

Recreation and Fire Management in Urban National Forests: A Study of Manager Perspectives

Kelly S. Bricker,¹ Deborah J. Chavez,² and William W. Hendricks³

Abstract

The purpose of this study was to understand U.S. Department of Agriculture Forest Service public land managers' perceptions of fire management and recreational use in urban national forests of the United States. An online survey was used to understand managers' perceptions of (a) the degree to which the presence of recreational activities and experiences are a constraint to fire management, (b) the degree to which fire management and suppression activities influence the quality of a visit to a recreation site, and (c) the relationships between fire management and recreation constraints. In all, 62 district rangers within urban national forests were asked to complete an online survey, and 33 responded (53 percent). The following items were thought to moderately to severely impact the managers' ability to manage fire: increased urban development, budget constraints, accumulation of burnable fuels, effect of smoke on visitors, increased visitation, and the lack of trained personnel. In addition, most managers believed that recreational use of day-use areas, trails, campgrounds, and access roads conflicted moderately or slightly with fire management decisions. Over 70 percent of respondents indicated that mountain bikes on unauthorized trails, vandalism, litter, encroachment from surrounding farmland, unauthorized grazing, and, unauthorized logging did not have an impact on fire management decisions. Generally respondents did not perceive management factors as limiting visitors' pursuit of recreation activities. In addition, most managers identified the occurrence of various management activities (e.g., campground closures from smoke, trail closures owing to wildland fires, fire suppression, etc.) as slightly to not limiting at all.

Keywords: Fire management, fire impacts, outdoor recreation, urban national forests.

¹ Associate professor, Department of Parks, Recreation, and Tourism, University of Utah, 250 South 1850 East, Room 1070, Salt Lake City, UT 84112-0920, e-mail: kelly.bricker@health.utah.edu.

² Research social scientist, U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, Wildland Recreation and Urban Cultures research unit, 4955 Canyon Crest Drive, Riverside, California 92507-6099; e-mail: dchavez@fs.fed.us.

³ Professor and coordinator of the Recreation, Parks, and Tourism Administration Program, Natural Resources Management Department, California Polytechnic State University, San Luis Obispo, CA 93407; e-mail: whendric@calpoly.edu.

Introduction

Increasingly, public land management agencies entrusted with fire management responsibilities are challenged to address a complex set of variables—in addition to the environmental conditions allowing for a safe and manageable burn (Machlis et al. 2002, McLean 1995). These factors include the size of the burn, location, elevation, landform, soil type, and vegetation including fuel load, climate, wildlife and habitats, policy, funding, air quality, safety of people and property, and access (McLean 1995). The interagency National Fire Plan was established to develop an inclusive strategy to address fire management and the impacts on communities and natural resources (Hendricks et al. 2003). Accordingly, the plan also addressed impacts on outdoor recreation (Chavez and Hendricks 2003).

Forest conditions and evolving land use patterns are creating a potential crisis in fire management (Butry et al. 2002). Evolving land use trends are putting more people in rural settings, increasing the burden on firefighting services and protection (Butry et al. 2002). Haphazard patterns of development result in scattered access, which inevitably increases the cost of fire protection while decreasing its effectiveness (Sampson 1999). In addition to development, the increased number of homes placed adjacent to public lands is on the rise, creating a wildland-urban interface (Wuerthner 2002). Many of these homes are not defensible against fire nor are the owners prepared to deal with the aftermath created by fire. As a result, many homeowners favor fire suppression, which complicates the public land manager's ability to use fire as a tool to maintain or restore damaged ecosystems (Jacobson and Marynowski 1997). People are building homes next to fire-prone ecosystems, which will eventually result in a blaze that will consume their investment (Sampson 1999, Wuerthner 2002). Some communities have taken aggressive actions by developing wildfire mitigation standards (Wuerthner 2002). These policies do not prohibit development but do educate homeowners on how to reduce their risk of damage from fire by clearing trees surrounding their homes and other common sense approaches (Wuerthner 2002).

People affect public lands not only by direct use, but also by influencing management and land use policies. Therefore, it is important that resource managers recognize the role of people as an integral part of any ecosystem (Jacobson and Marynowski 1997). Increased population growth in wildland-urban interface areas increases challenges for land managers to reduce the risk of wildfires. As catastrophic fires can have a significant economic impact, successful prescribed burning programs that reduce the risk of wildfires can reap great dividends (Sampson 1999, Wuerthner 2002). However, people who

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are unaccustomed to the management practice of prescribed burning may oppose the use of fire that results in production of smoke (Butry et al. 2002).

In 1970, legislation mandated that federal agencies incorporate public feedback into management policies and practices (Hendee and Harris 1970). An important step was the realization that effective communication between the public and public land managers was essential in gaining understanding and support for recreation and natural resource management programs (Bright et al. 1993). Because of the legislation and strong increasing public interest, land managers find themselves under constant scrutiny (Bright et al. 1993). Land managers have found it difficult to effectively communicate with the public about resource policies and practices. Public understanding, however, has been identified as a major factor in making prescribed burning management effective (Bright et al. 1993). Fire management officials report that when people understand the dynamics and the need for prescribed burning, they become more accepting (McLean 1995).

The results of several studies have shown that visitor perceptions may differ greatly from how managers perceive visitors' attitudes and preferences (Manning 1999). Typically, managers were oriented to the scientific, educational, and horticultural aspects of the area, whereas visitors focused on the preservation and naturalness of the area. In addition, studies have demonstrated that resource managers were more aware and cognizant of the environmental impacts of recreation in the area being managed than were the visitors (Manning 1999). Hendee and Harris (1970) found that managers overestimated the users' support for facility development and the use of nonintrusive management practices.

Research has indicated that changes in manager attitudes and perceptions are an important aspect in meeting natural resource goals (Manning 1999). Some research, for example, has demonstrated that managers find increased public support through educational programs, which improves visitor behaviors, influences policies, and impacts decisions that affect public lands (Jacobson and Marynowski 1997).

Owing to the complex issues associated with prescribed burns in wildland-urban interface areas, effective communication between land managing agencies and the public needs to be established. To facilitate this communication, land managers must also understand the motivations, attitudes, and preferences of the users. Although we are beginning to understand the visitor's perceptions of prescribed burns and fire management in wildland-urban interface areas (Chavez and Hendricks 2003; Hendricks et al. 2003, 2004), it is also necessary to study managers' perceptions of recreation use and fire management.

The primary purpose of the study was to understand U.S. Forest Service public land managers' perceptions of fire management and recreational use in urban national forests of the United States.

Study Objectives

The primary purpose of the study was to understand U.S. Department of Agriculture Forest Service (USFS) public land managers' perceptions of fire management and recreational use in urban national forests of the United States. Specifically, the objectives were to understand managers' perceptions of:

- The degree to which the presence of recreational activities and experiences are a constraint to fire management.
- The degree to which fire management and suppression activities influence the quality of a visit to a recreation site.
- The relationships between fire management and recreation constraints.

Methods

Researchers conducted an online survey of 62 district rangers located within urban national forests, as identified by the Pacific Southwest Research Station (see app. 1). During spring 2004, each potential participant was sent an introductory letter via e-mail informing them of the study and contact information of those conducting the study. Following Dillman (2007), the second e-mail letter with attached instructions on accessing the online survey was sent 1-week after the introductory letter. For all nonrespondents, a reminder letter was sent via e-mail after 1 more week. The process continued with two more followup letters to nonrespondents requesting their participation in the study.

Of the 62 individuals identified within 15 urban forests, 33 respondents returned completed surveys. These surveys represented 14 of the initial 15 forests identified for this study, for a response of 53 percent.

Online Survey

The study used an online survey. Two of 33 respondents completed the survey off-line and returned it via e-mail because of technical difficulties. The survey addressed several components relevant to fire management and recreation issues:

- Fire management practices within the district.
- Types of recreation opportunities within the district.
- Types of developed areas available.
- Understanding of the purposes of fire management.
- Level of impact of various administrative and visitor occurrences within the forest such as budget constraints, visitors' enjoyment, and management processes.
- Perceptions of conflicts with fire management decisionmaking.

- Perceptions of limitations to visitor pursuit of recreation.
- Frequency of illegal recreation activities and subsequent impacts on fire management decisionmaking.
- Education and public awareness programs.

Results

Characteristics of Respondents

The majority of respondents were male (84 percent), long-time employees of the USFS, and highly educated. Forty-six percent of respondents indicated that they have been employed with the USFS between 25 and 29 years, 19 percent between 20 and 25 years, 14 percent 30 or more years, and 14 percent between 10 and 16 years.

The majority of respondents indicated that their highest level of education was college graduate (70 percent). Twenty-six percent had completed a Masters degree, and 2 percent had some college education. The majority (59 percent) of respondents also indicated their current grade classification was GS-13, 18 percent indicated that their current grade classification was GS-15, and 16 percent indicated a grade classification of GS-14.

Respondents were relatively new to their current position, with 58 percent of respondents in their current position for less than 5 years. Twenty percent had been in their current position for between 5 and 9 years, and 18 percent had been in their current position for between 10 and 16 years. Two percent of the respondents had been in their current position for 20 years. The mean was 5.43 years (SD = 4.5).

Forty percent of respondents indicated that they attended one training session for fire management per year. Twenty percent indicated that they attended two training sessions annually, 30 percent indicated that they attended three training sessions per year for fire management, and 8 percent indicated that they attended more than three training sessions per year.

Fire Management and Operations

The majority of the respondents identified February (60 percent), March (76 percent), and April (62 percent) as the months they conduct prescribed burns. Many conducted prescribed burns in the months of October (56 percent) and November (56 percent). The months least often identified as having prescribed burns were the drier months May (24 percent), June (4 percent), August (2 percent), and September (20 percent).

A majority of respondents identified March (53 percent), February (51 percent), and April (49 percent) as the ideal months for prescribed burning. Many identified ideal prescribed burning in the months of October (47 percent) and January

(40 percent) in their district. The months identified as being the least ideal for prescribed/control burning were July (4 percent), June (7 percent), and August (7 percent).

The majority of the respondents identified that there were between one and four prescribed burns (45 percent) in their district during the past 12 months. Many identified that there were no prescribed burns (25 percent) during the last 12 months. Twenty percent of respondents identified that there were between 5 and 10 prescribed burns, and 12 percent identified more than 10 prescribed burns during the past 12 months within their district.

More than one-third (35 percent) of the respondents identified more than 10 natural fires in their district in the last 12 months. Many identified between 1 and 4 natural fires (28 percent) and between 5 and 10 natural fires (28 percent). A small number of respondents (11 percent) identified that there were no natural fires in their district within the last year.

A majority of respondents (83 percent) identified no controlled burns for ecological reasons in the past year, whereas the remainder (17 percent) identified one to five controlled burns for ecological reasons in the last year within their district. With respect to natural fires out of control within the year, a majority of respondents (75 percent) identified having no fires out of control within the last year. A small proportion (17 percent) identified 1 to 5 fires out of control, and 9 percent identified more than 10 fires out of control within the last 12 months.

The majority of respondents (71 percent) identified the month of August to be dry season. September and July were also considered to be dry season by the majority of the respondents (69 percent and 65 percent, respectively). A small proportion considered December (6 percent), January (6 percent), and February (15 percent) to be dry season.

Visitor Behavior and Fire Management

A majority of respondents identified the months of July (90 percent), June (86 percent), and August (82 percent) as receiving the heaviest visitor use throughout the year. Many received the heaviest visitor use in September (69 percent), May (59 percent), and October (55 percent). The months identified as receiving the lightest visitor use were the winter months of February (10 percent), January, March, November, and December (14 percent each).

The majority of respondents stated that the months that prescribed/controlled burning would have the least impact on users were the cooler months of February (58 percent), January (51 percent), and December (47 percent) (table 18). Ninety-three percent of the respondents indicated that prescribed/controlled burning in

Table 18—Months identified as when prescribed/ control burning would have the least and most impact on users

Month	Least impact		Most impact	
	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>
January	23	51	22	49
February	26	58	19	42
March	18	40	27	60
April	15	33	30	67
May	9	20	36	80
June	3	7	42	93
July	4	9	41	91
August	4	9	41	91
September	3	7	42	93
October	6	13	39	87
November	15	33	30	67
December	21	47	24	53

the month of June would have the greatest effect on users (table 18), as well as in the months of September (93 percent), July (91 percent), and August (91 percent).

All the respondents stated that they had developed recreation areas within their districts. Ninety-two percent described managed areas as “overnight with fees,” and 88 percent managed areas having “day use with fees.” A large proportion of respondents (78 percent) managed the area(s) of “day use with no fees” as well as “overnight with no fees” (66 percent). Twenty-four percent of respondents stated that they used “backcountry permits” in their districts.

A majority of respondents identified camping (97 percent), picnicking (97 percent), walking trails (92 percent), hunting and recreational shooting (89 percent), hiking (84 percent), marine/wildlife viewing (84 percent), fishing (84 percent), sightseeing (84 percent), driving corridors (84 percent), mountain biking (84 percent), and photography (81 percent) as occurring in their district. Additional activities were identified as winter nonmotorized (38 percent), winter motorized (14 percent), air-based (8 percent), races (5 percent), mountaineering/climbing (5 percent), spelunking or caving (5 percent), and gold panning (3 percent).

The most common primary activities identified by each respondent were camping (37 percent), driving corridors (18 percent), and sightseeing (13 percent) (table 19). The most common secondary activities identified were camping (24 percent), hiking (21 percent), walking trails (11 percent), and sightseeing (11 percent). The most common tertiary activities were using all-terrain vehicles/motorbikes (16 percent), hiking (14 percent), and wildlife viewing (11 percent).

Table 19—Primary, secondary, and tertiary recreational activities identified by respondents

Activity	Primary recreation activity		Secondary recreation activity		Tertiary recreation activity	
	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>
Camping	14	37	9	24	3	8
Driving corridors	7	18	3	8	3	8
Sightseeing	5	13	4	11	3	8
Hiking	2	5	8	21	5	14
Picnicking	2	5	2	5	3	8
Hunting & recreational shooting	2	5	1	3	1	3
ATV/motorbikes	2	5	3	8	6	16
Backpacking	1	3	1	3	2	5
Naturalist led programs	1	3	0	0	2	5
Motorized boating	1	3	1	3	1	3
Mountain biking	1	3	0	0	0	0
Wildlife and marine viewing	0	0	0	0	4	11
Walking trails	0	0	4	11	2	5
Fishing	0	0	1	3	0	0
Swimming and wading	0	0	1	3	0	0
Horseback riding	0	0	0	0	2	5

ATV = all-terrain vehicle.

Of those identifying impact, 43 percent identified the increase in urban development nearby as having a severe impact on their ability to manage fire, 35 percent identified budget constraints, and 30 percent identified the accumulation of burnable fuels.

Impacts to Fire Management

Respondents were asked to indicate the importance of a number of statements in incorporating prescribed burning as a management tool. Seventy percent of the respondents identified that prescribed burning was very important for forest health and ecosystem maintenance (table 20), 65 percent identified that prescribed burning was very important for the control of burnable fuel accumulation, 54 percent identified that prescribed burning was very important for the protection of surrounding urban development, 31 percent identified that prescribed burning was very important for the rejuvenation of native plants, and 27 percent identified that prescribed burning was very important for the creation of fire lines and for native animal habitat creation.

Of those identifying impact, 43 percent identified the increase in urban development nearby as having a severe impact on their ability to manage fire, 35 percent identified budget constraints, and 30 percent identified the accumulation of burnable fuels (table 21). Forty-six percent of respondents identified that smoke’s effect on visitors had moderate impact on their ability to manage fire, along with increased visitation, and the lack of trained personnel (43 percent). Fifty-four percent of respondents identified public opposition to fire management

Table 20—Importance of prescribed burning for various purposes

	Very important		Somewhat important		Important		No at all important	
	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>
Forest health—ecosystem maintenance	70	26	22	8	5	2	0	0
Control burnable fuel accumulation	65	24	19	7	8	3	5	2
Protect surrounding urban development	54	20	19	7	14	5	11	4
Rejuvenate native plants	31	1	27	10	27	10	14	5
Create fire lines	27	10	19	7	32	12	19	7
Native animal habitat creation	27	0	46	17	24	9	0	0
Control insects	8	3	35	13	27	10	27	10
Enhance aesthetics	8	3	22	8	27	10	41	15
Control recreation fire risks	8	3	24	9	35	13	30	11
Hands-on firefighting experiences	3	1	22	8	35	13	38	14

Table 21—Impact on respondents’ ability to manage fire

	Severe impact		Moderate impact		Slight impact		No impact	
	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>
Forest health—ecosystem maintenance	70	26	22	8	5	2	0	0
Increased urban development nearby	16	43	13	35	6	16	1	3
Budget constraints	13	35	13	35	9	24	1	3
Accumulation of burnable fuels	11	30	13	35	8	22	4	11
Process bureaucracy	10	27	13	35	11	30	2	5
Federal policy restrictions	8	22	12	32	12	32	4	11
Smoke’s effect on visitors	7	19	17	46	8	22	4	11
Increased visitation	6	16	16	43	11	30	3	8
Unauthorized recreation activities	3	8	5	14	16	43	12	32
Natural fires	1	3	11	30	14	38	8	22
Public opposition to fire management practices	1	3	13	35	20	54	2	5
Lack of trained personnel	1	3	16	43	8	22	11	30
Lack of regional support	1	3	9	24	8	22	18	49
Logging practices within forest	0	0	3	8	7	19	26	70

practices having only slight impact on their ability to manage fire, with a majority of respondents identifying logging practices within the forest having no impact on their ability to manage fire (70 percent). Interestingly, respondents were somewhat evenly spread on their perception of bureaucracy influencing their ability to manage fire at approximately one-third each, severely (27 percent), moderately (35 percent), and slightly (30 percent).

Fire Management and Visitor Conflict

Respondents were asked if they perceived recreational user conflict with fire management decisions in or near day use areas, trails, campgrounds, and access roads.

The majority of respondents perceived moderate to slight conflict with day use areas (59 percent), trails (73 percent), campgrounds (54 percent), and access roads (73 percent).

In addition, respondents were asked to identify whether they perceived limitations to visitors' pursuit of recreation in their district. Of those identifying severe limitations, 19 percent identified out-of-control fire from arson, 17 percent identified out-of-control fire from a campfire, and 11 percent identified out-of-control fire from prescribed origins (table 22). Of those identifying moderate limitations, 44 percent identified the prohibitions of fire in campgrounds and fire pits, 39 percent identified prohibitions of fire in backcountry, and 31 percent identified visible smoke as moderately limiting visitors' pursuit of recreation within their district.

Table 22—Respondents' perceived limitations to visitors' pursuit of recreation

	Severe limit		Moderate limit		Slight limit		Does not limit	
	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>
Fire out of control from arson	7	19	9	25	14	39	6	17
Fire out of control from a campfire	6	17	9	25	17	47	4	11
Fire out of control from prescribed origins	4	11	8	22	5	14	19	53
Campground closures from smoke	3	8	2	6	12	33	19	53
Prohibitions of fire in backcountry	3	8	14	39	14	39	5	14
Trail closures due to wildland fires	3	8	3	8	21	58	9	25
Decreased air quality	3	8	3	8	23	64	7	19
Fire out of control from natural causes	3	8	8	22	16	44	9	25
Fire out of control from logging operations	3	8	1	3	7	19	25	69
Prohibitions of fire in campgrounds and fire pits	2	6	16	44	15	42	2	6
Traffic delays due to fire management practices	2	6	3	8	17	47	14	39
Prohibition of fireworks	2	6	4	11	13	36	17	47
Visible evidence of wildland fires	1	3	3	8	14	39	18	50
Fire suppression	1	3	7	19	21	58	7	19
Decreased scenic beauty from smoke	0	0	8	22	14	39	14	39
Visible smoke	0	0	11	31	14	39	11	31
Prohibition of smoking tobacco	0	0	3	8	16	44	17	47
Prescribed ecologically beneficial fire	0	0	3	8	18	50	14	39
Natural ecologically beneficial fire	0	0	1	3	13	36	22	61
Fire from logging brush	0	0	0	0	5	14	31	86
Fire from residential brush burning	0	0	2	6	9	25	25	69

More than half of respondents perceived visitors' pursuit of recreation within their district as only slightly limited by trail closures owing to wildland fires (58 percent), fire suppression (58 percent), decreased air quality (64 percent), and prescribed ecologically beneficial fire (50 percent). More than half the respondents perceived that visitors' pursuit of recreation within their district was not limited by campground closures from smoke (53 percent), visible evidence of wildland fires (50 percent), natural ecologically beneficial fire (61 percent), fire from logging brush (86 percent), out-of-control fire from prescribed origins (53 percent), and out-of-control fire from logging operations (69 percent).

Respondents were asked to indicate how frequently certain incidents occurred in the district(s) they manage. Half of all respondents identified that both litter and increased urban development always occurred in their district(s), 28 percent indicated that vandalism always occurred, and 25 percent indicated that both campfires in nondesignated areas and visitors wandering off designated trails always occurred within the district(s). Half of the respondents indicated that visitors wandering off designated trails frequently occurred in the district(s) they manage, 47 percent identified that vandalism and campfires in nondesignated areas frequently occurred within their district(s), and 39 percent identified that the illegal use of firearms occurred frequently within their district(s).

More than half of respondents identified that public opposition to fire management (81 percent), illegal use of fireworks (75 percent), visible smoke from a prescribed fire (67 percent), illegal bonfires (61 percent), wildland fires (56 percent), unauthorized grazing (58 percent), mountain bikes on unauthorized trails (51 percent), unauthorized hunting (50 percent), and unauthorized logging (50 percent) seldom occurred within the district(s) they managed. Some respondents indicated that encroachment from surrounding farmlands and unauthorized logging (42 percent), development of industry (36 percent), and unauthorized grazing (28 percent) never occurred within the district(s) they managed.

To understand to what degree certain incidents affect decisions concerning fire management in the district(s) they manage, respondents were asked a series of questions concerning known effects that have been identified in the literature. Forty-two percent of respondents indicated that increased urban development severely impacted their fire management decisions, and 33 percent indicated that wildland fires did so (table 23). Many respondents identified that campfires in nondesignated areas (25 percent), visible smoke from a prescribed fire (25 percent), and increased urban development (22 percent) moderately impacted their fire management decisions.

Public opposition to fire management was considered as having a slight impact on fire management decisions by 67 percent of respondents (table 23). Illegal

More than half of respondents perceived visitors' pursuit of recreation within their district as only slightly limited by trail closures owing to wildland fires, fire suppression, decreased air quality, and prescribed ecologically beneficial fire.

Table 23—The degree to which incidents affect decisions concerning fire management

	Severe impact		Moderate impact		Slight impact		No impact	
	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>	<i>Number</i>	<i>Percent</i>
Increased urban development	15	42	8	22	7	19	5	14
Wildland fires	12	33	6	17	14	39	3	8
Visible smoke from a prescribed fire	3	8	9	25	14	39	9	25
Litter	2	6	1	3	3	8	29	81
Illegal use of fireworks	2	6	7	19	13	36	13	36
Mountain bikes on unauthorized trails	1	3	2	6	5	14	27	75
Vandalism	1	3	1	3	6	17	26	72
Campfires in nondesignated areas	1	3	9	25	14	39	11	31
Illegal use of firearms	1	3	1	3	8	22	25	69
Visitors wandering off designated trails	1	3	2	6	9	25	23	64
Illegal bonfires	1	3	6	17	16	44	12	33
Use of flammable fuels by visitors	1	3	3	8	12	36	18	50
Unauthorized grazing	1	3	1	3	5	14	28	78
Development of industry	1	3	1	3	8	22	25	69
Encroachment from surrounding farmlands	0	0	1	3	2	6	31	86
Unauthorized hunting	0	0	1	3	10	28	24	67
Unauthorized logging	0	0	1	3	2	6	31	86
Public opposition to fire management	0	0	4	11	24	67	7	19

bonfires (44 percent), wildland fires (39 percent), campfires in nondesignated areas (39 percent), and visible smoke from a prescribed fire (39 percent) were considered as having a slight impact on fire management decisions by many of the respondents. However, the majority, (more than 70 percent of respondents) indicated that the following incidents did not have an impact on fire management decisions:

- Unauthorized logging (86 percent)
- Encroachment from surrounding farmlands (86 percent)
- Litter (81 percent)
- Unauthorized grazing (78 percent)
- Mountain bikes on unauthorized trails (75 percent)
- Vandalism (72 percent)

Education and Public Awareness

All respondents stated that they conduct educational/public awareness programs to inform people about forest fire management issues in their district. Programs ranged from public awareness programs for fire management issues to news releases about current conditions to school programs and campfire programs (see app. 2). Twenty-five percent of respondents indicated that they conducted educational/public awareness programs one to six times per year. An additional

25 percent stated that they conduct the programs more than 20 times per year. Twenty-two percent identified conducting the programs 7 to 12 times per year, and 11 percent stated that they conduct the programs 13 to 20 times per year. Thirty percent of respondents indicated that the educational/public awareness programs were targeted toward children and young adults, and 22 percent targeted homeowners near or adjacent to the forest; 17 percent had no specific target group at all.

Conclusions

Most of the managers surveyed perceived urban development and the occurrence of wildland fires as severely impacting their fire management decisions. Others felt that some recreational-related events such as campfires in nondesignated areas and the impact of visible smoke from a prescribed fire moderately impacted their decisions concerning fire management. The majority of respondents felt that illegal or unauthorized recreational activities such as mountain bikes on unauthorized trails and vandalism had little or no impact on their decisions to manage fire.

When managers were asked about conflicts related to recreation and fire management, overall they perceived moderate to slight conflicts with day-use areas, trails, campgrounds, and access roads. Managers in essence were impeded to some degree within and surrounding these types of areas when it came to fire management.

Overall, prescribed and controlled burns are taking place outside of the heaviest recreational use months for the forests represented within this study. Managers did suggest that the prescribed/controlled burns would least impact recreation during December, January, and February. Most considered February, March, and April as ideal for prescribed/controlled burns, yet generally avoided months with heaviest visitor use (i.e., summer).

When asked about visitors' limitations in their pursuit of recreation, more than half of the respondents suggested that visitors were not limited by campground closures from smoke, visible evidence of wildland fires, natural ecologically beneficial fires, fires from logging brush, and out-of-control fire from logging operations. Overall, managers perceive that most of the actions they take with regard to fire do not limit or only slightly limit visitors' pursuit of recreational opportunities within the forest. Certainly whether or not visitors' perceptions are similar is an area for continued study and comparison.

Findings also suggest that managers surveyed did not perceive their actions related to fire management as limiting visitor's pursuit of recreational experiences. Most of the managers perceived their actions such as campground closures from smoke, visible evidence of wildland fires, trail closures owing to wildland fires,

Overall, managers perceive that most of the actions they take with regard to fire do not limit or only slightly limit visitors' pursuit of recreational opportunities.

fire suppression activities, traffic delays owing to fire management, prohibition of fireworks and tobacco use, decreased air quality, prescribed and naturally occurring ecologically beneficial fires, fires from logging brush, and fires from logging operations as not at all or slightly limiting visitors' pursuit of recreation.

Recommendations

Based on the results of this study, it is recommended that further research focus on areas where perceived conflict is greatest. Perhaps an understanding of visitors' knowledge of fire management in these areas can reduce potential conflict and resolve perceived limitations of managing for fire in these specific areas.

Further understanding of the effectiveness of both the messages and information relayed and the target audience is necessary to manage fire in recreation areas and near urban environments, as well as find a common ground between management perceptions of managing for fire in recreation areas, and visitors' understanding of fire management strategies and operations.

It is interesting to note, that while managers did not perceive fire management as limiting to recreational opportunities, they did perceive recreation areas limiting their ability to manage fire. A comparison of visitor's and manager's perception would assist in determining a common understanding of the impacts on both managers and visitors.

This study was conducted online. Although this was an effective way to minimize costs, we felt that it may have had some impact on the response rate. We also recommend conducting focus groups with managers to understand all of the complexities and operational environment in managing for fire in the forests.

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Appendix 1—Urban National Forests and Grasslands

Angeles National Forest
Arapaho and Roosevelt National Forests
Chattahoochee National Forest
Cimarron Comanche National Grasslands
Cleveland National Forest
Gifford Pinchot National Forest
Los Padres National Forest
Mt. Baker-Snoqualmie National Forest
Mt. Hood National Forest
Pike, San Isabel National Forests
San Bernardino National Forest
Tonto National Forest
Uinta National Forest
Wasatch-Cache National Forest
White Mountain National Forest

Appendix 2—Educational/Awareness Programs

Types of educational/public awareness programs described by respondents:

- Public awareness programs for fire management issues
- Press releases about current conditions and use restrictions
- Fire prevention programs at schools, public meetings for proposed vegetation/fuels management projects, forest plan revision public notice and comment
- Three public information persons in fire management. Considerable media involvement
- Various school programs are presented each year, partnership with (local) Fire Safety Awareness Center, (local) Youth Forest, news releases, working with communities on Fire Wise program, Fire Works program, campfire programs in (local) Canyon
- News releases and personal contact
- Numerous fire prevention and education programs as well as fairs and parades
- Programs with the local school district
- Approximately 15 to 20 prevention contacts each year. Classrooms, fairs, special events, etc.
- Mostly on the subject of defensible space and children's programs

- Go to classrooms to talk about the Forest Service in general
- Newspaper articles, radio talk shows, school talks, service club talks
- In conjunction with our fuels management program we have educational sessions, usually with the state foresters and other land managers, about the role of fire in this ecosystem and steps we are taking to return the forest to a healthier condition.
- Presentations at local primary and secondary schools. Meetings with county commissions, etc.
- Smokey programs, part of hunter education programs, newspaper articles
- Prevention programs conducted with state foresters (all year, but especially during fire prevention week)
- Personal public contacts with adjacent landowners or others who may be affected by prescribed burn activities
- District personnel do talks with school children and also interpretive talks at developed campgrounds
- Public community meetings, fire prevention programs, Fire Safe/FireWise communities, external scoping
- FireWise homeowners meetings, Wildland/Urban Interface meetings, implementation of the Good Neighbor Agreement
- Smokey Bear programs in schools. News release about prescribed burning.
- Prevention technicians conduct numerous programs.
- Smokey Bear and a fire engine at numerous activities
- FireWise programs are held in schools and community groups by the district's fire management officer or the fire prevention officer
- We have fire prevention people who visit with a variety of groups to get out different fire messages
- We do conservation education programs with some stressing the need to be careful with fire, but we also show that not every fire is devastating. We teach that fire has a long-term beneficial role in the environment by restoring ecosystems.
- In addition to fire prevention programs and messages that are handled by district fire prevention technician, we use every opportunity possible to inform our public about fire awareness such as local parades, state fair, county fairs, and radio stations.
- Only when we are having fires. This ranger district received over 100 inches of precipitation annually. Fire starts are usually only a few each year and the fire-return interval for large fires is 200 to 300 years.

- Primary (local) media outlet. Public outreach, work with local papers, fire prevention technician, naturalist programs, knowledgeable personnel, multiple tours
- Press releases and news articles
- Smoky Bear programs to local schools. Talks at Rotary and Chamber of Commerce. Displays at ranger stations
- District and forest-level conservation education effort to provide public information regarding fire and fuels management as well as insect and disease problem
- Work with community Fire Safe councils and property owners associations to inform, educate public on hazardous fuels program. Our volunteer association conducts evening campfire programs that introduce folks to fire and fuels management issues and programs.
- Smokey Bear programs for kids. Presentations by ranger or staff at meetings of community groups, environmental groups, etc. Participation in local Fire Safe Council.
- At fairs, schools, special events and other community gatherings. We staff a standard display with information, offer books for sale, meet, greet, and answer questions
- Through public involvement in the NEPA process for prescribed burns; with school groups through the (local) Youth Forest; through the printed media; open houses; annual fire management meetings with cooperators; Living With Fire programs.