov/fireinfo/2001/stats.html>

In addition, the nation's state foresters and their membership organization (NASF) have been active partners with the federal government concerning wildland fire for several decades. NASF's Forest Fire Protection Committee initiated specific efforts in the late 1990s to examine the utilization of resources and rising fire suppression costs. A Fire Resources Utilization Subcommittee was established and concluded that the input of state and federal wildland fire personnel was needed to address this concern. As a result, NASF conducted and published brief nationwide survey of state and federal wildland personnel in 2000.¹

Methodology

Through discussions with NASF's Forest Fire Protection Committee leadership, the Academy panel and staff agreed that a new survey of state wildland fire personnel was needed. The purpose of the survey was to identify new perspectives, issues and reactions to recent developments, particularly after the large 2000 fire season, implementation of the National Fire Plan, and issuance of the 2001 Federal Wildland Fire Management Policy.

NASF Fire Committee representatives and Academy staff reviewed the former survey and results early in 2002, and prepared a new survey to complement the 2000 one and provide input to the

¹ NASF, *Cost Containment on Large Fires: Efficient Utilization of Wildland Fire Suppression Resources*, July 2000.

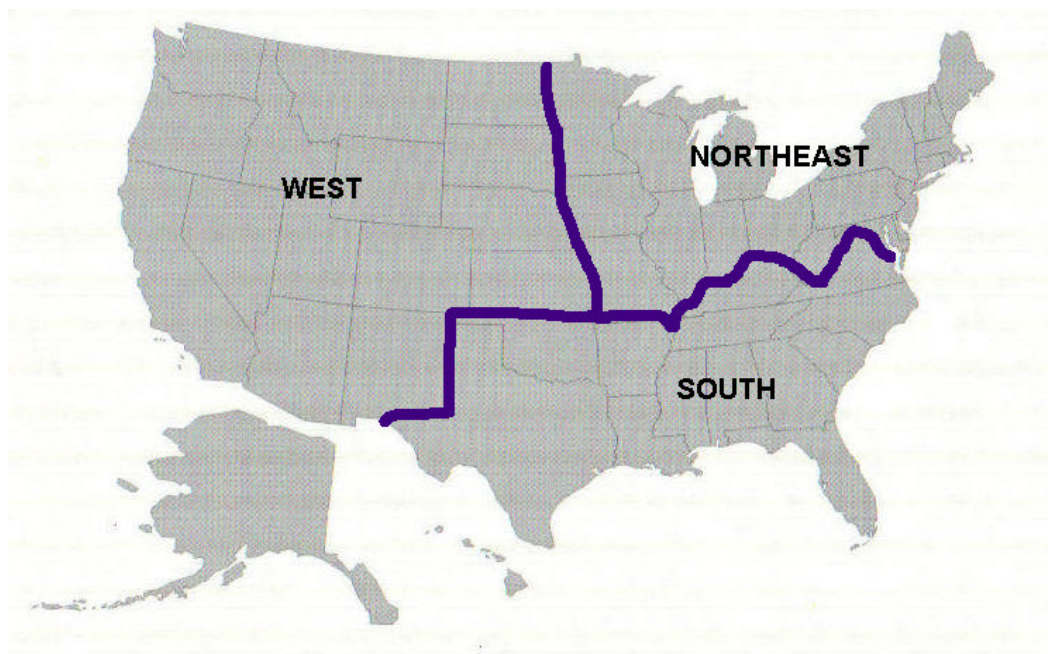
Academy study. Each of the five questions in the 2000 survey were included in the new instrument, though with some updates to facilitate compilation of the results. Several additional questions were added to enrich the understanding of state perspectives.

The survey was distributed through NASF to maximize the number of responses. Initial contacts were made with state foresters in the 50 states and seven U.S. territories at the end of March, and the survey went to them in early April, using both e-mail and standard mail. The survey also was distributed to each of the nation's state fire directors. Instructions with the survey requested each state forester and fire director to complete the survey, and also to duplicate it and ask fire line officers and incident commanders to respond. Subsequent emails and phone calls were made by Academy staff and NASF representatives to increase the number of survey responses. Academy staff also made a second mailing of the survey in mid-May. All data collection ceased at the end of May following a final request for responses at the spring NASF Fire Committee meeting.

Each survey response was analyzed using statistical software. SPSS software was used to compile and analyze the quantitative data in response to the first three survey questions, and QSR Nudist software was used for the qualitative data obtained through the open-ended questions. The textual responses were aggregated into categories, and some broad answers were coded into more than one category. Thus, percentages of responses to some questions exceed 100 percent. Although the use of open-ended questions limited the precision of findings, and made comparisons between the findings of the two surveys difficult, it yielded a good understanding of leading state perspectives.

Respondent Profile

The 105 responses received from state officials came from 44 of the 50 states, and were analyzed by NASF's three recognized regions, as well as nationwide. Each of these regions, which has approximately the same number of states, are known as the Northeast, South and West. They are shown in Figure E-3 and listed below. Each regions' leadership aided in gathering survey responses.

Figure E-3. Regions of the National Association of State Foresters

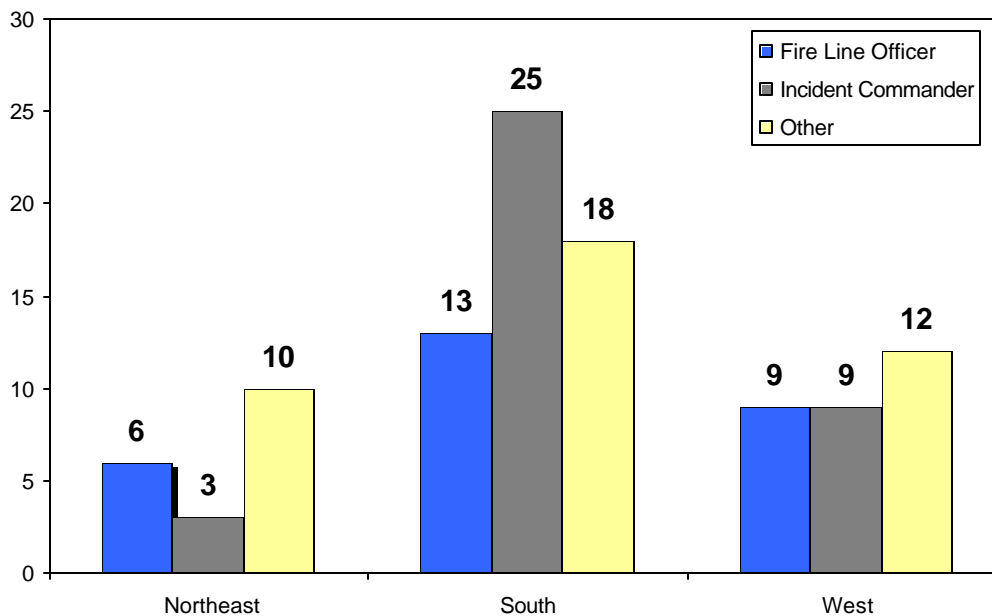
The level of survey response varied by region, and some states in each region provided more responses than others. The South provided the most responses, over half of the national total. Of the 56 southern responses, 19 were received from Florida, 10 from North Carolina, and 7 from Texas. In the Northwest, multiple responses were received from Wisconsin (4 out of the total of 19 in the region). Of the 30 responses in the West, 5 were received from Washington, 4 from Utah, and 3 each from New Mexico and Oregon.

List of States in Each NASF Region

Northeast	South	West
Connecticut Delaware District of Columbia Illinois Indiana Iowa Maine Maryland Massachusetts Michigan Minnesota Missouri New Hampshire New Jersey New York Ohio Pennsylvania Rhode Island Vermont West Virginia Wisconsin	Alabama Arkansas Florida Georgia Kentucky Louisiana Mississippi North Carolina Oklahoma Puerto Rico South Carolina Tennessee Texas U.S. Virgin Islands Virginia	Alaska American Samoa Arizona California Colorado Federated States of Micronesia Guam Hawaii Idaho Kansas Montana Nebraska Nevada New Mexico North Dakota Northern Mariana Islands Oregon Palau Republic of the Marshall Islands South Dakota Utah Washington Wyoming

Nationwide, incident commanders submitted 38 responses, while fire line officers submitted 27 responses. The remaining 40 responses were received from state foresters, fire directors and other state forestry and fire staff.

A regional analysis of respondents (Figure E-4) shows that within the Northeast, 6 responses were received from fire line officers, 3 from incident commanders and remaining 10 from other forestry or fire officials. Within the South, 25 responses were received from incident commanders, 13 from fire line officers, and 18 from other forestry and fire officials. Within the West, 9 responses were received from fire line officers, 9 from incident commanders, and remaining 12 from other forestry and fire officials. Thus, officials currently active on fires dominated the responses in the South, were a majority in the West, and were about even with others in the Northeast.

Figure E-4. Distribution of Respondent Types by Three NASF Regions

Survey respondents provided valuable information and recommendations that aided the Academy in this study. These findings also will help NASF and others to articulate state perspectives about the rising costs of wildland fire suppression effectively.

SURVEY RESULTS

The survey results were analyzed under the following five topics:

1. Large-Fire Suppression Cost Factors and Barriers to Cost Reduction
2. Recommended Actions to Reduce Fire Suppression Costs
3. Reactions to Recent Fire Efforts and Resources
4. Recommendations for Work In and With Localities
5. Recommendations for Improving Relations with States

The results are summarized below, and complete tabulations of the data are attached at the end of this appendix.

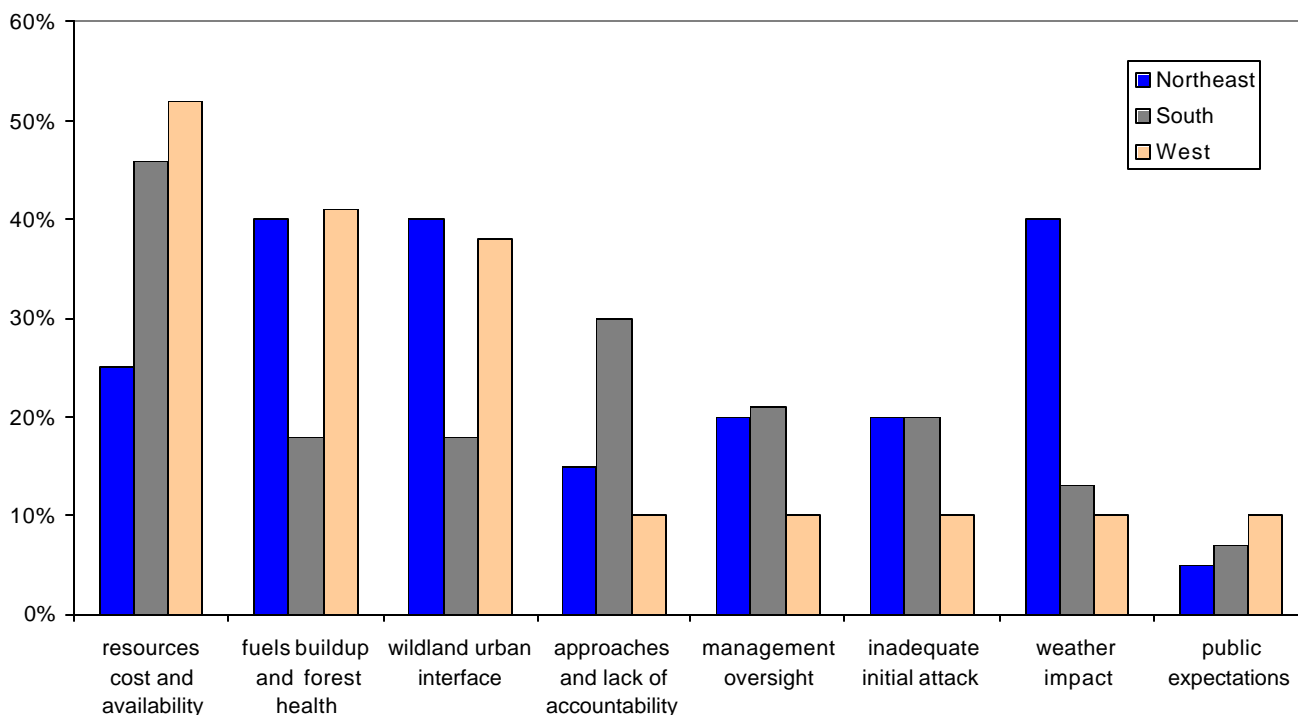
Large-Fire Suppression Cost Factors and Barriers to Cost Reduction

An important purpose of both the 2000 and 2002 surveys was to garner the perspectives of state forestry and fire officials about the factors contributing to escalating large fire suppression costs and the barriers to reducing these costs. Both surveys asked respondents to identify the most significant factors and barriers through two questions. While responses to the two questions (4 and 5) were compiled separately in 2002 and together in 2000, the overall findings from both years were similar.

The three most important factors increasing suppression costs in 2002 were identified as the increasing costs, availability and overuse of firefighting resources (44 percent); fuels build-up and deteriorating forest health (29 percent); and increasing development in wildland areas (28 percent). Comparison of these results with those from the Academy's other research in this study suggests that states place higher significance on the increasing costs, availability and overuse of firefighting resources. Other significant factors identified by respondents were: prevailing beliefs and approaches that contributed to the lack of accountability, motivation and incentives to reduce costs (22 percent); the quality of management control and oversight of decision making that can lead to over-ordering of resources to avert risks (18 percent); and inadequate initial attack (17 percent).

Some differences were revealed by tabulating the results by NASF region (Figure E-5). While the increasing cost and lack of available firefighting resources was the top factor in the West and South (52 percent and 46 percent respectively), only about half (25 percent) as many respondents in the Northeast identified this factor. This difference may be due to the relatively fewer number of large fires in the Northeast as well as a strong reliance on interstate fire compacts and relatively less use of federal resources in this region. In the Northeast, weather, drought and fire behavior topped the list of cost-increasing factors (40 percent), compared to less than a third as many respondents in the other regions.

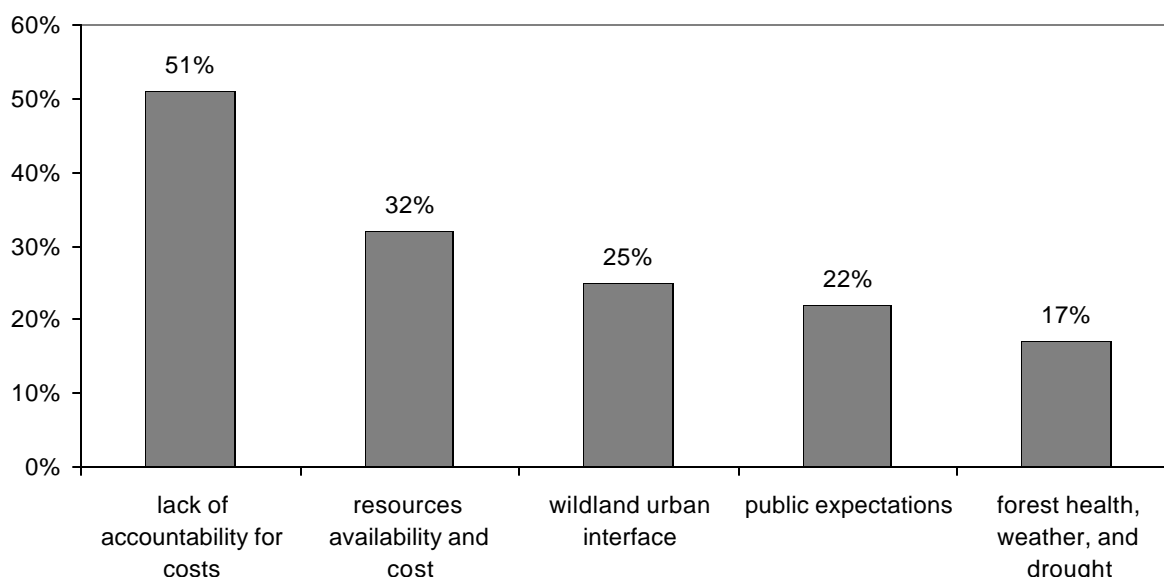
Figure E-5. Factors Contributing to Escalating Large-Fire Suppression Costs



Regional differences also exist concerning the importance of fuels build-up and forest health, as well as increased development in wildland areas. Respondents in the West and Northeast considered these factors to be the two of greatest concern, with approximately 40 percent in both regions citing both factors. However, less than half as many respondents in the South identified these factors (18 percent for both).

When asked about the greatest barriers to containing large-fire suppression costs (Question 5), a majority of respondents indicated that prevailing attitudes and the lack of accountability, motivation and incentives were a leading barrier (51 percent). Several respondents indicated, in response to this and/or other questions, that an "open checkbook" attitude and culture exists in the fire community. In general, this perception seemed more apparent among survey respondents than was found through the Academy's other research in this study.

Figure E-6. Barriers to Reducing Large-Fire Suppression Costs



As shown in Figure E-6, other identified barriers also related to the factors described above. The high cost and overuse of some resources was identified most often (51 percent), followed by resource limitations, particularly at the local level (32 percent). Increasing development and fuels buildup in wildland areas and the costs and complexity of suppressing fires in these areas was another important barrier (25 percent). Expectations and lack of understanding about fire hazards by the public, government leaders, and the media were also mentioned (22 percent), as was forest health, weather and drought conditions (17 percent).

In 2000, the responses to the two questions were analyzed together and the combined factors and barriers were categorized as being administrative (42 percent), operational (41 percent), and cultural or systemic (17 percent). Resources availability, attitudes and accountability, wildland/urban interface (WUI), and fuels management were identified as leading factors and

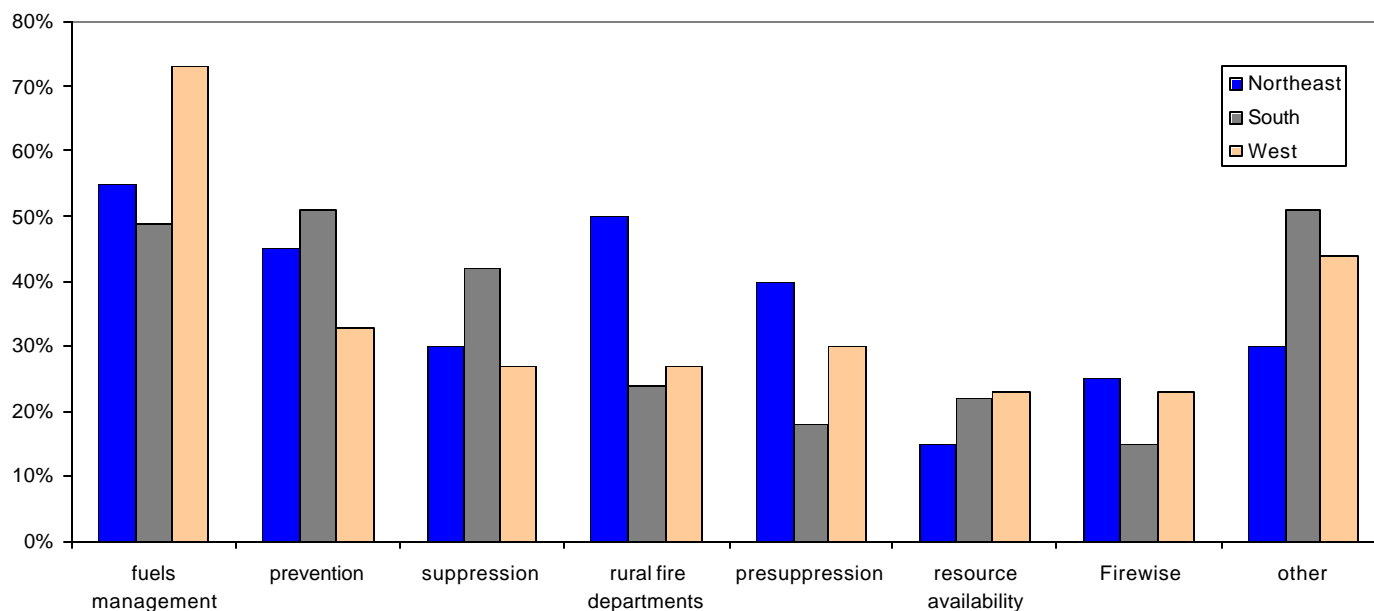
barriers at that time. Comparison between these findings of the two surveys suggest that cost is likely a greater concern in 2002.

Recommended Actions to Reduce Fire Suppression Costs

Both surveys asked for recommend actions to reduce the costs of suppressing large wildfires. The 2002 question provided with a list and asked respondents to rank the top three activities that should be emphasized to reduce suppression costs (Question 1). Nationwide, respondents selected fuels management (57 percent), prevention (45percent), and direct suppression practices (35 percent) as the top recommended activities, while partnering with rural fire departments (30 percent), presuppression (26percent), and several other activities were viewed as less important.

Some regional differences were observed, as shown in Figure E-7. Similar to responses for other questions, fuels management was by far the leading selection in the West (73 percent). It also was the leading choice in the Northeast (58 percent), and was the second strongest choice in the South (49 percent).

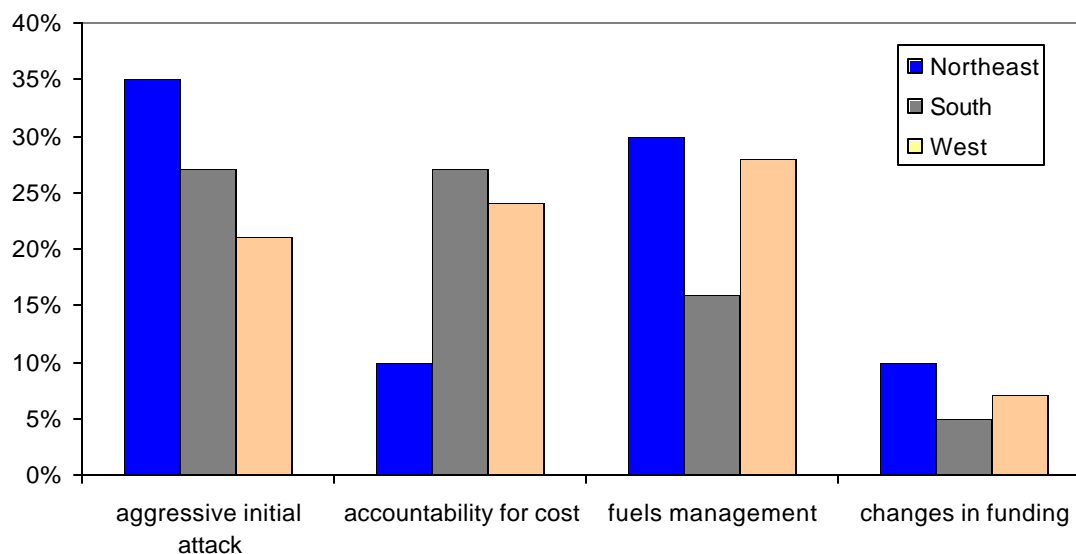
Figure E-7. Suggested Efforts to Reduce Large Wildland Fire Suppression Costs



Prevention was mentioned most frequently in the South (51 percent), while it was second and third in the West and Northeast. Another important difference is that providing assistance to rural fire departments ranked much higher in the Northeast (50 percent) than in the South and West with approximately half as many respondents in these regions mentioning this activity. Presuppression and Firewise were also more frequently identified in the Northeast (40 percent and 25 percent respectively) than in the other regions. Resource availability was indicated less often in the Northeast than in the other two regions. Other responses included training, experience, and fire line officer roles.

Respondents also were asked to recommend the first step they would take to control suppression costs (Question 8). The vast majority of responses in 2002 were to strengthen initial attack, increase accountability, and conduct fuels management. Nationwide, the level of support for these efforts was quite similar, but some regional differences existed. Aggressive initial attack was suggested most frequently by all respondents (27 percent), but it was most strongly indicated in the Northeast (35 percent), as shown in Figure E-8.

Figure E-8. Suggested Steps to Control Large Wildland Fire Suppression Costs



The second most frequent category of responses was to increase accountability, monitoring, and other approaches to contain costs (23 percent), although it was an infrequent choice in the Northeast (10 percent). Recommendations to change funding approaches were least mentioned nationwide (7 percent), but drew a slightly higher response in the Northeast than in the other two regions. Accountability and funding recommendations included greater scrutiny over the use of expensive resources, use of cost containment officers and independent auditors at individual fires, assurance that cost considerations are included at all levels of training and supervision, eliminate "bulk" suppression funding and provide more funds to local levels (field units of federal agencies, states and localities).

Most of the remaining recommendations focused on fuels management, including greater use of prescribed fire and other fuels treatment (22 percent). Fewer respondents in the South (16 percent) provided recommendations in this category, while responses were nearly equally mentioned in the other regions. This difference may reflect the relatively higher incidence of incident commanders among the respondents in the South.

Similar recommendations were made in response to the 2000 survey. Direct comparisons were not possible between the two results due to the differences in overall categories, but strong commonalities exist. Respondents in both years called for increased accountability for cost

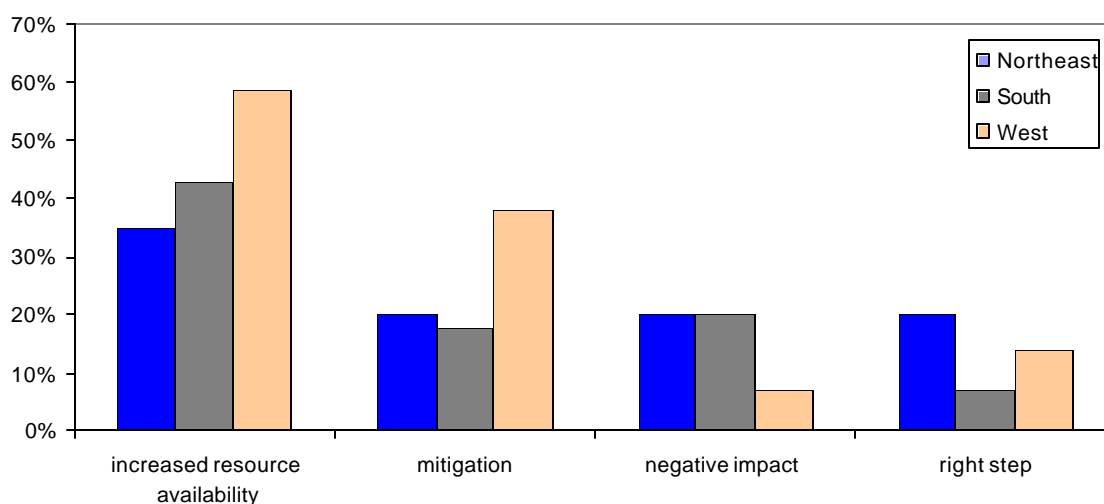
containment, aggressive initial attack and comprehensive fuels management policies and approaches. Additional recommendations made in 2000 included the development and implementation of clear and firm policies to promote program consistency, efficiency and effectiveness; as well as more efficient use of overall resources and greater use of local resources, which are also reflected in responses to other questions in the 2002 survey.

Reactions to Recent Fire Efforts and Resources

State forestry and fire officials were asked to indicate their perspectives about the impact of the fire community's efforts and additional funding resources available to the federal government over the last two years. In response to Question 2, most respondents indicated that the fire community has strengthened emphasis on activities intended to reduce suppression costs during this time (90 percent). The most frequent activity identified as evidence of this increased emphasis was fuels management (47percent). It was followed by the Firewise program for educating and organizing communities to mitigate wildfire hazards (30 percent) and fire prevention (29 percent). Responses to each of the other categories of activities ranged between 10 percent-15 percent.

Responses to Question 3 about the impact of additional federal funding were generally positive, though some regional differences and mixed results also emerged. The most frequent response was that more federal funding increased resource availability and capacity at the local level, along with stronger initial attack capability (46 percent). As shown in Figure E-9, this reaction was the strongest in the West (59 percent), but weakened in the South and Northeast (43 percent and 35 percent respectively). Nationwide, improvements were also cited (24 percent) for mitigation and preparedness (including fuels management, education, planning and related efforts); the West most frequently cited this improvement (38 percent).

Figure E-9. Impact of Additional Federal Wildland Fire Funding in Past Two Years



Only small numbers of respondents indicated that minimal or negative impacts had occurred as a result of the additional funding (16 percent). However, respondents in the Northeast and South had this reaction more frequently (20 percent in both regions) than those in the West (7 percent). Examples of these results included that the funding was too restrictive and/or had too much "red tape," insufficient funding was provided to localities, cumbersome and lengthy processes existed with state and federal fire grants, inexperienced people were hired, too much funding was applied to fuels management on federal lands or wasted in general, and the new funding did not reduce suppression costs. Finally, a few respondents (11 percent) were more neutral about the additional funding, indicating that it was a step in the right direction but more time would be needed to evaluate impacts.

Question 7 complemented this query about recent approaches and funding by asking about (1) improvements by the fire community in delivering and supporting a clear national message on the importance of fire suppression cost containment over the last two years, and (2) how this message could be improved. To a similar question in 2000, 24 percent of the respondents stated that the message had been adequately presented and supported, and 76 percent disagreed. The 2002 respondents split evenly on this.

Several suggestions were made to improve delivery and support of this message. An overarching theme expressed by respondents was to better articulate the message, show commitment, and be accountable for delivering a consistent message. Sentiments in both years included: "actions speak louder than words," and "organizations must not only 'talk the talk,' but also 'walk the walk'." One respondent to the 2002 survey noted that "before the fire starts I hear about cost control; during the fire, I don't." Responses to this question also reiterated the need for evaluating and holding fire managers accountable for costs. Some suggestions were to offer bonuses or otherwise reward fire managers for saving money rather than for spending it. Some respondents said that the message is strengthening among the fire community, but it is not getting out to the public as well.

Recommendations for Work in and with Localities

While not asked about in the 2000 survey, the 2002 survey sought to understand the perspectives of state officials about how to increase cooperation with local governments in addressing wildfire hazards in wildland areas with increasing development. Respondents provided several suggestions about significant efforts that should be taken by the federal or state governments to increase this cooperation (Question 10). Many responses involved approaches to increase local engagement (45 percent) and local capacity (41 percent), for mitigation, preparedness and suppression efforts.

General suggestions included:

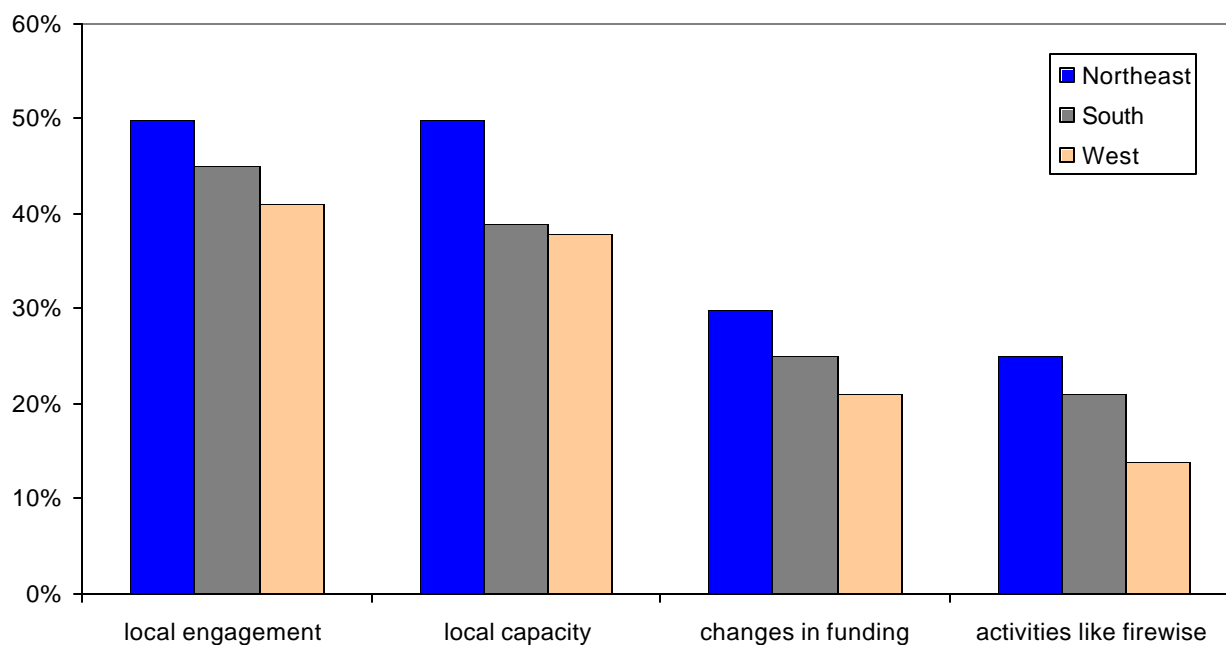
- better and more regular communication and meetings with fire departments and city and county officials (pre and post fire season)
- encouragement, listening to and action based on local ideas
- preplanning and advanced agreements on rules and responsibilities that emphasize safety and efficiency

- regular involvement of localities in Geographic Area Coordination Groups
- coordination of federal and state grant programs and other agency activities directed toward localities

In terms of fire suppression activities, suggestions were to remove barriers to local participation in fires such as restrictive policies, procedures and qualifications; increase use of mutual aid agreements, unified command and joint dispatching; develop and use local overhead teams; synchronize radio communications; and improve and conduct joint training and exercise activities.

Responses in the other two categories provided related input, including greater participation in planning and mitigation, including programs such as Firewise (22 percent) and changes in funding, such as increasing funds for local governments and fire departments, and giving more flexibility to localities (23 percent). The differences among the three regions for this question were less distinctive than for other questions (Figure E-10). As explained in the methodology, some responses were classified in multiple categories, and the Northeast provided the most suggestions that fit into multiple categories. In comparing the three regions, respondents in the Northeast most frequently indicated that state and federal efforts to strengthen local capacity would help to increase cooperation and control fire suppression costs. Western respondents had the fewest number of suggestions in all four categories.

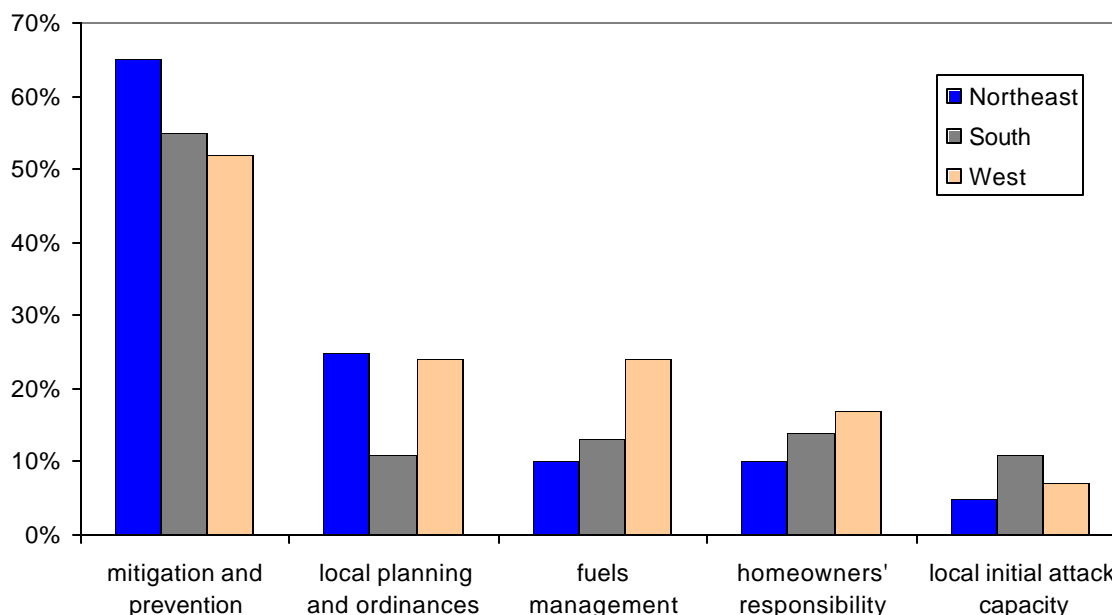
Figure E-10. Suggested Federal or State Government Actions to Increase Local Cooperation



Question 11 asked respondents to identify additional efforts needed to control fire suppression costs in what is commonly known as the wildland urban interface. The majority of responses

called for action before fires start, and many mitigation and prevention efforts were suggested (56 percent). Responses suggested public education, outreach to local planning, zoning and community development entities, planning, Firewise and related programs, and specific suggestions to help suppression efforts such as dry hydrants and permanent fire breaks. As shown in Figure E-11, fire mitigation suggestions were strongest in the Northeast.

Figure E-11. Suggested Efforts in Wildland Urban Interface to Control Fire Suppression Costs



The most distinct suggestion was the need for local planning and ordinances, including zoning and building codes. Repeated suggestions were to conduct planning at state and local levels, develop and enforce local ordinances, restrict development, and require and enforce provisions for "defensible space," firefighter access, and water sources in zoning and building codes. Other suggestions were to establish "fire plain" zoning similar to flood plains, adopt a "national urban interface code," and include forest management in local planning. Respondents in the Northeast and West indicated greater support for these actions (25 percent and 24 percent respectively) than in the South (11 percent). There may be several reasons for this disparity, such as the growth in both development and damaging fires in the West and general acceptance of planning approaches in the Northeast. Another reason may be because there was a relatively higher number of survey respondents in the South who were incident commanders and fire line officers, and they may be less familiar with local planning and ordinances.

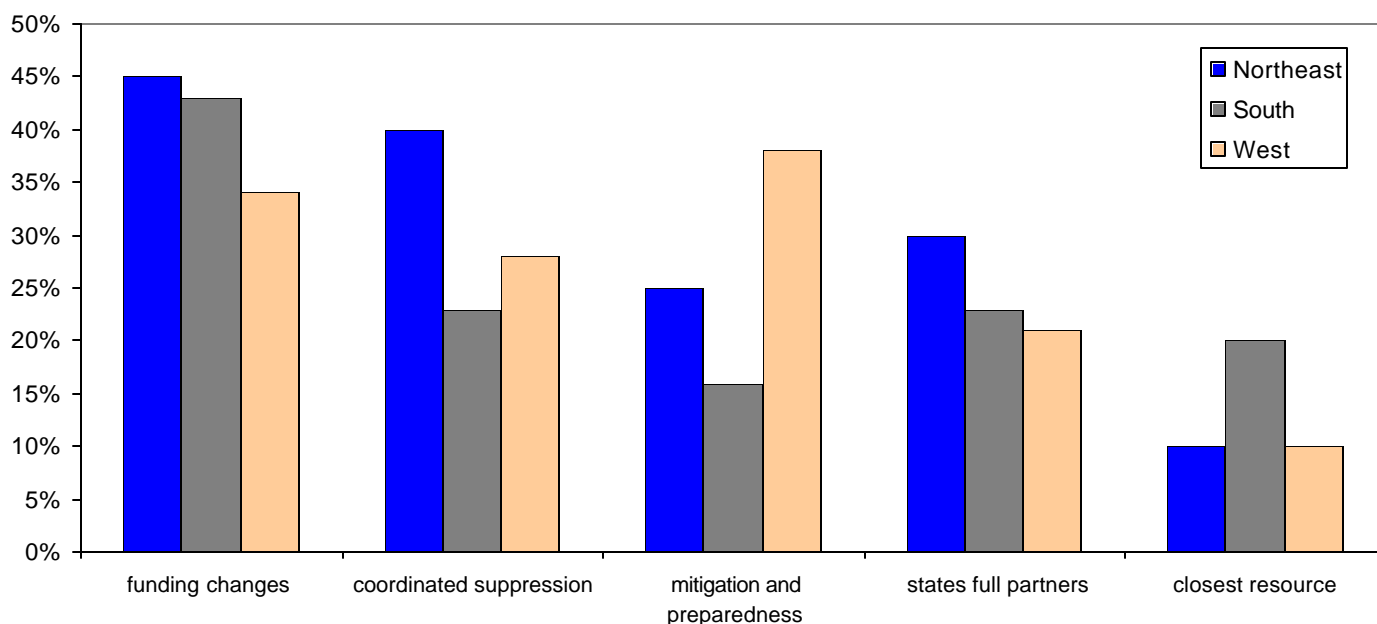
Responses were categorized according to three other specific types of actions. Fuels management suggestions were cited by 15 percent of the overall respondents, but were more often mentioned in the West (24 percent) than in the South and Northeast (13 percent and 10 percent respectively). Some respondents indicated that land, home and other property owners

should fire proof their properties and exhibit greater responsibility and accountability for their actions, and that insurance rates and incentives should be used to influence such responsibility (14 percent). Specific suggestions included that insurance companies should not write policies or establish higher rates if defensible space and other minimum prevention methods are not used by property owners. More respondents in the West called for such actions than in other regions (17 percent). Increasing local capacity for initial attack was the final category (9 percent), with suggestions including more funding, training, equipment and other resources for local fire departments. Another suggestion in response to this and some other questions was to contract with local governments in wildland-urban interface areas.

Recommendations for Improving Relations with States

The 2002 survey asked for suggestions about how the federal government can increase cooperation with and learn from state governments to help control the costs of fire suppression (Question 9). The most common category of responses was to change and/or increase the funding provided to states for fire programs (41 percent), with several suggestions to fund staffing, training and other capacity building, and to improve existing grant programs. Similar to suggestions for improving local government relationships, these suggestions included mitigation, prevention, and suppression, with particular focus on initial attack.

Figure E-12. Suggested Federal Actions to Increase Cooperation with State Governments

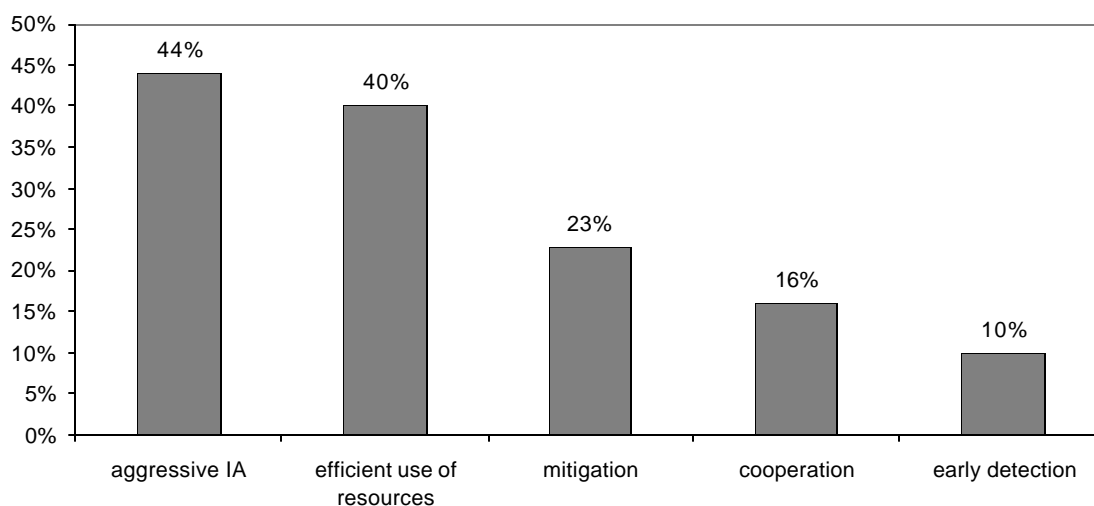


Additional suggestions addressed coordinated approaches to suppression (28 percent) and the need to utilize closest forces, particularly state and local resources (15 percent). As shown in Figure E-12, some regional differences were noted in these responses. For example, respondents in the Northeast most frequently suggested coordinated approaches to suppression (40 percent), while those in the South most often called for the federal government to use the closest forces

approach (20 percent). Other responses included ideas for more coordinated mitigation and preparedness efforts (24 percent), while others suggested making states full partners (24 percent). Respondents in the West most frequently called for coordinated mitigation and preparedness (38 percent).

Respondents were also asked to identify two of the most cost effective fire suppression techniques used in their state that could be considered "best practices" and could be adopted by the federal government (Question 13). As shown in Figure E-13, aggressive initial attack and prepositioning of resources was identified most frequently (44 percent). This suggestion is consistent with responses to other questions in this and the 2000 survey. Ten percent of the responses identified early detection as a technique supports initial attack.

Figure E-13. Suggested Federal Actions Based on State Fire Suppression "Best Practices"



Efficient use of resources, including having the appropriate equipment and teams to respond to fire conditions, was also strongly indicated (40 percent). Several specific suggestions were made, such as greater use of helicopters, mechanized equipment of various kinds, inexpensive personnel on crews, and using the closest forces. Another suggestion was to adopt a local resource ordering priority system in which the furthest and most expensive resources are ordered last. Various mitigation and prevention efforts were also suggested (23 percent), such as fuels management (including prescribed burning, cattle and other approaches), greater public awareness and planning, accurate monitoring of fire danger, and daily risk assessment and fire prevention team deployment. Use of local and state laws and other programs was also suggested, such as for planning and restrictions on debris burning. Strong cooperative relationships were also suggested, including meeting and training together, establishing unified commands, and making better use of and providing assistance to local fire departments (16 percent).

A particular focus of the Academy study addressed the federal government's use of the Wildland Fire Situation Analysis (WFSA) system that is used to help large fire incident management teams analyze alternative strategies for fighting a fire and ordering the appropriate equipment and personnel necessary to implement the strategy. Thirteen states reported using or (planning to use) a WFSA-type of analysis for selecting firefighting strategies (Question 6).

A final survey question (#12) asked respondents to identify two significant technologies to help control fire suppression costs. Several technologies were identified, most of which would increase intelligence available to firefighters before wildfires are ignited. The largest category was for fire behavior research and weather monitoring and prediction (23 percent). Specific suggestions included more accurate and current weather and fire information and predictions, installation and upgrading of the Remote Automated Weather Stations (RAWS) network nationwide, and fire prediction and risk assessments. A similar level of respondents suggested greater use of geographic information systems (GIS), Global Positioning System (GPS) receivers, and related mapping capabilities (22 percent). Remote sensing, other geographic information technology and cell phones also were specifically mentioned to more quickly and effectively detect fires, and thus be able to put fires out while they are small (18 percent). In addition, various management support systems were identified to monitor and automate financial records, and to track costs (16 percent). Approaches and technologies to conduct rapid initial attack were also suggested (10 percent), including prepositioning of resources and the use of aircraft.

CONCLUSIONS

This survey provided many specific suggestions to help the states work together with federal and local officials, and others, to help contain the costs of suppressing large wildfires. While none are without precedent, many may be worth greater attention as costs continue to increase and government resources become more limited. The incentives for working together rise as budgets shrink.

Almost twice as many state respondents to this survey, compared to the 2000 survey, believe there is now a coherent message calling for cost containment. Yet, it is still true that only half the respondents agree that this message is as clear, consistent, and backed up with action as it should be. So there is still a lot of room for improvement. Many respondents to this survey, not unlike many federal studies, emphasized the need for greater accountability, motivation, and incentives for reducing costs while suppressing wildfires.

Many state forestry and fire officials in this survey favored enhanced roles for local governments, particularly where local communities interface with wildlands. Without engaging local leaders, firefighters, and planning and development officials more fully, wildfire suppression costs will continue rising. Many respondents also recognized needs to increase the capacity of local governments to respond better to these challenges.

These respondents were more focused on the rising costs of firefighting resources than the federal officials whom Academy representatives talked with in preparing case studies of six large

federally managed wildfires that burned in the summer of 2001. Most of the federal officials were most concerned with the “predispositions” that are in place before the fire ignites, but inevitably set the fire on a path to high-costs. These predispositions include the heavy fuel loads, nearby communities, numerous natural resource values that must be protected, and other conditions that require use of maximum effort and high-cost firefighting resources. Of course, this is not an either-or proposition, but more one of emphasis. Cost consciousness is needed both on the fire and before it begins.

Some regional differences appeared in analyzing the responses. Overall, Western respondents emphasized the need for fuels treatments while those in the Northeast and South emphasized the need for mitigation and prevention efforts. Once again, regional differences emphasize that conditions, concerns, and expectations differ from one part of the nation to another. Consequently, prescriptions for improvement need the flexibility to adjust to and accommodate different approaches in different places.

To improve relationships between federal and state wildfire activities, significant numbers of respondents called for fuller partnerships, joint activities, and the use of state and local forces before ordering resources from a distance—again strengthening the theme of coordinating with other governments in the part of the nation where the activity is taking place. Federal funding to the states will be most effective if it can adjust to and help address the states’ highest priority needs.

DATA TABULATIONS

The following tabulations present all the data from the 2002 survey.

1. In your opinion, what are the top three activities that should be emphasized to reduce the costs of suppressing large wildfires? (Please pick only 3 – and rank them - with #1 the most important.)

- FUELS MANAGEMENT **57.1%**
 - most important – 28.6%
 - second most important – 18.1%
 - third most important – 10.5%
- PREVENTION **44.8%**
 - most important – 23.8%
 - second most important – 12.4%
 - third most important – 8.6%
- SUPPRESSION **35.2%**
 - most important – 17.1%
 - second most important – 5.7%
 - third most important – 12.4%
- PARTNERING WITH RURAL FDs **29.5%**
 - most important – 8.6%
 - second most important – 10.5%
 - third most important – 10.5%
- PRESUPPRESSION **25.7%**
 - most important – 9.5%
 - second most important – 7.6%
 - third most important – 8.6%
- OTHER - Resource Availability (21.0%), Firewise Communities (19.0%), Training (16.2%), Experience (14.3%), Role of Line Officer (14.3%)

2. In your opinion, over the past two years has the interagency fire community strengthened its emphasis on any of the above activities?

Yes – 89.5%

No – 9.5%

If so, which one(s)?:

- Fuels management – **46.7%**
- Firewise program– **29.5%**
- Prevention – **28.6%**
- Other - Presuppression (15.2%), Partnering with Rural Fire Departments (14.3%), Resource Availability (12.4%), Training (11.4%), Suppression (10.5%)

3. In your opinion, what has been the impact, if any, of the additional wildland fire funding available to the federal government over the past two years?

- increased resource availability, increased capacity at the local level (funds and assistance in personnel, equipment, training, etc.), strong IA capability – **46%**
- more mitigation activities in high-risk areas (fuel mgmt, Firewise, WUI issues are being addressed, planning)– **24%**
- negative and minimal impact (red tape, not enough to locals, inexperienced people, no reduction in suppression costs) – **16%**
- step in the right direction; need to wait to see its impact – **11%**

4. What are the two most significant factors contributing to escalating large fire suppression costs?

- increasing cost of resources (particularly aviation, personnel, new technology, and contracted resources), limited resources availability (ordering from remote locations), overuse of some expensive resources – **44%**
- fuels buildup, deteriorating forest health, backlog in fuel and timber management – **29%**
- increasing development in wildland areas, and poor planning in WUI areas, costs of protecting structures (interface fires are more expensive and cost more) – **28%**
- beliefs, approaches, no motivation to reduce costs, lack of accountability for costs, lack of incentives to reduce costs – **22%**
- quality of management oversight, ordering more resources than needed, management and use of expensive resources (like aviation), risk aversion (liability avoidance) – **18%**
- inadequate initial attack (not sufficient capacity for IA), lack of aggressive firefighter tactics – **17%**
- weather patterns (especially drought) and fire behavior (higher intensity fires, on larger scale) – **11%**
- public, political, and agencies' expectations – **8%**

5. What are the two most significant barriers to reducing the costs of large fire suppression activities?

- team attitudes, “open checkbook attitude”, no accountability for costs, lack of motivation (incentives), expensive tactics used – **51%**

- resource availability and cost, insufficient capacity at the local levels, dispatch system slow to respond, budget constraints– **32%**
- increased WUI and values at risk to be protected, fuels build-up in those areas (suppression more complex and costly)– **25%**
- media, public, political, and agencies' expectations (contain fires, save homes), lack of understanding of fire hazard, opposition against fire management practices (prescribed burning, thinning) – **22%**
- forest health and weather patterns – **17%**

6. *Does your state use any kind of quantified situation analysis as part of your process of suppressing large wildland fires? (perhaps similar to the federal government's Wildland Fire Situation Analysis (WFSA) that is used to help large fire incident management teams to analyze alternative strategies for fighting a fire and order the equipment and personnel necessary to implement the strategy.)*

YES NO If yes, please name the program: _____ and the lead contact in your state: _____ and phone: _____

Thirteen states reported using or (planning to use) a WFSA-type of analysis for selecting firefighting strategies, comparable to the federal practice. A contact familiar with WFSA was identified for the following states: Alaska, Arizona, Colorado, Florida, Idaho, Montana, New Mexico, North Carolina, Texas, Utah, Washington, Wisconsin, and Wyoming.

7. *Has there been improvement by the interagency fire community in delivering and supporting a clear national message about the importance of fire suppression cost containment?*

Yes – 50%
No – 50%

How could this be improved?

- Better articulation, implementation, and promotion – **24%**
- Evaluate and hold fire managers accountable for costs – **14%**

8. *If you were in charge, what is the first step you would take to control the cost of suppressing large wildfires in the U.S.?*

- keep fires small, aggressive initial attack, more research and development – **27%**
- accountability for cost, scrutinize use of high cost resources, monitoring – **23%**
- fire use and other fuels treatments – **22%**
- changes in funding, money from local budget, eliminate bulk funding, more funds for local – **7%**

9. What are the **two** most significant efforts that should be taken by the federal government to increase cooperation with **State** governments to control the cost of suppressing large wildfires in the U.S.?

- continue, increase change funding for IA, prevention, state/local – **41%**
- coordinated suppression: implementation, unified command, multiagency incident teams – **28%**
- coordinated mitigation, preparedness and prevention: community fire planning, train together – **24%**
- consider states as full and equal partners – **24%**
- utilize closest resource concept, use more state and local resources – **15%**

10. What are the **two** most significant efforts that should be taken by the federal or state government to increase cooperation with **local** governments to control the cost of suppressing large wildfires in the U.S.?

- greater local engagement and coordinated implementation, work and train together, collaboration, coordinated community planning – **45%**
- help build and maintain capacity at the local level – **41%**
- changes in funding, increase funding for local fire departments, give more flexibility to locals – **23%**
- planning, mitigation, preparedness, Firewise and related programs – **22%**

11. What additional effort could help control fire suppression costs in the Wildland Urban Interface (WUI)?

- mitigation, prevention, education, Firewise and related initiatives – **56%**
- local planning, ordinances, zoning, building codes – **17%**
- emphasize fuels treatment and management – **15%**
- put responsibility and accountability with home and property owners, increase insurance rates and incentives – **14%**
- increase local initial attack capacity – **8.6%**

12. What are **two** most significant technologies to help control fire suppression costs in the U.S.?

- fire behavior and weather monitoring, prediction, research – **23%**
- geographic information systems (GIS) and Global Positioning System (GPS) receivers, particularly for mapping – **22%**
- early detection technologies, particularly by satellites and other remote sensing – **18%**
- management support systems, including for tracking costs, dispatch, communications – **16%**
- highly effective and new initial attack equipment – **10%**

13. What are two of the most cost effective fire suppression techniques used in your state that could be considered as "best practices" and could be adopted by the federal government?

- aggressive initial attack and repositioning of resources– **44%**
- efficient and effective use of resources (equipment and teams) – **40%**
- mitigation, prevention, fuels management, local planning – **23%**
- strong, cooperative relationships with federal and local responders (meet and train together, unified command, providing assistance to local fire departments) – **16%**
- early detection capabilities – **10%**

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**SUMMARY OF WILDLAND FIRE-RELATED ISSUES AND RECOMMENDATIONS
IDENTIFIED BY OTHERS IN PRIOR STUDIES AND REPORTS**

In 1994, the cost to the federal government to suppress wildfires exceeded \$1 billion for the first time. Beginning in 1995 and continuing to today, the increasing cost of wildland fire management has been the subject of a stream of large studies and reports by federal and state agencies, the research and academic communities, and others. Many of these products have, in turn, drawn from other studies and reports at the national, regional, local, and fire-specific levels. These products have generated hundreds of observations and recommendations to improve wildland fire management, including many related to cost containment and cost efficiency and effectiveness.

As part of its study, the Academy capsulized the issues and related recommendations in 30 of the large studies and reports issued since 1994. This review organizes the issues and recommendations identified by others into three groups: key policy changes, key planning and budget changes, and key changes in managing individual large wildland fires.

A chronological bibliography of the documents cited in this summary is at the end of this appendix. The bibliography provides the short titles used to reference sources throughout the summary.

It should be emphasized that the views expressed in this Appendix are those of the organizations preparing the studies. They do not necessarily represent the views of the Academy Panel. The documents summarized here are intended to represent a diverse range of views.

KEY POLICY CHANGES

Prior reports have found that the forces tending to increase wildfire suppression costs greatly outweigh those tending to reduce costs. Consequently, they have proposed major changes in wildland fire management policy to alter this outcome. These proposals may be summarized as follows.

Containing Costs Is Not a High Priority When Suppressing Wildfires

The reports were unanimous in recommending that the protection of human life should remain the “first priority” when suppressing wildfires. The high cost impact of protecting human life while suppressing wildfires has been generally acknowledged and accepted.

While accountability for protecting human life has been repeatedly affirmed, the 2000 NASF Report on Cost Containment notes that the concept of accountability has rarely extended to the costs incurred in suppressing wildfires and the cost-effectiveness of the strategies and tactics used. Instead, the protection of nonfederal lands and structures in the wildland-urban interface (WUI) is now second only to the protection of human life as the highest priority in suppressing wildfires. The Forest Service’s 2000 Assessment of Factors Influencing Wildfire Costs observed

that the “negative after effects of burning homes on adjacent private lands are greater than the negative after effects of being a high-cost fire.” According to the report, this will continue to lead decision makers to request and retain firefighting resources to deal with the most likely scenario or the worst-case scenario rather than the best-case scenario.

In addition, firefighting in the WUI is a high-visibility, high-stakes, exciting endeavor. Line managers and firefighters involved in this work are often rewarded with public recognition and thanks, as well as personal satisfaction for contributing to protecting life and valuable personal property. Conversely, failure to meet these public expectations often results in the opposite. One outcome has been that the cost of protecting private structures can exceed their value.

Recommendations

- The Forest Service’s 2000 Assessment of Factors Influencing Wildfire Costs observed that controlling costs has to be a vital concern to the Forest Service. It needs to be a predominant message. Being sensitive to budgeting for wildfire suppression and keeping expenditures within planned budgets needs to be a top priority and integral to wildland fire management decision-making.
- The 2000 NASF Report on Cost Containment recommended that (1) “containment of costs of suppression should be second only to firefighter safety;” (2) after each agency has formally established cost control in wildfire suppression as a high priority, they should hold every member of the nation’s wildland firefighting organization accountable for his or her role in containing costs; (3) meaningful accountability for cost containment must be instituted throughout all levels of the nation’s wildfire suppression program; (4) if cost containment is to be a key factor in the management of the incident, then the Agency Administrator must clearly and effectively communicate that priority to the Incident Management Team at the outset and throughout the incident; and (5) superiors must support Agency Administrators who make sensible yet difficult or politically unpopular choices in order to reduce costs.

Reimbursing the Forest Service for Its Costs to Suppress All Wildfires Provides No Incentive to Contain Costs

The 2000 NASF Report on Cost Containment stated that throughout the national wildfire suppression organization, costs and cost-effectiveness have rarely been regarded as a priority and many Incident Management Teams have operated under the assumption that they have an open checkbook available to them. Similarly, the Forest Service’s 2000 Assessment of Factors Influencing Wildfire Costs states that: “Emergency funding for firefighting lacks the rigor, discipline, and incentives for more efficient decision making.” According to the report, the Forest Service “manages emergency firefighting funds as if they are unbudgeted, unlimited, unallocated, and without benchmarks on acceptable spending levels.”

The 2002 Thoreau Institute Report on Incentives concluded that the most important factor increasing the cost of recent wildfires is “perverse budgetary incentives,” specifically the “blank check” that the Congress gives the federal land management agencies, in general, and the Forest

Service, in particular, every year to put the fires out. According to the report, the Congress has created a budgeting process that “practically ensures waste, fraud, and abuse.” The Congress gives the federal land management agencies a budget for fire. But when fire conditions get bad enough—and the agencies themselves decide when that happens—they can start spending non-budgeted “emergency fire suppression and pre-suppression funds.” Under this process, funds budgeted for other programs and activities are used to pay for firefighters and firefighting equipment and supplies. The Congress then reimburses the agencies to repay these funds and accounts. As a result, the report observes that the agencies (1) spend a lot of money on fire suppression simply because they can and (2) continue to suppress fires that they ought to let burn because of the budgetary rewards from suppression.

Recommendations

- According to the Thoreau Institute report, the two most effective alternatives are for the Congress to (1) simply stop funding federal wildfire suppression or (2) decentralize federal land management and let each land unit fund itself out of its own receipts. In addition, hazardous fuels reduction efforts should focus only on the lands immediately surrounding homes and other structures in the WUI and not on the wildlands located near the structures. No effort should be made to treat lands away from federal land boundaries or to suppress fires that do not threaten borders, whether they are natural or human caused.
- According to the Forest Service’s 1995 Large Fire Review, the agency could give its field offices incentives to reduce costs by (1) allocating a fixed level of fire suppression funds to each region and then require the regions to submit formal requests for additional funding, (2) establish regional thresholds for fire suppression spending and trigger a Washington office review when a region exceeds its threshold, and (3) allocate fire suppression funds to the individual national forests and then let them carry over unspent funds or deficits from year to year.

Federal Agencies Are Incurring Increasing Costs for Protecting Lands and Structures in the Wildland-Urban Interface

According to the 2001 Update of Federal Wildland Fire Management Policy, federal, state, tribal, and local fire protection agencies are still unclear on their roles and responsibilities for structural fire protection and suppression within the WUI. This is especially true when structural protection involves strategies to control the perimeter of the fire because it is heading toward a WUI. Moreover, under cost-share and mutual-aid agreements with state and local governments, federal agencies often end up with a disproportionately high assignment of costs because the agreements are based on acres burned. Studies over the last seven years have shown that the costs to federal agencies to suppress a wildfire increase the nearer it comes to communities and that when costs are allocated on the basis of acres burned, federal land management agencies end up with a disproportionately high assignment of costs. These studies have also observed that, given the current presence of fire protection agreements in rapidly urbanizing settings all over the country, continuation of current trends will result in substantially higher wildfire suppression costs for the agencies in the future.

Recommendations

- The Forest Service's 1995 Strategic Assessment of Fire Management and the agency's 1995 Course To the Future recommended that the Forest Service's role in fire management in the WUI should be redefined and renegotiated with partners in fire management. The goal of the negotiations should be the phasing out of the agency's primary protection role on private lands in urbanized and developing rural areas.
- Toward this end, the Forest Service's 1995 Large Fire Review recommended that the agency complete a comprehensive review of all interagency fire suppression agreements that commit the agency to the protection of private property.
- The Forest Service's 1995 Strategic Assessment of Fire Management also recommended that wildfire suppression costs should be distributed among federal and nonfederal agencies on the basis of the costs for suppression in an agency's area, not on the basis of the number of acres burned.

Developers and Homeowners Need Incentives to Adopt Fire-Safety Practices

Since 1995, federal land management agencies have recognized that to attain fire-safe attributes, public outreach and education are critical. They have, therefore, implemented a FIREWISE program, along with State Foresters and county and local governments, as a common strategy for educating homeowners and communities about how they can take effective measures to protect their property from wildfires. In addition, both the Department of the Interior and the Forest Service have programs designed to enhance the wildfire suppression capabilities of rural and volunteer fire departments by providing funds and technical assistance through the states to improve communication capabilities, provide critical wildfire management training, and purchase protective fire clothing and other firefighting equipment.

However, the 2001 Update of Federal Wildland Fire Management Policy found that little had changed during the intervening seven years. There are still many areas of the nation where planning, zoning, and building regulations are too permissive, allowing poorly controlled development to occur in high-hazard areas. In such areas, unsafe homes are built, they burn, and they are then rebuilt—most times incorporating the same designs, construction materials, or locations that originally led to their destruction. In addition, government and insurance programs and policies continue to allow rebuilding in high-hazard areas and rebuilding without prudent protections in location and construction.

Recommendations

- The 2000 NASF Report on Cost Containment observed that there is a need for local and state governments to use their regulatory authorities to strike a safe balance between the siting of structures, the use of FIREWISE construction materials and methods, and the creation of defensible space.

- The 2002 Joint Cohesive Strategy observed that (1) creating defensible perimeters around homes, (2) improving planning and building codes and zoning regulations, (3) employing fire-resistant landscaping, and (4) developing community-specific fire protection measures will help reduce wildfire risk to communities, prevent wildfires from burning homes, and reduce insurance premiums and suppression costs.
- The 2002 Thoreau Institute Report on Incentives observed that (1) the federal government could offer to cost share with private owners, paying half of the costs of new roofing and landscaping while the owners pay the other half, and (2) private owners can be given an additional incentive if insurance companies are prompted to charge people more if they do not treat their lands or offer discounts to those who do. Similarly, the Forest Service's 1995 Course to the Future recommended supporting tax and insurance incentives for fire-safe communities in the WUI.
- The 2002 report by the Thoreau Institute also observed that, to immunize the government against lawsuits, the Congress could pass a law declaring that property owners who fail to take advantage of the federal government's cost-sharing program to fireproof their properties would not be able to seek damages if their buildings are subsequently lost to a fire that started on federal lands.
- The Forest Service's 1995 Strategic Assessment of Fire Management recommended, among other things, that:
 1. States should (a) develop model state and local building codes/guidelines for communities in fire-prone areas in cooperation with the federal government and (b) be rewarded for taking steps to adopt such codes/guidelines.
 2. The receipt of federal funding for rural firefighting should be contingent on aggressive state and local efforts to implement the building codes, and federal funding to reduce hazardous fuels in the WUI should be targeted to areas where landowners have agreed to participate in fire-safe building designs and practices as well as other fire-safety projects.
 3. The Federal Emergency Management Agency (FEMA) should be encouraged to enforce its regulations requiring that grants for reconstruction be contingent on implementing building standards that ensure fire safety.
 4. Fire insurance practices should encourage fire-safe building practices and insurance premiums on structures should reflect the risk of wildfire associated with building in hazardous situations.
 5. A federal emergency assistance program should be established that is available when states are confronted with fire situations that exceed their capability.
 6. A national fire emergency fund should be developed that is available to states that maintain a prescribed level of capacity. The federal government could provide

initial funding. However, unless a state has a fire emergency fund of its own, it should be required to contribute to the fund.

The Forest Service's Statutory, Regulatory, and Administrative Framework Needs to be Tailored to Better Address Hazardous Fuels Reduction and Burned Area Restoration

According to a 1997 GAO Report on Forest Service Decision-Making, the agency lacks the statutory, regulatory, and administrative framework needed to efficiently and effectively address hazardous fuels and other forest health issues. The Forest Service's 2002 Report on its Planning Process identified the statutory, regulatory, and administrative requirements that impede the efficient and effective management of the national forests. According to the report, the Forest Service has created some of its own problems as its rules and administrative requirements have accumulated over time. However, much of the problem lies beyond the Forest Service's ability to control.

For example, federal regulatory agencies are primarily focused on the immediate risks to single resources, such as threatened and endangered species or the quality of air on any given day, rather than on long-term outcomes and landscape-scale conditions. In addition, some courts have increasingly directed the Forest Service to obtain information beyond that which the agency views as needed to comply with legislative requirements. Moreover, the Forest Service is the only federal land management agency with a legislatively required appeals process.

The Forest Service's June 2002 Planning Process report recognizes the importance to sound decision-making of public participation, interagency consultation, and environmental studies. While these critical components of informed management must remain, their current form tends to shift the focus away from the long-term health of the land and produces long decision-making delays that can prevent needed work from happening before it is overtaken by events.

Recommendations

On August 22, 2002, President Bush announced a new initiative to restore forest and rangeland health and prevent catastrophic wildfires on public lands. The Healthy Forests Initiative is intended to expedite federal and local efforts to restore forest health through active land management efforts, such as the thinning of small trees and brush and, where appropriate, prescribed burns. Toward this end, the President directed the Secretaries of the Interior and Agriculture as well as the Chairman of Council on Environmental Quality (CEQ) to:

- Improve the procedures for developing and implementing fuels treatment and forest restoration projects in priority forests and rangelands, in collaboration with local governments.
- Reduce the number of overlapping environmental reviews by combining project analysis and establishing a process for concurrent project clearance by federal agencies.
- Develop guidance for weighing the short-term risks against the long-term benefits of fuels treatment and restoration projects.

- Develop guidance to ensure consistent National Environmental Policy Act (NEPA) procedures for fuels treatment and restoration activities, including development of a model Environmental Assessment (EA) for these types of projects.

The President will also work with the Congress on legislation to allow more timely, efficient, and effective implementation of forest health projects. Such legislation would:

- Authorize agencies to enter into long-term stewardship contracts with the private sector, non-profit organizations, and local communities. Long-term contracts provide contractors the incentive to invest in the equipment and infrastructure needed to productively use the material generated from forest thinning, such as small-diameter logs, to make wood products or to produce energy (biomass).
- Expedite implementation of fuels reduction and forest restoration projects, particularly in high priority areas.
- Ensure that judges consider the long-term risks of harm to people, property, and the environment in challenges based on short-term risks of forest health projects.
- Remove the rider that imposes extraordinary procedural requirements on the Forest Service appeals process that are inconsistent with pre-existing requirements of law.

Distrust of Timber Harvesting Must be Overcome

The most controversial issue related to reducing hazardous fuels and restoring forest health is the role of timber harvesting. On one hand, many experts agree that fuels must be reduced in many areas, at least initially, by mechanical means, including commercial timber harvesting, in conjunction with prescribed fire. On the other hand, revenue from commercial timber harvesting can be used to fund other programs and activities. As GAO pointed out in its 1999 Cohesive Strategy Report, this provides an incentive for land managers to (1) focus on areas with high-value commercial timber rather than on areas with high fire hazards or (2) include more large, commercially valuable trees in a timber sale than are necessary to reduce the accumulated fuels. Thus, as noted in the 2002 Sierra Club Report, some parties believe that the federal land management agencies, in general, and the Forest Service, in particular, cannot be trusted to focus on areas with high fire hazards rather than on areas with high-value commercial timber. These parties also note that the effectiveness of mechanical thinning in protecting communities and restoring forests is still far from conclusive and that the long-term effects of timber harvesting are not know. Similarly, a 2000 Forest Service Report on Postfire Logging observed that the “information on the environmental effects of postfire logging is scanty at best” and recommended “caution” in its use.

According to the 2002 Incentives Report by the Thoreau Institute, “both sides are partly right and mostly wrong.” On one hand, commercial timber sales, if they are done right, can play a role in reducing hazardous fuels. On the other hand, since the Forest Service can use the revenue from

commercial timber harvesting to fund other programs and activities, the incentives are to focus on areas with high-value commercial timber rather than on areas with high fire hazards.

Recommendation

- One option for ending the existing gridlock, cited in the 2002 draft Joint Cohesive Strategy, the 2002 Forest Service Planning Process Report, and the 2000 Postfire Logging Report, as well as by scientists and land managers, is adaptive management. Adaptive management is an approach to decision-making based on the premise that (1) decisions are necessarily based on incomplete data and a less-than-perfect understanding of natural processes, (2) the understanding of ecosystems continually evolves, and (3) unexpected events can and will occur. It accepts that uncertainty is normal but tries to ensure that this fact does not grind decision-making to a halt. Rather, adaptive management is directed at making decisions on the basis of the best information available, monitoring the results, learning from experience, and adjusting future management accordingly. In addition, new developments in information technology are making it easier to share information and to collaborate across traditional jurisdictional boundaries on a landscape scale. Moreover, public participation in the Forest Service's decision-making continues to evolve and now includes multiparty monitoring and evaluation of certain fuels reduction projects to assess whether ecological management objectives and administrative efficiencies are being achieved and whether the needs of rural communities are being addressed.

Access Is an Unresolved Issue

Among the more contentious debates over how federal lands should be managed is the role of roads, particularly in areas that are now roadless. On one hand, roads provide access for fuels reduction and fire fighting. However, roads can also have negative environmental and economic effects. Therefore, the positive effects of improved access for fuels reduction and fire fighting need to be weighed against the negative ecological impacts as well as the costs to construct and maintain the roads.

Recommendation

- The Forest Service's 1995 Fire Economics Assessment Report recommended that access be improved on national forests for fire suppression activities. However, more recent products, including the 2001 Forest Service Transportation Policy, would require federal land managers to use science-based analyses to identify the minimum road system needed to administer, use, and protect their lands and resources.

The Value of Protecting Natural Resources Has Not Been Resolved

According to the 2002 Thoreau Institute Report on Incentives, most fires that do not threaten a WUI should be allowed to burn. According to that report, letting more acres burn would save hundreds of millions of dollars of fire suppression costs each year, not to mention the lives of dozens of firefighters. In addition, the agencies may not need to spend as much money on

preparedness (pre-suppression). However, as noted in the Forest Service's 1995 Fire Economics Assessment Report, wildfires can also threaten resources protected by law, regulation, or policy, and protecting them can increase wildfire suppression costs. Examples include threatened and endangered species and their habitats, archeological and historic sites, riparian zones, wilderness areas, rivers and lakes, and special and geologic features. Moreover, trends in public opinion and changes in forest policy indicated that society might value the national forests more for their variety of non-commodities than for their commercial timber, according to both the Forest Service's 1995 Fire Economics Assessment Report and its 1995 Strategic Assessment of Fire Management.

Recommendation

- The Forest Service's 1995 Fire Economics Assessment Report raises the policy question concerning how much should be spent to protect a changed value mix. For example, would the Pacific Northwest forests, with their reduced timber harvest levels, be more efficiently protected by reducing pre-suppression levels and letting more wildfires burn, or would their implicit values, not yet quantified, warrant current or higher levels of pre-suppression funding?

KEY PLANNING AND BUDGET CHANGES

Each year, the administration and the Congress must make difficult decisions concerning the priority to be given to wildland fire management relative to other appropriations (budget accounts) as well as the priority to be given to the various wildland fire management activities. These activities include fire prevention and education, preparedness (initial attack and extended attack), hazardous fuels reduction, restoration and maintenance of ecosystem health (wildland fire use), suppression of large fires and simultaneous ignitions on a planning unit, protection of life and property in the WUI, rural fire assistance, and fire-related research.

Options Have Been Proposed to Prioritize Wildland Fire Management Activities for Funding

Many prior studies and reports provide a confusing message concerning the funding priority to be given to the various wildland fire management activities. However, options have been proposed, and recommendations made, to assist decision makers in reaching more informed decisions concerning the allocation of appropriated funds.

Recommendations

- The 2002 Draft Joint Cohesive Strategy, developed by the Department of the Interior (DOI) and the Forest Service, would establish hazardous fuels reduction as the wildland fire management activity warranting the highest priority for increased federal funding. It notes, among other things, that without a significant increase in funding to reduce hazardous fuels, the risk of wildfires to communities and ecosystems would continue to increase. The strategy also stated that (1) unless the rate of restoration is increased,

greater burned acreages and higher wildfire suppression costs will continue and (2) wildfires that burn under extreme conditions often require extensive site rehabilitation treatments that significantly increase wildfire costs. It concludes that the “cost of restoring or maintaining an ecosystem through treatment activities is generally much less than the cost of suppressing a wildland fire and rehabilitating the land.”

- The 2001 DOI and Forest Service Report on a New Wildland Fire Program Analysis and Budgeting Process recommends replacing the multiple fire management planning and budget processes being used by the five federal land management agencies with a single, uniform, cost-effective, objective-driven, performance-based, integrated wildland fire program analysis and budgeting process. This new process—named the Fire Management Analysis Process or Fire-MAP—would, among other things, provide federal land managers with the ability to evaluate the cost effectiveness of alternative fire management strategies to achieve the full range of wildland fire management goals, objectives, and activities. The process would (1) focus on the relative importance of goals and objectives over time and (2) allow each federal land management unit, such as a national forest or national park, to define its programmatic fire management needs by analyzing the integration of, and trade-offs among, the various wildland fire management activities.

Risk Assessment and Management Needs to be Integrated into the Agencies’ Planning and Budgeting Processes

As noted in the Forest Service’s 1995 Fire Economics Assessment Report, wildland fire management is a form of risk management. As wildland fire management decision-making has become more complex, contentious, and uncertain, the need to quantify and explain risks has become greater. To make informed decisions concerning the proper mix of wildland fire management activities, federal land managers must first establish an acceptable level of risk. In other words, they must decide whether to plan and budget for the worst fire years or strictly on the basis of economic efficiency. They then need to analyze the risks associated with the integration of, and trade-offs among, the various wildland fire management activities to identify potential program efficiencies. Currently, none of the existing planning and budgeting processes or computer planning models calculates levels of uncertainty in choosing a program level. However, there are vast data on historical fire weather patterns, and the computational capabilities of fire behavior and operations simulation models could support the development of a risk-based fire-planning model.

Recommendations

- The Forest Service’s 2000 Strategy for Fire Management states that the agency could develop a continuum of wildland resource/political values and apply the appropriate suppression response to each. On lands with low resource/political values, such as wilderness, the agency would use very limited resources to monitor and confine a wildfire. Conversely, on lands with high resource/political values, such as the WUI, it would use “massive resources, with associated high cost.” In between these extremes, it would develop appropriate suppression response tactics. These tactics would typically

involve higher uncertainty and greater risk than the tactics applied at either end of the spectrum. The compelling reason for dealing with higher risk and uncertainty is the reward of lower cost for the agency.

- The Forest Service's 1995 Fire Economics Assessment Report recommended that the costs of risk aversion or excessive risk-taking be avoided through active evaluation of risk in fire management decisions, institutionalizing decision processes, training in risk analysis, rewarding the taking of measured risks, using new risk analysis software, and implementing advances in risk communication.
- The 1995 report also observed that with a better understanding of the level and nature of variability, agencies could use "insurance concepts" to design a funding mechanism to develop reserves for bad fire years and an incentive system to reward units for holding costs within rationally determined ranges of variability. This mechanism could help fire managers become aware of their risk behavior and better evaluate how their choices tradeoff acceptable risk against the cost of managing the fire program.

Completing and Updating Fire Management Plans (FMPs) May Lower Suppression Costs on Some Federal Land Units

According to the 2002 GAO Report on Preparedness, as of September 30, 2001, over half of all the federal land management units with burnable acres did not have fire management plans that meet the requirements of the 1995 Federal Wildland Fire Management Policy. If a fire management plan does not meet the requirements of the policy, local units do not have the option of letting wildfires burn and are required to suppress them.

The Forest Service and DOI have now developed consistent procedures and standards for fire management planning that will assist local units in their efforts to have fire management plans that are in compliance with the national fire policy. Their goal for completing and updating their fire management plans is set for 2004.

Recommendation

- In its 2002 report, GAO recommended that DOI and the Forest Service ensure that fire management plans are completed expeditiously for all burnable acres and are consistent with national fire policy.

Wildland Fire Management Needs to be Better Integrated into Federal Land Management Planning (LMP)

The 2002 Thoreau Institute Report on Incentives observed that, of the fire management plans that have been prepared, most do not allow fires to burn outside of large wilderness areas and that even in wilderness areas, fires are only allowed to burn under strict conditions. Thus, completing and updating their fire management plans "is hardly the panacea for natural burning that some people want to see in the future." Other products have placed this shortcoming on the failure to integrate wildland fire management into federal land management planning. For

example, the Forest Service’s 2000 Strategy for Fire Management observes that the lack of integrated planning results in competing and conflicting direction and objectives. Functional budgets and programs prevent integration, efficient funding, and staffing of projects and inhibit broad-based understanding of fire’s role in ecosystem management.

Recommendations

- The Forest Service’s 2000 Assessment of Factors Influencing Wildfire Costs recommended that fire be placed as an equal resource in the agency’s land management planning process.
- The 2000 NASF Report on Cost Containment observed that, in many areas, fire must be managed as any natural resource would be managed. Therefore, the preferable course would be to deal with fuel loads as a component in a sound resource management program well in advance of any potential incident.

Federal Agencies Need to Anticipate Needs to Protect Private Lands and Structures

Both the fire management plans—as well as the computer planning models that use information from the plans to determine the amount and kind of personnel and equipment needed to reach a given level of firefighting preparedness—only consider lands for which a federal land management agency has direct fire protection responsibilities. Therefore, the plans and models do not consider the federal and non-federal firefighting resources that are needed to protect nonfederal lands, including lands in the WUI that pose direct risks to communities and structures. According to several reports and studies, the resources to protect these lands and structures can be significant in some areas. As a result, the failure of the plans and models to anticipate the resources associated with protecting nonfederal lands from fires originating on federal land management units almost guarantees inadequate resources for initial and extended attack, inefficiencies, and ultimately excessive costs.

Recommendation

- Several reports—including the Forest Service’s 1995 Fire Economics Assessment Report, the agency’s 2000 Assessment of Factors Influencing Wildfire Costs, the 2000 NASF Report on Cost Containment, and the 2001 DOI and Forest Service report on a New Wildland Fire Program Analysis and Budgeting Process—have recommended that the fire management plans and the computer planning models be updated to keep pace with today’s fire suppression complexities. This would include the lands in the WUI adjacent to the boundaries of the federal lands. Including these lands would address the increased pre-suppression resources needs.

Federal Agencies’ Analytical Tools Need to Reflect the Costs Associated with Political, Social, and Media Expectations

A reality of today’s wildland fire management is that the ever-increasing intermingling of human communities with wildlands brings increasing societal expectations for suppressing wildfire,

even as it creates a situation in which fire suppression becomes much more difficult. Because of the increased population and private development within the interface, public concern and expectations influence decisions and the commitment of federal resources. In their belief that local, state, and federal firefighters are somehow able to prevent the loss of lives and property in the face of catastrophic wildfire, citizens, politicians, and the media have exerted substantial pressure on Incident Management Teams and Agency Administrators to employ costly extraordinary suppression measures to do so.

Recommendation

- The Forest Service's 1995 Course to the Future observed that large-fire decisions that result in the greatest expenditures are usually driven by non-economic factors, such as political and social expectations. Yet, the value and costs derived from these expectations are not reflected in the agency's analysis tools. Until such costs are considered, these tools will be unable to accurately guide large-fire management decisions.

Existing Computer Planning Models Need to be Enhanced

The five federal land management agencies currently use three different computer planning models to identify the personnel and equipment needed to respond to and suppress wildfires. Several reports have made recommendations to enhance one or more of the existing computer planning models.

Recommendations

- The 2001 DOI and Forest Service Report on a New Wildland Fire Program Analysis and Budgeting Process observed that the computer models that use information from the plans to determine the amount and kind of personnel and equipment needed to reach a given level of fire-fighting preparedness do not consider the fire-fighting personnel and equipment that are available in adjacent state and local jurisdictions. These resources could decrease the need for federal fire-fighting personnel and equipment in certain areas. Therefore, it is important to identify the best mix and location of fire management resources (federal, state, and local) to achieve the land management goals and objectives.
- The Forest Service's 1995 Fire Economics Assessment Report observed that the process used by the Forest Service, the Bureau of Land Management, and the Bureau of Indian Affairs encourages high valuation of resources damaged by fire to maximize pre-suppression funding. However, there is no similar activity to display the effects of restoring fire to the ecosystem and the benefits of increasing burned acreage are not generally modeled in the process. Fuels management is considered beneficial only in the sense that a reduction in suppression costs can be demonstrated. Therefore, the model needs to be revised to incorporate fuel treatments and the beneficial effects of fire in an interactive analysis.
- Other reports have noted that the Forest Service, the Bureau of Land Management, and the Bureau of Indian Affairs use one model to identify the personnel and equipment

needed for preparedness and suppression, a separate set of programs to prioritize hazardous fuels reduction projects, and do not also identify the staffing and financial support requirements for wildland fire use.

- The 2002 Thoreau Institute Incentives Report identified a number of flaws in the process used by the three agencies. Specifically, the model does not, but should, take into account (1) the savings on suppression and pre-suppression costs of letting a fire burn, (2) annual variations in weather, (3) the effect that suppression in one year will have on suppression costs in future years, and (4) non-market resource values.

KEY CHANGES IN MANAGING INDIVIDUAL LARGE WILDLAND FIRES

No matter how well prepared federal wildland fire management agencies are, under severe weather and drought conditions, some unwanted wildland fires will escape initial and extended attack, especially in areas where extreme hazardous fuels exist. Prior reviews of the costs of suppressing large wildfires have observed that, once a wildfire overwhelms initial and extended attack and a decision is made to suppress it, there may be few opportunities to significantly reduce the costs of managing the fires. However, they have identified opportunities to improve the overall efficiency of the fire suppression efforts and, thus, reduce some costs. Toward this end, the 1995 Forest Service Fire Economics Assessment Report observed that, until major changes in fire management policy begin to take shape, keeping costs in check must be a key discussion topic at every management transition point, briefing, and oversight review.

Improved Integration of Risk Analysis into Wildfire Management Decisions Might Reduce Some Costs

Most Incident Management Teams and Agency Administrators recognize that they have the authority to select priorities and strategies that will reduce cost. However, at least six reports issued during the last seven years have observed that there are few incentives or rewards for Incident Management Teams and Agency Administrators to take prudent and acceptable risks that could lead to reductions in large wildfire suppression costs. Rather, the potential for litigation and claims, critical media coverage, and political pressure to suppress all wildfires are major disincentives to risk taking. However, the reports also recognized that the assumption of risk must be based on adequate risk analysis.

Recommendations

- The July 2000 NASF Report on Cost Containment recommended that federal land management agencies provide Incident Management Teams and Agency Administrators with better decision-making tools and then support and encourage calculated risk-taking as they set suppression objectives.
- The Forest Service's 2000 Assessment of Factors Influencing Wildfire Costs and the 2001 DOI and Forest Service Report on a New Wildland Fire Program Analysis and Budgeting Process recommended that, to improve fire suppression capabilities, models

like the Rare Event Risk Analysis Program (RERAP)¹ or the Fire Area Simulator (FARSITE),² be standardized, improved, and institutionalized.

- According to the 2000 Forest Service report, accomplishing the goal of “well analyzed risks” would require that the Wildland Fire Situation Analysis (WFSA) be integrated with other tools, particularly RERAP, FARSITE, and other fire behavior analysis methods. This would require better integration of the WFSA with information resources, such as GIS, according to the report.
- According to the 2000 Forest Service report, integration of the WFSA with other tools would also impose new training requirements. In addition, a risk analysis approach would require modeling of the effectiveness of fire suppression resources, both in terms of theoretical production rates (e.g., chains of line per hour per hand crew) and in the actual conditions under which the resources are deployed (e.g., environmental conditions, terrain, and fatigue).
- The Forest Service’s 2002 Report on Cost-Containment recommended that the agency utilize its assessment capability for the risks of wildfire starts and risks of incurring large fires, as well as its new Predictive Services experts, to help with long-term fire behavior assessments and risk analysis. This would assist fire managers with questions about how and when to move what suppression assets to the highest priority locations. The geographic areas would then need to commit to moving these assets where needed, when needed, and not holding onto resources unnecessarily.

The Benefits and Costs of Restrictions on Suppression Strategies and Tactics Should be Identified and Analyzed

The Forest Service’s 1995 Fire Economics Assessment Report observed that environmental and other laws, regulations, and policies can have both positive and negative impacts on fire expenditures. For instance, the use of Minimum Impact Suppression Techniques (MIST) can increase costs by increasing the likelihood of spotting across fire lines and extreme fire behavior. In addition, increased expenditures could result from additional efforts to either avoid or mitigate damage from the construction of fire lines, backfire or burnout operations, dropping of fire retardant, construction of fire camps, and other fire suppression activities. Conversely, MIST can decrease fire expenditures by reducing the need for rehabilitation of fire lines. The 1995 report observed, however, that the impact of environmental and other laws, regulations, and policies on fire-related expenditures was likely to continue to increase.

¹ RERAP determines probabilities that a wildland fire will exceed a maximum allowable perimeter before a fire-ending event will halt fire spread.

² FARSITE is a large fire growth simulator.

Recommendations

- The Forest Service's 1995 Large Fire Review recommended that the agency require a tradeoff or benefit/cost analysis of any restriction on suppression tactics, such as the use of dozers, retardant, or other suppression methods. This analysis should include any increase in resource damage caused by greater burned acreage that may result from the restriction.
- The Forest Service's 2002 Cost-Containment Report recommended that Agency Administrators should always evaluate all facets of MIST in the WFSA alternatives and include this direction in the Delegation of Authority.

A Younger, Less Experienced Federal Workforce Could Benefit from More Training and Mentoring

According to GAO's 2002 Preparedness Report, all five of the major federal land management agencies were expected to hire all of the fire-fighting personnel that they identified as needed by the 2002 fire season. However, this younger, less experienced workforce is being hired at a time when fire suppression is becoming much more complex. Recommendations to develop the required knowledge, skills, and abilities have focused on training and mentoring.

Training-Related Recommendations

- The 2000 NASF Report on Cost Containment recommended that federal land management agencies take the following training-related actions.
 1. Encourage federal and state employees to participate in training and then make them available to be dispatched for suppression.
 2. Include in every individual's position description a requirement for a training plan that identifies the suppression or prevention position(s) to which the employee is aspiring.
 3. Insist that supervisors allow employees the time to attend formal training to advance their fire suppression qualifications according to their training program.
- The Forest Service's 2000 Assessment of Factors Influencing Wildfire Costs recommended that federal land management agencies should (1) review current training for incident management personnel and (2) amend the training as necessary to include methods of cost containment and efficient management of suppression resources.

Mentoring-Related Recommendations

- The 2000 NASF report recommended that federal land management agencies take the following mentoring-related actions.

1. Use recent federal and state fire program retirees as mentors.
 2. Use qualified retirees for fire assignments where appropriate, particularly for “mentoring” posts.
- The 2000 Forest Service report recommended that federal land management agencies implement a mentoring program to improve fire management skills for all personnel engaged in fire suppression.

Non-Firefighting Personnel Are Needed to Fill Support Positions

Three reports—the Forest Service’s 2000 Assessment of Factors Influencing Wildfire Costs, the 2000 NASF Report on Cost Containment, and the Forest Service’s 1995 Course To the Future—observed that, in the past, when a fire occurred, non-fire personnel would make themselves available to serve. This was the Forest Service’s “militia.” However, the traditional “militia” approach to large fire suppression is not working. The overall reduction in Forest Service field personnel over the last decade is the primary reason. This, combined with the decreasing availability of existing personnel to participate in fire suppression activities because of low pay incentives, higher priority work, and a variety of personal reasons, will require some changes to be made if the agency is to remain effective.

Recommendations

- The 2000 NASF Report on Cost Containment recommended that federal land management agencies take the following fire support-related actions.
 1. Make available for fire assignments employees in local fire management agency offices who lack the skill, demeanor, or physical ability to serve in a red-carded position on a fire but are capable of performing wildfire suppression or prevention activities at some specific, defined level. This requirement should be inserted in every individual’s position description.
 2. Work with NWCG to promote an in-depth examination of factors contributing to the erosion of the pool of experienced forest fire suppression personnel and to develop strategies for reversing the trend.
 3. Place a high priority on ensuring that qualified people are allowed to be available for suppression dispatches.

Agency Administrators Need to More Effectively Exercise Their Wildfire Management Responsibilities

The overall responsibility and accountability for an incident rests with the Agency Administrator, who must make immediate, high-cost decisions that directly influence the manner in which suppression efforts develop on a wildfire. However, according to the 2000 NASF Report on Cost Containment, Agency Administrators often have minimal experience and limited

knowledge of fire effects, fire management, or fire behavior. As a consequence, inexperienced Agency Administrators (1) make decisions that lead to higher suppression costs and (2) fail to make important administrative or operational choices that could reduce overall incident costs. In addition, Agency Administrators often (1) delegate away the pivotal initial strategic decision on a wildfire, in part, because they do not feel qualified to address today's complexities of fire suppression and (2) fail to provide strong and effective leadership, guidance, and oversight to Incident Management Teams once they arrive to assist in managing a wildfire, according to Forest Service's 2000 Assessment of Factors Influencing Wildfire Costs.

Training-Related Recommendations

- The Forest Service's 2000 Assessment of Factors Influencing Wildfire Costs and the 2000 NASF Report on Cost Containment recommended that Agency Administrators be required to attend either a national or regional training course in fire management leadership to more effectively exercise their fire management responsibilities.
- The Forest Service's 2000 Assessment of Factors Influencing Wildfire Costs recommended that federal land management agencies review current training for Agency Administrators and amend the training as necessary to include methods of cost containment and efficient management of suppression resources.
- The 2000 NASF report recommended that current training for Agency Administrators be reviewed and amended as necessary to include methods of cost containment and efficient management of suppression resources.

Mentoring-Related Recommendations

- The July 2000 NASF report recommended that federal land management agencies assign experienced Agency Administrators, including recent retirees, to mentor inexperienced Agency Administrators prior to an actual incident and to coach them during an actual incident.
- The January 2000 Forest Service report recommended that federal land management agencies implement a mentoring program to improve fire management skills for all personnel engaged in fire suppression.
- The Forest Service's 1995 Course To the Future recommended that an oversight system be developed to reinforce and support inexperienced Agency Administrators during large wildfires. The abilities and skills of Agency Administrators should be strengthened through, among other things, oversight reinforcement for inexperienced Agency Administrators. Each region should form Agency Administrators support teams to coach less experienced local managers during times of critical fire suppression decision making.

Other Recommendations

- The 2000 Forest Service report recommended that Agency Administrators remain appropriately engaged in the management of an incident after an Incident Management Team arrives to ensure that a fire is managed in a safe and efficient manner. This would include (1) constructing a more systematic and consistent approach to oversight of Agency Administrators and (2) providing a predominant message that costs are a priority and are expected to be as low as practicable in the management of the incident.
- The 2000 NASF report recommended that, to assist Agency Administrators, fire management personnel keep a current, localized version of the Fire Management Leadership Desk Reference (developed by the National Advanced Resource Technology Center) available and review it annually.
- The 2000 NASF report also recommended that all Agency Administrators should become responsible for supporting the annual Fire Loss Tolerance report, what it contains, what goes into the report, and what the report means to accountability for cost containment nationally on large fires.

The Cost, Performance, and Productivity of Non-federal Crews and Equipment Need to be Evaluated

According to several reports issued over the last seven years—including the Forest Service’s 2000 Assessment of Factors Influencing Wildfire Costs, the agency’s 1995 Large Fire Review, and a 1999 Forest Service Paper on Reducing Large Wildfire Suppression Costs—state, local, and contract crews and equipment generally cost more than using federal personnel and equipment. In addition, the performance and productivity of some non-federal crews have been questioned.

Recommendations

- The Forest Service’s 1995 Large Fire Review recommended that the agency develop alternative methods for providing logistics and finance personnel for fire suppression assignments, including contracting and utilizing personnel from other agencies.
- According to the 2000 Forest Service report, if the agency must depend more on contract crews in the future, it will need better controls for contract preparedness, training, and safety. The report also recommended that the Forest Service (1) use only crews with proven qualifications who are sanctioned or certified as wildland firefighting crews and (2) be more aggressive in calling for available crews nationwide.

Changes Are Needed to Delegations of Authority to Better Consider Costs

According to the Flathead Forest’s 2000 Line Officer’s Wildfire Guide, few decisions by Agency Administrators obligate more money, commit more people to hazardous duty, have longer-term impacts on natural resources, or determine the scope of future management decision space than

the selection of a large fire suppression strategy. Two documents assist an Agency Administrator in making this selection—a Delegation of Authority and a WFSA. Together, these two documents represent the most important procedural responsibility that an Agency Administrator has in managing a wildfire.

Recommendations

- The Forest Service’s 2002 Cost-Containment Report recommended that the agency develop a new example of a Delegation of Authority. The new Delegation of Authority should include “trigger points” that would mandate an Incident Management Team to initiate a meaningful least-cost alternative and cost containment actions that should include effects on values at risk.
- The 2002 Forest Service report also recommended that the agency consider including a “cost restraint” (i.e., \$800 to \$2,200 per acre) in the Delegation of Authority. The expectation would be for the Incident Management Team to manage costs within this range and that the Agency Administrator review this expectation every day.
- The 2000 NASF Report on Cost Containment recommended that incident goals be measurable and attainable and that incident objectives be linked to the costs of attaining them. Well-developed fire management objectives should address environmental, social, economic, and political issues and therefore provide excellent insight into setting priorities, cost-benefit guidance, and the types of fire management strategies that are acceptable.
- The Forest Service’s 1995 Large Fire Review observed that there are few incentives to take risks that could lead to reductions in large fire suppression costs. To address this finding, the report recommended, among other things, that the Forest Service assure that Agency Administrator objectives for fire suppression in the Delegation of Authority are measurable and associated with specific costs for attaining the objective.

An Incident Business Advisor (IBA) Should Be Assigned to Every Large Wildfire

Prior to 1995, very little economic analysis of strategies and tactics was being done on individual fires and, even if inefficiencies were detected, they were seldom being noted and corrected during the fire. However, the large wildland fires and lengthy fire seasons during the 1990s saw the introduction of the “comptroller” position on the Incident Management Team. The role of the comptroller—later renamed the Incident Business Advisor—is to advise the responsible Agency Administrator and line officers on cost issues specific to a single fire. By 1999, Incident Business Advisors were on some large wildfires.

Recommendations

- The Forest Service’s 2000 Assessment of Factors Influencing Wildfire Costs and NASF’s 2000 Report on Cost Containment recommended that an Incident Business Advisor be

assigned to a large fire throughout the incident to collaborate with the Agency Administrator and to provide proper fiscal oversight to the Incident Management Team.

- The Forest Service's 1995 Large Fire Review recommended that the agency define the role of the comptroller (Incident Business Advisor) to include (1) input and participation in the development of the WFSA, (2) participation in basic workforce planning in order to estimate the finance organization needed and to ensure that appropriate people and resources are ordered on a timely basis, and (3) selection of the suppression alternative.

Reviews of Large Wildfires Provide Effective Oversight and Feedback

According to the Forest Service's 1995 Fire Economics Assessment Report, periodic reviews of large wildfires, which include economic efficiency as a criterion for evaluation, are necessary to reinforce efficient and informed decision-making and to provide for national consistency. The Forest Service Manual now includes criteria on which to conduct a Large Incident Cost Review. One criterion is when actual or expected expenditures exceed \$5 million. However, the Forest Service's 2000 Assessment of Factors Influencing Wildfire Costs stated that indications were that these criteria needed to be applied more consistently.

Recommendations

- The 2000 NASF Report on Cost Containment recommended that annual reviews be conducted of a sample of large wildfires, focusing on the impact of strategy, tactics, and decision-making on cost, risk, and accountability. It also recommended that (1) better fire-cost thresholds be developed to ensure proper oversight of large fire management and (2) post-fire critiques be performed that emphasize the comparison between the costs and benefits of suppression.
- The Forest Service's 2002 Cost Containment Report recommended that the agency conduct post-fire reviews. These reviews should emphasize pre-attack planning and should hold managers accountable for deviating from pre-planned actions. The report also recommended that the Forest Service evaluate why Initial Attack failed on all large wildfires (greater than 1,000 acres) over the course of the 2002 and 2003 fire seasons. Each fire should be analyzed from the initial detection and reporting stage through the escaped fire declaration. Trends and commonalities should be sought to derive reasons so mitigations can be developed. The analysis should focus on causes where "returns" would be the greatest.
- The Forest Service's 2000 Assessment of Factors Influencing Wildfire Costs recommended that the top leadership of the agency's State and Private Forestry mission area, specifically the Deputy Chief and the Associate Deputy Chief, needed to be more consistently involved in large wildfire cost reviews.
- A 1999 Forest Service Paper on Reducing Large Wildfire Suppression Costs observed that oversight reviews and studies that look at individual fires, season-long expenditures,

and long-term trends in suppression costs offer important insights into large wildfire expenditures.

- The Forest Service's 1995 Large Fire Review recommended that the agency (1) assign oversight teams to review all major fires within 5 days of heavy resource commitment (or a specific dollar outlay) to analyze the cost effectiveness of the strategy and tactics and (2) review and assess the strategy and priority on large, costly fires anytime a key factor changes, including the delay of an expected season-ending event and repeated failures of a suppression strategy. The report also recommended that the Forest Service annually require regional and Washington Office reviews of a sample of large wildfires with the focus on cost, risk, and accountability. A comptroller (Incident Business Advisor) should be included on each review team.

Agreement Needs to be Reached on Measures of Cost Efficiency

According to the Forest Service's 2000 Assessment of Factors Influencing Wildfire Costs, there are several measures of fire suppression cost efficiency. These include (1) total emergency fire suppression, (2) total cost plus net value change, (3) total cost per acre, and (4) total cost plus savings. However, as an agency, the Forest Service does not agree on a consistent measure to illustrate cost efficiency. On each large wildfire, the agency reports savings as well as costs. The Incident Commander or Agency Administrator approves the method of calculating savings. Methods vary and results can be questionable.

Recommendation

- The report observes that agreeing on which cost and savings measures illustrate the most appropriate picture of wildfire suppression cost efficiency is critical.

The Criteria for Prioritizing Wildfires Need to be Reconsidered

According to the Forest Service's 2000 Assessment of Factors Influencing Wildfire Costs, the criteria for assigning priorities for resources are as follows: (1) the potential to destroy life, improvements, and property; (2) the potential for long-term natural resource loss (e.g., to watersheds or timber); (3) the potential for short-term natural resource loss (e.g., to grazing or crops); and (4) the difficulty of containment (e.g., difficult terrain).

Recommendation

- The report concluded that reconsidering the criteria for prioritizing fires in a multiple-fire situation would have direct positive impacts on fire management effectiveness in both the short term and long term. It also recommended the development of fire behavior software that can be used for regional priority assessment.

Agreement Needs to be Reached on the Standards of Cost Efficiency

The 2000 NASF Report on Cost Containment observed that the expenditure of resources in support of the suppression of wildfire is not guided by any standards to ensure efficiency. Absent a set of performance/cost standards, there is little incentive for Incident Management Teams and/or Agency Administrators to (1) evaluate their strategies and tactics from a cost/benefit standpoint, (2) enhance the efficiency of both mobilization and demobilization of resources, (3) strictly control the use of Type 1 aviation resources, or (4) eliminate over-ordering of resources.

Recommendation

- The NASF report recommended that federal land management agencies (1) develop national or regional suppression cost standards to assist Incident Management Teams in administering suppression efforts and to measure their efficiency, and (2) establish clear and uniform fire-related job performance standards for Agency Administrators.

High-Cost Centers Need to be Included in All Large-Fire Reviews

The Forest Service's 1995 Large Fire Review observed that the use of heavy lift (type D) helicopters had risen significantly and was one of the highest cost centers on large fires. While this resource can be a cost-effective suppression tool on some wildfires, the report observed that the use of type 1 helicopters on some wildfires during the 1994 fire season was ineffective and that they were being used primarily to show the viewing public and the media that active fire suppression was taking place.

Recommendation

- The report recommended that the Forest Service ensure that Incident Management Teams complete a benefit/cost analysis when using this often effective but very expensive resource, and provide adequate supervision and management. It also recommended that the agency include helicopter operations as a key item in all local and regional fire reviews.

Decisions to Lease or Buy Should be Reviewed

The Forest Service's 1995 Large Fire Review stated that, in 1994, the agency procured seven helicopters using an "exclusive use" contract rather than the more expensive "call when needed" contract. The actual cost for the seven "exclusive use" helicopters was compared to the cost for the same helicopters under a "call when needed" contract. The 1994 savings was \$812,240 or more than \$100,000 per helicopter.

Recommendation

- The report noted that a 1992 national study of type 1 and 2 helicopters had made recommendations on the most efficient staffing levels and procurement methods for large

and medium helicopters. The focus of the recommendations was the mix of contracting methods that would result in the greatest potential cost savings.

The Agencies Could Benefit from Economies of Scale

The Forest Service's 2000 Assessment of Factors Influencing Wildfire Costs stated that present contracts do not allow for reduced costs for long-duration events. Full daily rates over a long period resulted in paying the equivalent of the full price of some equipment, such as cars and trucks.

Recommendation

- The report recommended that the terms for fire contractors (goods and services) be adjusted to allow for cost adjustments on long-duration fires (economies of scale).

Nearby Resources Should be Used First

According to the 2000 NASF Report on Cost Containment, local resources are almost always available to fill support roles that do not require advanced firefighting skills, e.g., clerical and business functions. However, both the planning and the dispatch systems frequently overlook qualified resources that are available nearby, resulting in unnecessarily high administrative and transportation costs to bring distant resources to bear, according to both the NASF report and the Forest Service's 2002 Report on Cost Containment.

Recommendations

- The NASF report stated that emphasis should be on the use of nearby resources first, before importing distant resources that must be transported, housed, and fed. The report then provides ten specific recommendations to facilitate this goal, such as developing directories of local skills and prioritizing available resources on the basis of how distant they are and dispatching them accordingly.
- The Forest Service report recommended that the agency examine the mobilization of resources on a geographic area level and national level with the objective of cost containment.

Pre-Attack Planning Should be Improved

The Forest Service's 2002 Report on Cost Containment stated that strategic pre-positioning, as the strong foundation of preparedness, should be implemented as it reflects support to initial attack planning on the agency's land units.

Recommendations

- The 2002 Forest Service report recommended that preparedness and pre-positioning be an integral part of requests for severity funding to show what resources are needed and where they are needed in order to address predicted wildfire trouble before it occurs.
- The 2000 NASF Report on Cost Containment recommended that the federal agencies (1) expand their use of equipment caches and pre-position equipment and personnel to quickly bolster first-response forces, even to the point of co-locating federal and state resources and (2) ensure that communications networks are useable by all local groups.
- The Forest Service's 2000 Assessment of Factors Influencing Wildfire Costs stated that better pre-planning of base camp locations would improve overall efficiency.

The Effectiveness of Incident Management Teams Could be Improved

The Forest Service's 2000 Assessment of Factors Influencing Wildfire Costs stated that having more flexible standards in place would significantly improve the overall effectiveness of the management of the fire.

Recommendations

- The Forest Service report observed that there needed to be better flexibility in team composition and rotation.
- The 2000 NASF Report on Cost Containment stated that federal land management agencies should (1) reemphasize the importance of Type 3 Incident Management Teams for extended attack and for smaller fires and insist on their use in appropriate situations and (2) avoid ordering a Type 2 team if an incident is of a complexity that will allow the safe use of a Type 3 team.

BIBLIOGRAPHY OF DOCUMENTS CITED

(Listed Chronologically)

Strategic Assessment of Fire Management, USDA Forest Service (Jan. 13, 1995)—“the Forest Service’s 1995 Strategic Assessment of Fire Management”

Course to the Future: Positioning Fire and Aviation Management, Fire and Aviation Management, USDA Forest Service (May 1995)—“the Forest Service’s 1995 Course to the Future”

Fire Suppression Costs on Large Fires: A Review of the 1994 Fire Season, USDA Forest Service (Aug. 1, 1995)—“the Forest Service’s 1995 Large Fire Review”

Fire Economics Assessment Report, Fire and Aviation Management, USDA Forest Service (Sept. 1, 1995)—“the Forest Service’s 1995 Fire Economics Assessment Report”

Federal Wildland Fire Management Policy and Program Review, U.S. Department of the Interior and U.S. Department of Agriculture (Dec. 18, 1995)—“the 1995 Federal Wildland Fire Management Policy”

Analysis of USDA Forest Service Fire-Related Expenditures 1970-1995, Research Paper PSW-RP-230, Pacific Southwest Research Station, USDA Forest Service (March 1997)—“the Forest Service’s 1997 Analysis of Fire-Related Expenditures”

Forest Service Decision-Making: A Framework for Improving Performance (GAO/RCED-97-71, April 29, 1997)—“GAO’s 1997 Report on Forest Service Decision-Making”

Western National Forests: A Cohesive Strategy Is Needed to Address Catastrophic Wildfire Threats (GAO/RCED-99-65, April 2, 1999)—“GAO’s 1999 Cohesive Strategy Report”

Issues in Large Wildfire Suppression Cost Reduction: An Operational Perspective, Proceedings of the Symposium on Fire Economics, Planning, and Policy: Bottom Lines, Pacific Southwest Research Station, USDA Forest Service (April 5-9, 1999)—“a 1999 Forest Service Paper on Reducing Large Wildfire Suppression Costs”

Environmental Effects of Postfire Logging: Literature Review and Annotated Bibliography, USDA Forest Service, Pacific Northwest Research Station, General Technical Report PNW-GTR-486 (January 2000)—“the Forest Service’s 2000 Postfire Logging Report”

An Agency Strategy for Fire Management, USDA Forest Service, A Report from the National Management Review Team (Jan. 12, 2000)—“the Forest Service’s 2000 Strategy for Fire Management”

Policy Implications of Large Fire Management: A Strategic Assessment of Factors Influencing Costs, A Report by the Strategic Overview of Large Fire Costs Team, State and Private Forestry, USDA Forest Service (Jan. 21, 2000)—“the Forest Service’s 2000 Assessment of Factors Influencing Wildfire Costs”

Line Officer’s Guide to Wildland Fire Decision Making, Flathead National Forest, USDA Forest Service (April 2000)—“the Flathead Forest’s 2000 Line Officer’s Wildfire Guide”

Cost Containment on Large Fires: Efficient Utilization of Wildland Fire Suppression Resources, National Association of State Foresters, Fire Resources Utilization Subcommittee (July 1, 2000)—“the 2000 NASF Report on Cost Containment”

Managing the Impact of Wildfires on Communities and the Environment, A Report to the President in Response to the Wildfires of 2000, the Secretaries of the Interior and Agriculture (Sept. 8, 2000)—“the 2000 National Fire Plan”

Review and Update of the 1995 Federal Wildland Fire Management Policy, U.S. Departments of the Interior, Agriculture, Energy, Defense, and Commerce; U.S. Environmental Protection Agency; the Federal Emergency Management Agency; and the National Association of State Foresters (January 2001)—“the 2001 Update of Federal Wildland Fire Management Policy”

Administration of the Forest Development Transportation System, Final Rule, USDA Forest Service (Jan. 3, 2001) and *Forest Transportation System*, Final Administrative Policy (Jan. 3, 2001)—“the 2001 Forest Service Transportation Policy”

Record of Decision: Sierra Nevada Forest Plan Amendment Environmental Impact Statement, Pacific Southwest Region and Intermountain Region, USDA Forest Service (Jan. 12, 2001)—“the 2001 Sierra Nevada Framework”

A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy, the Departments of the Interior and Agriculture, the Western Governors’ Association, the National Association of State Foresters, the National Association of Counties, and the Intertribal Timber Council (August 2001)—“the 2001 10-Year Comprehensive Strategy”

Developing an Interagency, Landscape-scale Fire Planning Analysis and Budget Tool, Report to the National Fire Plan Coordinators: USDA Forest Service and U.S. Department of the Interior (Nov. 30, 2001)—“the 2001 DOI and Forest Service Report on a New Wildland Fire Program Analysis and Budgeting Process”

Implementation of Multi-party Monitoring and Evaluation: The USDA Forest Service Stewardship Contracting Pilot Projects, FY 2001, Report to the USDA Forest Service Prepared by the Pinchot Institute for Conservation (January 2002)—“the 2002 Report on Stewardship Pilot Projects”

Severe Wildland Fires: Leadership and Accountability Needed to Reduce Risks to Communities and Resources (GAO-02-259, Jan. 31, 2002)—“GAO’s 2002 Hazardous Fuels Report”

Large Fire Cost Containment Group Report and Recommendations, Fire and Aviation Management, USDA Forest Service (Feb. 22, 2002)—“the Forest Service’s 2002 Cost Containment Report”

Wildland Fire Management: Improved Planning Will Help Agencies Better Identify Fire-Fighting Preparedness Needs (GAO-02-158, March 29, 2002)—“GAO’s 2002 Preparedness Report”

Restoring Fire-Adapted Ecosystems on Federal Lands: A Cohesive Fuel Treatment Strategy for Protecting People and Sustaining Natural Resources, U.S. Department of the Interior and USDA Forest Service (April 2002 Draft)—“the Draft 2002 Joint Cohesive Strategy”

A Collaborative Approach for Reducing Wildland Fire Risks to Communities: 10-Year Comprehensive Strategy: Implementation Plan, the Departments of the Interior and Agriculture, the Western Governors’ Association, the National Association of State Foresters, the National Association of Counties, and the Intertribal Timber Council (May 2002)—“the 2002 10-Year Implementation Plan”

The Process Predicament: How Statutory, Regulatory, and Administrative Factors Affect National Forest Management, USDA Forest Service (June 2002)—“the Forest Service’s 2002 Planning Process Report”

Reforming the Fire Service: An Analysis of Federal Fire Budgets and Incentives, Randal O’Toole, The Thoreau Institute (July 2002)—“the 2002 Thoreau Institute Incentives Report”

Restoring America’s Forests: Protecting Habitat, Saving Streams, and Generating Jobs in Our National Forests, Sierra Club (July 18, 2002)—“the 2002 Sierra Club Report”

Healthy Forests: An Initiative for Wildfire Prevention and Stronger Communities (Aug. 22, 2002)—“the 2002 President’s Healthy Forests Initiative”