

Big Sur Visitor Characteristics and Wildland Fire Recreational Constraints

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Abstract

A study conducted with visitors to the Big Sur region of California during summer 2002 is presented. An onsite survey was administered to visitors to the U.S. Forest Service and California State Parks day-use and overnight facilities. Recreational constraints owing to wildland fire and fire management are detailed along with the effects of activity type, visitor demographics and other characteristics, and views of these constraints. Differences primarily exist in views of constraints related to regulations.

Keywords: Big Sur, wildland fire, fire management, recreational constraints, forest visitors, wildland-urban interface.

Introduction

In recent years, understanding human behavior and the social sciences' contributions to fire management has become increasingly important to natural resources managers and researchers (Hoover and Langer 2003). In response to decades of fire exclusion, an ever-increasing wildland-urban interface, and a social stigma regarding wildfires, federal agencies devised a comprehensive fire management plan (Hoover and Langer 2003). The extreme fire season of 2000 not only reinforced this need, it illustrated further research and outreach needs. The social sciences were highlighted in the fire plan as one area critically needing additional research. Managers can benefit from research regarding the influence of fire on recreation preferences (Machlis et al. 2002) to assist in wildland fire suppression and management efforts.

Although attention to the human dimensions realm of fire management has been expanding, information remains limited regarding visitors to natural resource recreation settings and their experience with fires (Borrie et al. 2006, Thapa et al. 2004). Early research by Taylor et al. (1986) found that participants in three related studies were concerned about the potential impacts of wildland fire on

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recreation values and recreation areas. People who engaged in camping, picnicking, hiking/backpacking, and nature study differed in their response to severe fires, but not to less severe fires. Similarly, in a travel-cost model testing the impacts of fires on backcountry canoeists, the canoeists preferred routes that were less severely burned (Englin et al. 1996). Three more recent studies have begun to provide some insight into the relationship between recreationists and fire. In a study of tourists and their visitation constraints to natural areas in Florida, Thapa et al. (2004) found that nearly 50 percent of the tourists surveyed would cancel trips or change destinations because of high fire danger and health concerns. Secondly, a survey of southern California urban proximate wilderness visitors (Winter 2006) led to a recommendation of increased agency education and communication regarding fire management with specified information to targeted groups. Thirdly, research with U.S. Department of Agriculture Forest Service (USFS) district rangers found that, in general, they did not perceive fire management actions as impacting the recreational activities of visitors (Bricker et al. 2005).

Among the numerous studies funded nationally related to human dimensions and fire has been a multiyear cooperative project between the USFS Pacific Southwest Research Station and California Polytechnic State University, San Luis Obispo. This paper presents data collected during summer 2002 in the Big Sur region of the California coast. The purpose of the research presented here is to examine the characteristics of visitors to the region and to determine their perceptions of recreational constraints owing to wildland fires and fire management within a fire-prone ecosystem.

Managers are often faced with the dilemma of why individuals do not participate in some recreational opportunities. Decisions of whether to participate may be based on previous experience, personal choice, or barriers and constraints to participation. Leisure constraints have been conceptualized as being intrapersonal (psychological), interpersonal (social, involvement with others), and structural (external factors that intervene between preferences and participation such as resources and facilities) (Crawford and Godbey 1987, Crawford et al. 1991).

Constraints are not universal in regard to visitor demographics or recreation activities (Jackson 1994), and the links among constraints, demographics, and types of activities have been documented in previous research. Jackson (1994) found that differences in activity types influenced perceptions of constraints. Similarly, visitor characteristics such as age (Jackson 1988, McCarville and Smale 1993, Scott and

Jackson 1996), experience (Petrick et al. 2001), income and education (Crawford et al. 1991, McCarville and Smale 1993), and gender (Arnold and Shinew 1998, Scott and Jackson 1996) have been found to affect constraints.

Clearly it is important to understand and quantify the relationship between visitor characteristics and perceived recreational constraints for specific activities or management concerns. In this case, fire and fire management is the specific area of concern.

Fire management may affect visitors from the moment they enter a park, forest, or open space area. Regulations prohibiting campfires are common during the dry season in fire-prone ecosystems, and prescribed fires are commonly used in fuel management. Studies regarding public attitudes toward fire management have usually shown a positive response to burns in general, unless the fire was caused by someone else's negligence (Cortner et al. 1984, Taylor and Daniel 1984, Zwolinski et al. 1983). With an understanding of the specific constraints experienced by visitors to Big Sur during their pursuit of recreational activities, managers can isolate areas in need of improvement, educate visitors in regard to the need for regulations, and better serve forest visitors.

Methods

Study Locale

The study took place at USFS and California State Park locations along a 60-mile stretch of Highway One on the California central coast in the Big Sur region. The region includes day-use and overnight facilities within the Los Padres National Forest and the California State Parks System. The Los Padres National Forest provides beaches, day-use areas, trails, wilderness areas, and campgrounds. In addition, the California State Park system offers day-use and campground facilities in the area. A visitor center adjacent to the main trailhead entering the Ventana Wilderness is operated jointly by the USFS, California State Parks, and the California Department of Transportation. Estimates of annual visitation to the region include 1.5 million visitors to California State Parks and the Los Padres National Forest. Approximately 70 miles from the San Jose metropolitan area, Big Sur is a popular destination for local, state, national, and international visitors. The area's scenic beauty, rugged coastline, trails, beaches, and towering redwoods have attracted visitors for nearly a century. Another notable distinction of the area is that it is prone to fires owing to its unique weather patterns, fuels, and topography (Phippen 2001).

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Study Procedures

This paper, a portion of a larger study, focuses on data collected during summer 2002 on 20 randomly selected days. Randomly selected locations included three California State Parks day-use areas, one campground, and four USFS trailheads. Data collection occurred from approximately 9:30 am to 5:00 pm. The locations of data collection were randomly selected and were randomly assigned to a morning or to an afternoon period. Trained research assistants contacted visitors at the selected sites and asked individuals 18 years of age or older if they were willing to participate in the study. Participation in the study was voluntary and the subjects were assured of anonymity. Subjects completed a self-administered questionnaire onsite. The subjects included day-use and overnight visitors to the facilities. Four hundred thirty-one questionnaires were completed and returned onsite. Thirty-five individuals declined to participate in the study. The overall participation rate was 92.5 percent.

Data Analysis

Independent and dependent variables were identified for the analysis based on the study purpose. Independent variables were primarily visitor characteristics including gender, previous visit when a fire had occurred, previous visit to Big Sur, income, type of stay, marital status, and activity type. Perceived recreational constraints owing to fire and fire management were the dependent variables. Twenty-four constraints were measured on a 5-point scale (0 to 4) “not at all a barrier” to “extreme barrier” (adapted from Petrick et al. 2001).

A one-way ANOVA was used to examine differences in constraints by activity type for the three primary activities (camping, sightseeing, and hiking) pursued by the subjects during the data collection period. An ANOVA was also employed to identify differences in constraints by type of stay, income, education level, and residence. A post-hoc Tukey procedure identified significant differences among levels of variables when they were present in the ANOVA. This procedure was used to examine pairs of variable levels when a significant *F* test was found from the ANOVA. Finally, independent sample *t*-tests were used to determine statistically significant differences in constraints for gender, previous visit to an area when a fire was present, and previous visit to Big Sur.

Results

Visitor Characteristics and Activities

The 431 subjects provided an overview of their characteristics in responses to demographic items on the survey. Just over half of the subjects were male (52.7 percent), most were non-Hispanic Whites (80 percent), and many were married (53 percent). The average age was approximately 39 years, and annual household income was above \$55,000 for 62 percent of the subjects. Most of the subjects were camping (64 percent), 18 percent were day-use visitors, and 16 percent were staying in a hotel or bed and breakfast. Nearly 80 percent of the subjects were residents of California and 6 percent were international travelers. Most of the subjects (74.5 percent) had previously visited Big Sur. Sixteen percent experienced a wildland or prescribed fire in a park or forest during the previous 12 months.

Two questions were designed to determine participation in activities during the subjects' visit to Big Sur. First, the subjects responded to a list of activities that they were pursuing during their visit (table 1). Secondly, from this list, the subjects identified their primary recreational activity during this visit to the Big Sur region. The most frequent activities were hiking (85.5 percent), walking for pleasure (68.5 percent), camping (65.1 percent), sightseeing (53.7 percent), wild/marine-life viewing (49.3 percent), picnicking (47.2 percent), and photography (46.0 percent). Few subjects participated in kayaking (4.9 percent), horseback riding (4.2 percent), scuba/snorkeling (3.3 percent), ocean fishing (2.3 percent), and hunting (0.9 percent). The three "primary" recreational activities by a substantial margin were camping (51.9 percent), hiking (26.6 percent), and sightseeing (14.8 percent).

Activities, Characteristics, and Constraints

The subjects were asked whether 24 perceived constraints related to fire and fire management would likely affect whether they would return to the region to participate in their primary recreational activity. Constraints were measured using a 5-point scale (where 0 = not a barrier, 1 = a slight barrier, 2 = somewhat of a barrier, 3 = an important barrier, and 4 = an extreme barrier; see table 2). Mean scores among the 24 constraints (see table 2 for complete list) were highest for "fire by arson out of control" (3.23), "fire by logging out of control" (3.22), "fire by campfire out of control" (3.09), and "prescribed fire out of control" (3.00).

A one-way ANOVA based on the three activity types (camping, hiking, and sightseeing) determined few significant differences among mean scores for the 24 constraints for these activities. Significant differences were only present for "no fires allowed in fire pits or on cooking grills in developed campgrounds or picnic areas" at $F(2, 282) = 30.26, p < 0.001$ and for "stoves only allowed in the

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Table 1—Participation in recreational activities

Activity	Participation	
	<i>Number</i>	<i>Percent</i>
Hiking	367	85.5
Walking for pleasure	292	68.5
Camping	280	65.1
Sightseeing	232	54.0
Wild/marine life viewing	212	49.3
Picnicking	203	47.2
Photography	197	46.0
Beachcombing	164	38.5
Driving for pleasure	163	37.9
Eating at a Big Sur restaurant	151	35.2
Swimming/wading	140	32.9
Exploring tidepools	138	32.4
Shopping in Big Sur region	106	24.7
Sunbathing at beach	95	22.1
Backpacking	73	17.0
Take dog for walk	60	14.0
Mountain biking	42	9.8
Jogging/running	39	9.1
Naturalist-led activities	33	7.7
Surfing	29	6.7
Road biking	29	6.8
Kayaking	21	4.9
Horseback riding	18	4.2
Scuba/snorkeling	14	3.3
Ocean fishing	10	2.3
Hunting	4	0.9
Other	32	10.1

Table 2—Recreational constraints

Barrier	Mean	Standard deviation
Fire by arson out of control	3.23	1.20
Fire by logging out of control	3.22	1.19
Fire by campfire out of control	3.09	1.24
Prescribed fire out of control	3.00	1.26
Natural fire out of control	2.63	1.41
Decreased air quality from smoke	2.27	1.30
Traffic delays fire suppression	2.24	1.23
Brush burning logging operations	2.24	1.23
No fires in pits/grills in developed areas	2.12	1.49
Brush burning from homeowner	2.06	1.39
Campground closures due to fire	2.02	1.26
Decreased visibility of scenic beauty due to smoke	1.98	1.31
Trail closures due to fire	1.91	1.25
Fire suppression taking place	1.88	1.27
Picnic area closures due to fire	1.75	1.26
Visible smoke from fire	1.59	1.32
Visible burned area	1.44	1.25
No fires/stoves in backcountry	1.32	1.47
Natural fire burning for ecological benefits	1.30	1.25
Prescribed fire for ecological benefits	1.20	1.21
Stoves only in backcountry	1.03	1.33
Fire permit requirement in backcountry	0.99	1.33
No smoking except in designated areas	0.64	1.22
Prohibit fireworks	0.36	0.97

Score has a 5-point scale where 0 = no barrier to 4 = extreme barrier.

backcountry” at $F(2, 282) = 3.19, p < 0.05$. Camping had a significantly higher score (mean [M] = 2.75) than hiking ($M = 1.70$) and sightseeing ($M = 1.34$) for the former, and camping ($M = 1.10$) scored significantly higher than sightseeing ($M = 0.65$) for the latter.

T -tests and an ANOVA were conducted to examine differences in constraints relating to three characteristics of the visitors: whether or not the subjects had previously visited Big Sur, if they had experienced a prescribed or wildland fire in a park or forest during the previous 12 months, and the type of accommodation (overnight camping, day use, or hotel/bed and breakfast). The t -tests based on visitation to Big Sur found significant differences for “a fire started by arson that is out of control,” ($M = 3.32$ previous Big Sur visit, $M = 3.00$ no visit) “no fires allowed

in fire pits or on cooking grills in developed campgrounds or picnic areas,” ($M = 2.25$ previous Big Sur visit, $M = 1.83$ no visit) and “no smoking except in designated campground areas” ($M = 0.73$ previous Big Sur visit, $M = 0.44$ no visit) at $p < 0.05$. T -tests conducted regarding experiencing a fire during previous visitation to a park or forest showed significant differences for 5 of the 24 constraints items at $p < 0.05$. Differences were present for “decreased air quality from wildland/prescribed fire smoke” ($M = 2.32$ no fire experience, $M = 1.96$ fire experience), “visible burned areas from a wildland/prescribed fire” ($M = 1.48$ no fire experience, $M = 1.13$ fire experience), “visible smoke from a wildland/prescribed fire” ($M = 1.64$ no fire experience, $M = 1.25$ fire experience), “a prescribed fire set for ecological benefits” ($M = 1.24$ no fire experience, $M = 0.91$ fire experience), and “a natural fire being allowed to burn for ecological benefits” ($M = 1.34$ no fire experience, $M = 0.97$ fire experience). There were four constraint items with significant differences for the accommodation type. Overnight campers were more likely to perceive constraints for “no fires allowed in fire pits or on cooking grills in developed campgrounds or picnic areas” ($F [2, 403] = 36.57, p < 0.004$), “no fire/stoves in the backcountry” ($F [2, 402] = 5.71, p < 0.001$), “stoves only in the backcountry” ($F [2, 400] = 9.59, p < 0.001$), and “permit requirement for campfire/stove in the backcountry” ($F [2, 403] = 4.57, p < .011$). For all items, overnight campers scored significantly higher constraint levels than day-use visitors and hotel/bed and breakfast users except for the permit requirement where the difference was only significant with day-use visitors.

Demographics and Constraints

Visitor demographics of gender, income, education, and residency were also examined for their effects on constraints.

Gender—

Gender had a more profound influence on constraints than any other variable with 14 of 24 items exhibiting a significant difference between females and males (table 3). Scores for females were higher on items relating to fire suppression and control; whereas, scores for males were higher on items pertaining to regulations.

Income—

Annual household income was treated as four discrete categories for ANOVA procedures: \$35,000 and under, \$35,001 to \$55,000, \$55,001 to \$75,000, and more than \$75,000. Four of the 24 items demonstrated significant differences: “A natural fire being allowed to burn for ecological benefits” ($F [3, 389] = 3.33, p < 0.02$), “brush burning from logging operations” ($F [3, 392] = 3.74, p < 0.011$), “no fire/stoves in the

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Table 3—Gender differences in recreational constraints

Barrier	Female	Male	<i>p</i> value
Fire by arson out of control	3.42	3.07	.003
Fire by logging out of control	3.43	3.03	.001
Fire by campfire out of control	3.30	2.90	.001
Prescribed fire out of control	3.22	2.82	.001
Natural fire out of control	2.87	2.42	.001
Decreased air quality from smoke	2.55	2.02	.001
Traffic delays due to fire suppression	2.38	2.12	.032
Brush burning logging operations	2.32	2.18	.302
No fires in pits/grills in developed areas	2.18	2.07	.474
Brush burning from homeowner	2.08	2.05	.811
Campground closures due to fire	2.21	1.84	.003
Decreased visibility of scenic beauty due to smoke	2.27	1.73	.001
Trail closures due to fire	2.05	1.78	.025
Fire suppression taking place	1.99	1.78	.099
Picnic area closures due to fire	1.88	1.63	.042
Visible smoke from fire	1.79	1.42	.005
Visible burned area	1.55	1.36	.112
No fires/stoves in backcountry	1.10	1.53	.003
Natural fire burning for ecological benefits	1.41	1.21	.099
Prescribed fire for ecological benefits	1.33	1.10	.055
Stoves only in backcountry	0.99	1.07	.545
Fire permit requirement in backcountry	0.91	1.06	.281
No smoking except in designated areas	0.48	0.79	.010
Prohibit fireworks	0.27	0.44	.076

Score has a 5-point scale where 0 = no barrier to 4 = extreme barrier.

backcountry” ($F [3, 387] = 3.04, p < 0.029$), and “permit requirement for campfire/stove in the backcountry” ($F [3, 387] = 6.53, p < 0.001$). Except for “a natural fire being allowed to burn for ecological benefits,” individuals with income levels under \$35,000 had significantly higher scores than one or more of the other income levels.

Education—

Three levels of education (high school education or less, college education, graduate school) were used for ANOVA procedures. Significant differences were found for “no fires allowed in fire pits or on cooking grills in developed campgrounds or picnic areas” ($F [2, 403] = 4.44, p < 0.012$), “no smoking except in designated campground areas” ($F [2, 404] = 4.42, p < 0.013$), and “permit requirement for campfire/stove in the backcountry” ($F [2, 405] = 3.03, p < 0.049$). For all three constraints, those with a graduate school education had lower constraints scores than the other two education levels.

Residency—

The ANOVA indicated two constraint items with significant differences between California residents, other U.S. residents, and international visitors. California residents were more likely to perceive constraints for “no fires allowed in fire pits or on cooking grills in developed campgrounds or picnic areas” at $F(2, 406) = 4.44$, $p < 0.001$ and “no fire/stoves in the backcountry” at $F(2, 407) = 3.05$, $p < 0.048$. Differences were present between California residents and the other two groups for the first constraint and between California residents and international visitors for the second constraint.

Discussion

This research set out to study perceived recreational constraints owing to fire management and wildland fires. Subjects responded to an onsite survey conducted within the Big Sur region of the California central coast. The intent of the research was to examine the effects of a number of visitor demographics and characteristics on perceptions of constraints and to determine the constraints that were perceived barriers to participation in recreational activities.

The constraints with the highest mean scores were all related to fires that were described as “out of control” regardless of the initial cause of the fire. However, there was a distinct order to these mean scores with fires that might be perceived as having less desirable sources receiving the higher scores. The two highest rated barriers were “a fire out of control by arson” and “a fire by logging operations that is out of control.” The lowest rated out-of-control fire was started by natural causes. Although it seems that an out-of-control fire would be a consistent constraint to recreational activities regardless of the source, it appears that preconceived notions and attitudes might influence these perceived constraints. This supports the need to understand the public’s attitudes toward fires in developing fire policies (Manfredo et al. 1990) and the implication that the public, including visitors to natural resource recreation areas, have an effect on fire management decisionmaking and policies. Ultimately, fire management perceptions may be based on the values of these visitors (Bright et al. 2003).

For most of the independent variables, only a few constraint items emerged as statistically significant differences among levels of the variables. However, regardless of the visitor characteristic or demographic treated as an independent variable, significant differences were usually present for constraints that could be construed by visitors as regulations. Many of these differences were probably due to the functional nature of the activity. For example, it is not surprising that campers would rate regulations higher than sightseers for constraints relating to

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fire restrictions within a campground of backcountry setting. Nevertheless, it is essential to understand compliance or a lack of compliance with regulations by visitors to successfully carry out fire management strategies (Winter 2003).

One exception to the trend of most constraints being based on regulations was gender, with half of the constraint items demonstrating gender differences. This supports much of the previous leisure constraints research that has found that women often feel more constrained than men when engaging in leisure (Arnold and Shinenew 1998). These results may have considerations for critically reviewing the proportion of survey participants (male v. female) or the composition of community groups who should be involved in fire management planning to determine if representative viewpoints of the constituency demographics are present. More importantly, further investigation is necessary to determine why females rate the constraints higher than males on numerous items relating to fire and fire management and why males rate regulations as higher barriers.

Another independent variable that differed in its effect on recreational constraints was the influence of experiencing a wildland/prescribed fire during the previous 12 months. Rather than significant differences relating to regulations, these distinctions revolved around the actual presence of fires and ancillary causes such as decreased air quality, visible burned areas, visible smoke, and ecological benefits. However, contrary to previous research, the subjects who had not experienced a fire had higher constraints scores on these items. Machlis et al. (2002) suggested that the perception of threats from fires should increase with more experience. It may be that additional information concerning the type of fire experienced and the severity of the fire is necessary to understand why these experienced individuals have lower perceptions of constraints relating to fires. It is also plausible, that once experienced, these factors are no longer a barrier in a natural resources recreation setting. The experience of recreationists with fires could be distinctly different than the experiences of community members in a fixed location.

This research provides a glimpse of the effects on visitors of perceived recreational constraints caused by fire management and wildland fires. The study highlights the importance of considering and understanding the perceptions of visitors to natural resource recreation areas in adopting fire management strategies, techniques, planning models, policy setting, and decisionmaking. Specifically, the findings suggest that managers consider providing detailed information about the reasons that certain regulations are imposed, how fire suppression activities are implemented for “out of control” fires, and what actions visitors should take when they find themselves in a scenario confronting a wildland or prescribed fire that

The study highlights the importance of considering and understanding the perceptions of visitors to natural resource recreation areas.

presents potential constraints to their planned recreational pursuits. Furthermore, information and marketing programs that provide visitors with access to suggestions for alternative areas or forests for a planned visit would be helpful.

Metric Equivalents

1 mile = 1.61 kilometers

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