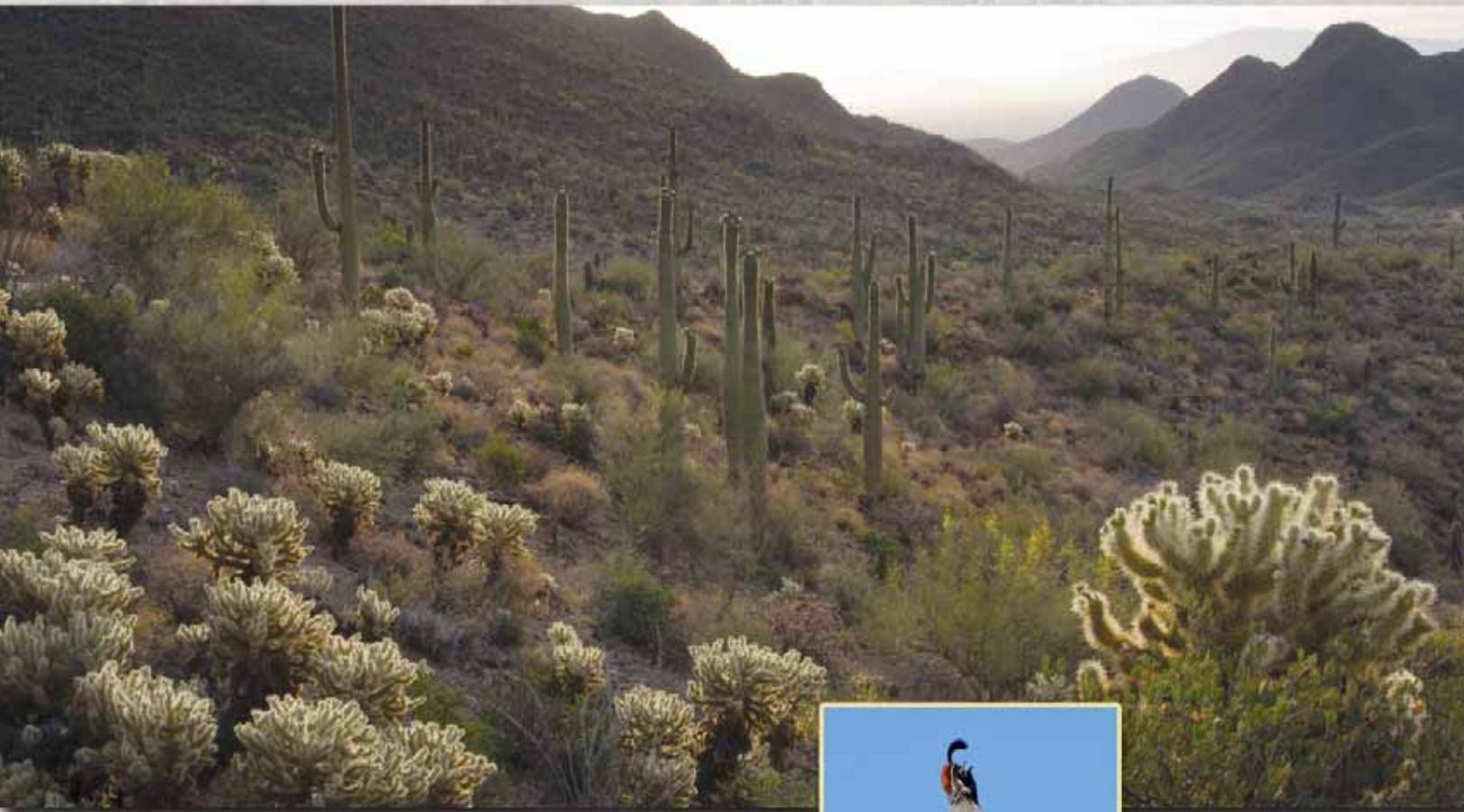


I N T E R N A T I O N A L

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In This Issue

- Managing Cave Wilderness
- Perceptions of Technology, Risk & Rescue
- Attitudes Toward Fire & Wind Disturbances
- India, Nepal



Visitor Attitudes Toward Fire and Wind Disturbances in Wilderness

BY ROBERT G. DVORAK and ERIN D. SMALL

Abstract: This study examines visitor attitudes across the Boundary Waters Canoe Area Wilderness regarding the effects of natural disturbances on visitor planning and wilderness conditions. Visitors were intercepted at entry points and permit distribution locations during 2007. Results suggest that respondents were aware of recent wind and fire disturbances. Few respondents reported that these events had affected trip plans. Evidence of natural disturbances was evaluated as desirable or indifferent conditions in wilderness. Further investigation of these events related to travel patterns and perceptions may help understand their impacts on visitor use and behavior.

Introduction

The Wilderness Act of 1964 (P.L. 88-577) directs that wilderness be managed to preserve natural conditions and processes while providing outstanding opportunities for solitude or primitive and unconfined types of recreation. The act also indicates that wilderness be administered in a manner that will leave areas unimpaired for future use and enjoyment as wilderness. However, a potential conflict of these goals exists with the management or nonmanagement of natural disturbances in wilderness. Although fire and windstorms are natural processes, suppression of naturally ignited fires, the existence of human-caused fires, and wind-fall management practices have changed the forests and the role of disturbance on the landscape. These practices further complicate wilderness management with potential impacts on visitor use, enjoyment, and the relationships individuals have with a wilderness area. Several visitor studies have examined these impacts, such as fire effects on visitation and visitor attitudes (Borrie, McCool, and Whitmore 2006; Knotek et al. 2008), decreased visitor expenditures during and following wildfires (Butry et al. 2001), impacts to recreational demand (Loomis et al. 2001), and changes in how visitors value land once it has burned (Hesseln et al. 2004).



Robert G. Dvorak. Photo by Rob Truax.



Erin D. Small. Photo by Mandy Farrar.

Thus, to meet wilderness mandates, managers must understand their natural disturbance policies and management relative to the potential impacts on visitors. This article examines visitor attitudes toward recent wildfires, fire suppression activities, and the 1999 blowdown windstorm at the Boundary Waters Canoe Area Wilderness (BWCAW) in Minnesota. It addresses how these natural disturbances and events may have influenced visitor perceptions of wilderness character and if trip planning and visitation were affected.

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Figure 1—BWCAW area visited shortly after 2007 Ham Lake Fire. Photo by Erin Small.

Context

The Boundary Waters Canoe Area Wilderness is a 1,098,057-acre (444,557 ha) wilderness located in the Superior National Forest of northern Minnesota. With the passage of the Wilderness Act in 1964, the BWCAW was officially designated as part of the National Wilderness Preservation System and is the largest designated wilderness area east of the Mississippi River. On July 4, 1999, a massive storm hit northern Minnesota. Winds in excess of 90 mph (144 kmph) caused extensive blowdown on nearly a half million acres of the BWCAW, downing an estimated 25 million trees (Lime 2000). Portages were blocked by downed trees, campsites were destroyed, and access became limited. Forest conditions also changed to create a challenging situation where previously used minimal management intervention tactics and tools could no longer adequately deal with potential fire risk. Therefore, management priorities shifted to downed fuel wood reduction, fire prevention education, and staff preparation for wildfire suppression and emergency response.

Because wilderness policy dictates that natural processes rule in these areas, managers of the Superior National Forest have implemented a wildland fire use policy to allow lightning-ignited fires to burn in a manner that duplicates natural conditions as much as possible (U.S. Forest Service 2006). Managers have also prescribed management-ignited fires in certain areas to restore natural conditions

and reduce hazardous fuel wood situations. Within the blowdown area, active suppression and prescribed fire have been used as tools. In 2006, the lightning-ignited Cavity Lake Fire affected more than 32,000 acres (12,955 ha) in the blowdown area and was actively suppressed. In 2007, at the beginning of the data collection of this study, the visitor-ignited 75,000 acre (30,364 ha) Ham Lake Fire burned 20,000 acres (8,097 ha) within the BWCAW despite suppression activities (see figure 1). The fire burned across the Gunflint Trail, a major wilderness access point, and included areas with private homes and outfitters' structures (see figure 2). Closures of roadways, campsites, and entry points were necessary for public safety. Although public safety remains the highest priority in any disturbance, it is important to understand that disturbance management policies affect the landscape and may alter visitor attitudes, experiences, and relationships with the wilderness.

Methods

This study's sampling design was informed by previous BWCAW studies



Figure 2—Areas of regrowth along the Gunflint Trail, BWCAW. Photo by Robert Dvorak.

conducted in 1969 and 1991 (Stankey 1973; Cole et al. 1995; Watson 1995), as well as by current knowledge about recreation use and input from Superior National Forest wilderness staff. This study was a precursor to a qualitative study conducted by Schroeder and Schneider (2010). Data were collected using mail surveys from May 1 to September 30 in 2007. During this peak season, an entry point visitor quota system is in place. Permits issued by group are required for all overnight visitors and day use motor boaters. These permits are specifically allocated to the 74 designated entry points to the BWCAW. To most accurately represent this population, data from 2006 allocated permits were examined, and a total of 76 sampling days were selected and stratified simultaneously across both entry points and months during the peak season, according to the proportion of use.

Sampling occurred at both wilderness entry points and permit distribution locations. Because sampling at all 74 entry points was logistically and practically impossible, on-site locations represented the 17 most used points. These points account for more than 70% of the total use during the peak season. Low use entry points were sampled through the permit distribution locations. This contact method may have been less ideal than on-site contacts, but was deemed more efficient for reaching visitors utilizing low use entry points.

A total of 884 groups were contacted at various entry points and distribution centers. Of these groups, 13 groups refused to provide contact information to receive mail-back questionnaires, resulting in a sample population of 871 total groups (98.5% contact rate). Intercepted groups were asked to complete an interview for the on-site survey portion of the study. This

interview could be conducted either before or after the trip and included questions of basic trip and demographic information (e.g., group size, type, length of stay) and contact information for each group member over 15 years of age. Approximately two weeks after the interview, individuals were mailed a survey packet. Packets included a cover letter describing the study, a questionnaire, and a prepaid envelope to return the questionnaire. A reminder/thank you postcard was sent one week after the first mailing and a replacement questionnaire sent two weeks after the postcard. A total of 613 questionnaires were returned for a 69.2% response rate.

Visitors were asked in the mail survey if they were aware of recent fire and wind disturbances and if these events had an effect on their trip planning. If visitors responded “yes” to the planning question, open-ended questions were asked to understand how their planning was affected. Visitors were also asked the importance of several factors in choosing an area to visit and the desirability of different conditions in a wilderness context. These factors and conditions were evaluated using 3-point and 5-point Likert-type scales, respectively.

Results

Tests for nonresponse bias suggested no significant or practical differences between respondents and nonrespondents. Additionally, to examine the representativeness of the sample, the proportion of returned overnight surveys by month and entry point was calculated and compared to the actual number of visitors by month and entry point from 2007 permit data. Results suggest no mean differences in proportions between the overnight sample and 2007 permit data ($t = .000, p = 1.00$). These proportions were further compared based on the top 17 “high use” sites ($t = .439, p = .661$) and again, no significant mean differences were found.

Awareness and Planning

The majority of respondents were aware of the recent fire and wind disturbances in the BWCAW (see table 1). More than 90% of respondents reported they were aware of the 1999 blowdown storm. This level of awareness was less for both recent prescribed burning activities and recent lightning-ignited fires. Despite these high levels of awareness, only a minority of respondents reported that these events had affected their trip plans in either

Table 1—Awareness of recent BWCAW events and effects on visitor planning.^a

Recent events in the BWCAW	“Yes”
Aware of 1999 storm blowdown	91.9%
Blowdown affected plans to visit BWCAW in past years	21.8%
Blowdown affected plans to visit BWCAW this year	9.2%
Aware of prescribed burning (management-ignited fires) occurring in BWCAW	82.2%
Prescribed burning affected plans to visit BWCAW in past years	4.1%
Prescribed burning affected plans to visit BWCAW this year	2.4%
Aware of lightning-ignited fires that occurred in BWCAW	69.3%
Lightning-ignited fires affected plans to visit BWCAW last year (2006)	8.0%
Lightning-ignited fires affected plans to visit BWCAW this year (2007)	11.1%

^aSample size (n = 427–601) was limited by visitor awareness.

Visitors were generally accepting of the fire and wind disturbances present in the BWCAW.

previous years or on the current trip. The blowdown storm had the greatest impact, affecting more than 20% of respondents on trips in previous years. Relative to fire activity, lightning-ignited fires had the largest effect, 11%, on respondents' current trip. However, it is important to note that the 2007 Ham Lake Fire event, the largest fire event of the season, was human caused and may confound visitor responses. Respondents may not have differentiated this human-caused event from lightning-ignited fires.

For those respondents indicating that the blowdown storm and fires had affected their trip plans, open-ended responses were examined to further understand the effects of these disturbances. Common responses included that the blowdown areas and burn areas were directly avoided. Trips were also rerouted around affected areas, and visitors tended to avoid locations where a campfire ban issued by the Superior National Forest was in effect. Very few individuals who went to the BWCAW in 2007 described altogether cancelling or postponing their trips due to these disturbances. However, it is worth noting that a complete understanding of cancelled or postponed trips is not possible. The study design precluded contacting those individuals who chose not to visit the BWCAW in 2007, and their attitudes are therefore not reflected in the sample.

Factors in Site Choice

Respondents were specifically asked how important the 1999 blowdown

storm, the occurrence of prescribed burning, and the occurrence of lightning-ignited fires were in choosing a specific area to visit on this trip (see table 2). For each of the disturbances, more than 70% of respondents reported that these events were not important factors in choosing an area to visit on their current trip. Only one in 20 respondents felt the events were important factors.

Although these fire and wind disturbances were apparently not important in choosing the area to visit for the visitor's current trip to the BWCAW, it is important to note that many respondents either did not travel or were unsure whether they had traveled through a blowdown or burn area. Only 27% of respondents were sure they had traveled through an area affected by the 1999 blowdown storm. Similarly, only 8% of respondents reported they had traveled through a prescribed burn area, and 10% reported they had traveled through a burn area affected by 2006 lightning-ignited fires.

Wilderness Conditions

Respondents were asked if the occurrence of fire suppression and the use of prescribed burning were something they considered personally desirable in a wilderness setting (see table 3). They were also asked how personally desirable encountering evidence of natural disturbance was in a wilderness set-

ting. The majority of respondents reported that evidence of natural disturbance (e.g., blowdown, flooding), use of prescribed burning, and fire suppression were neutral or desirable occurrences in a general wilderness context. However, approximately 25% of visitors reported that suppression of lightning-ignited fires was an undesirable or very undesirable action in a wilderness setting. Conversely, the use of prescribed burning to reduce risk of uncontrolled or catastrophic wildfires or to restore the natural role of fire to the wilderness landscape was a very desirable action within a wilderness context.

Application

Several important insights into managing fire and wind disturbance impacts can be communicated to wilderness managers from this study. At face value, fire and wind disturbances were not a factor in trip planning for those who went to the BWCAW, despite respondents being very aware of their presence in the BWCAW. This may be the case for several reasons. Previous studies have suggested that directly after a fire, visitors may be more apt to visit burned areas (Englin et al. 2001). Use may actually increase in these areas because individuals are curious about the conditions. Another possible reason for responses is that areas affected by

Table 2—Important factors in choosing area to visit.^a

Factor	Not important	Somewhat important	Very important
1999 Blowdown	76.0%	19.2%	4.9%
Occurrence of prescribed burning	75.0%	19.6%	5.4%
Occurrence of lightning-ignited fires	71.2%	22.9%	5.9%
Natural place, lack of human evidence	9.2%	41.9%	48.9%
Remoteness, solitude	7.0%	36.7%	56.3%
Scenic beauty	3.3%	22.8%	73.9%

^an = 588–603.

Table 3—Desirability of wilderness conditions.^a

Condition	Very undesirable	Undesirable	Neutral	Desirable	Very desirable
Suppress fires that are started by lightning	3.5%	21.8%	42.7%	26.2%	5.8%
Evidence of natural disturbance (e.g., fire, blowdown, flooding)	0.2%	4.0%	55.0%	34.2%	6.6%
Use of prescribed burning to reduce risk of escaped wildfires	0.5%	2.0%	29.7%	55.2%	12.6%
Use of prescribed burning to restore the natural role of fire	0.5%	2.0%	33.3%	51.2%	13.0%

^an = 601–603.

fires and the blowdown storm are not predominantly in high destination areas. Visitors may only pass through these areas to other destinations, and the most desirable campsites/entry points were not severely affected.

Despite these possible explanations, some conflicting information does exist in the study. Although these disturbances were not particularly important to respondents during the planning of their trip, respondents acknowledge that they did not visit or were unsure if they had visited these areas. Additionally, open-ended responses by visitors who reported their plans were affected describe actions that changed their travel patterns. Respondents described avoiding blowdown and burn areas, rerouting trips around affected areas, and avoiding locations covered by campfire bans. These types of actions may not have been considered by respondents when reflecting upon the effects of disturbances on their trip planning. Therefore, it is possible that these disturbance events are having an additional effect on visitor travel patterns in the BWCAW. It is also worth noting again that the sample only reflects those respondents who visited the BWCAW in 2007. The attitudes of individuals who chose not to visit the BWCAW because of these disturbances and impacts were precluded from the sample.

Since the Superior National Forest utilizes travel models to determine quotas for managing wilderness experiences and opportunities for solitude, any new factors influencing these models are important to understand. If, for example, campsites are hard to find or encounters with other groups are higher during times of fire, such information could be applied to travel models and changed during and directly after wildfires. Further examination is necessary to understand these changes in travel patterns related to fire and wind disturbances and whether they are applicable to a larger proportion of visitors. A more in-depth understanding of these factors could assist managers in factoring fire and wind disturbance issues into their travel management plans.

Responses in this study also suggest that visitors were generally accepting of the fire and wind disturbances present in the BWCAW. More specifically, respondents perceived management actions such as fire suppression and prescribed burning as desirable actions in wilderness settings if the reasons were to reduce risk or restore the natural role of fire to the landscape. These actions along with the evidence of natural disturbance on the landscape were considered desirable occurrences in a wilderness context. In an effort to increase public understanding of fire

and wood fuels management, managers may need to continue to provide information regarding the role these disturbances play in management and how they offer humans insight into natural forest processes.

As further insight is gained into visitor attitudes and opinions regarding the management of forest resources in wilderness, it will remain important to posit management strategies and actions within the public attitudes and relationships associated with the wilderness. Thus, management actions that target fire and wind disturbances in these areas (e.g., fire bans, road closures) might require further explanation to prevent visitors from avoiding these areas or dramatically changing their behavior beyond the desired intent of these management actions. Although managers may default to fully describing all conditions and actions to visitors, they must balance this desire with allowing visitors to seek the unknown in wilderness. This may be achieved by encouraging visitors to gain an appreciation and interest in the unique experiences these disturbance areas can offer them during their visit. Otherwise, there is potential for these areas to be perceived as ongoing detractions to visitation.

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Continued on page 36

development by fostering an understanding of how Connect can be used for future job-related problem solving once the course or training has concluded.

Continued Evolution

Although this article has focused on the early positive outcomes Connect is having, the network is still in a tenuous evolutionary phase according to group/member development theories. One frequently cited theory of group development suggests that groups go through four stages—forming (hesitant participation, acclimatization), storming (conflict, role definition), norming (rule definition, cooperation), performing (progress, stabilization) (Tuckman 1965). Similarly, members themselves go through four somewhat similar stages—being online, doing online, acting online, thinking online (DiMauro 2010)—that characterize increasing member engagement in a community. In both of these models, the rate of group or community failure and member attrition are greatest during the first two stages.

Connect's main successes lie in facilitating informal information exchanges among workers with common problems.

Connect has not progressed beyond the forming stage, with most members either being or doing online only, but with few acting or thinking online. So although membership numbers are high and sign-ups continue at a steady pace, participating members represent a significantly smaller portion of overall members, and the initial results of an online survey of Connect members reveals that almost 75% of respondents log on to Connect no more often than once a month. As such, increasing the number of members who participate frequently and meaningfully to ensure quality content and continued relevance remains an elusive goal. Additionally, one of the objectives of the recent online Connect

member survey is to understand what type of oversight or involvement in community evolution members want to have, a step that will perhaps move the community into the storming stage where clearer member roles and responsibilities can be explored.

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Continued from VISITOR ATTITUDES, page 31

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