

# Badly Burned? Effects of an Escaped Prescribed Burn on Social Acceptability of Wildland Fuels Treatments

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ABSTRACT

In Sept. 2003, a prescribed burn on the Uinta National Forest escaped, costing nearly \$3 million to extinguish while choking Utah cities with smoke for a week. When the incident drew harsh criticism from local officials and news media, fire managers worried that prescribed burning no longer would be feasible in northern Utah. Subsequently, we surveyed residents of three affected counties, including respondents to a 2001 survey, about acceptability of fuels management practices. Results suggest prescribed fire remains an acceptable tool for some situations but citizens doubt agencies' ability to use it effectively, especially near populated areas.

**Keywords:** fuels, prescribed fire, social acceptability

Fears about wildfire risk and forest health have greatly increased public and political interest in efforts to reduce hazardous fuel loads on public lands. When President Bush's initial FY 2005 budget called for fuels reduction projects on 4 million acres—300,000 more than in FY 2004—some lawmakers immediately complained that it was not enough (SAF 2004). Such statements exemplify a longstanding tendency for US wildland fire policy to reflect public concern as much as scientific judgment. The original Forest Service policy of immediate suppression was greatly influenced by the extensive wildfires in 1910 (Pyne 1997), while more recently a National Park Service "wildland fire use" policy was modified due to public outcry over the 1988 Yellowstone fires, even though the ecological benefits of those fires became known quickly (Lichtman 1998).

While there is widespread agreement

that wildland fuel loads should be reduced, there is less consensus about how to do so. While some forest thinning projects have gained broad local support (Farnsworth et al. 2003, Little 2003), some vocal environmental activists have been suspicious of thinning, partly because prescribed fire more closely mimics natural disturbance patterns, but also because they tend to distrust federal agencies that they accuse of using fuels reduction as an excuse for logging (Shouse 2002, Ring 2003). Others are equally suspicious of prescribed fire, which they describe as wasteful and unnecessarily dangerous, especially after more than 200 homes burned in Los Alamos, NM, when a prescribed burn blew out of control (Holloway 2000, Nelson 2002). Similar debates rage over the use of livestock grazing as a tool for vegetation manipulation in fire-prone areas (Wuerthner 2002).

Such disagreements are noteworthy be-

cause federal land management requires attention to the social acceptability of management practices and of resulting conditions of forests and rangelands (Thomas 1996, Shindler et al. 2002). Practices that do not enjoy public support are unlikely to be widely implemented, regardless of their effectiveness in reducing fuels. For that reason, a number of studies have been conducted in recent years to better understand citizens' perceptions of wildland fuels management (e.g., Loomis et al. 2001, Winter et al. 2002, Brunson and Shindler 2004). These studies generally have found public support for mechanical treatments as well as prescribed fire, although the latter tends not to be acceptable for all locations, and judgment patterns have been found to differ in different regions of the United States.

One potential influence on judgments about the acceptability of prescribed fire as a fuels management tool is adverse publicity surrounding burns that go beyond the original prescription. The Cerro Grande fire near Los Alamos in 2000 is perhaps the best-known event of this kind. A more recent example occurred in the Uinta National Forest not far from Salt Lake City and Provo, UT. On Sept. 23, 2003, fire managers lost control of a prescribed burn intended to treat 600 ac of Gambel oak (*Quercus gambelii*) woodland, resulting in a 7,828-ac wildfire that sent smoke into parts of the Wasatch Front metropolitan area for a week.

Coming at the end of a busy wildfire season, near a rapidly growing metropolitan area where air quality is a major concern, the incident drew intense criticism from local government officials and the news media, as exemplified by this *Salt Lake Tribune* editorial on Sept. 30, 2003:

“When smoke from a fire intentionally set by the U.S. Forest Service is stinging your eyes and clogging your lungs, you don’t want to hear the Forest Service insisting that it did everything right. You want to hear an apology. . . . In the fifth year of a drought, the West’s forests are exceptionally dry. Utahns have been ordered not to start campfires and not to smoke in the tinder-dry mountains. So it seems reasonable to ask why the Forest Service would think this a good time for a prescribed burn.”

Coincidentally, the Utah chapter of the Society of American Foresters held a fuels management field tour on the adjacent Wasatch-Cache National Forest in early Oct. In discussions during that event, Forest Service officials expressed concern that the Uinta National Forest wildfire, called Cascade II because of its proximity to the popular Cascade Springs recreation site, had made it very difficult for fire managers on either forest to use prescribed fire for fuels reduction. Based on what is known about social acceptability of forest management in general, this concern seemed well placed. It appeared likely that the Cascade II fire had damaged public trust, and research has shown that social acceptability judgments of natural resource management practices are heavily influenced by citizens’ trust in the organization implementing the practice (Shindler et al. 2002, Shindler and Toman 2003). Accordingly, we initiated a study of social acceptability regarding prescribed fire and other aspects of wildland fuels management in northern Utah, focusing on an assessment of the effects of the Cascade II incident.

## Methods

To measure citizens’ views about fuels management practices, as well as their knowledge of wildfire and fuels issues, we mailed surveys to residents of three counties. Salt Lake and Utah counties are the state’s most populous, with an estimated combined 2002 population of 1.32 million, roughly 57% of all Utah residents. Smoke from Cascade II was thick enough that the Utah Division of Air Quality issued a health advisory for the Utah and Salt Lake valleys, so that youth soccer games were canceled and

school authorities kept elementary students inside during recess. Wasatch County, immediately east of Utah Valley where Cascade II actually burned, is much smaller at 17,000 people (2002 Census Bureau estimate). With a population growth rate more than twice that of the state as a whole, it is shifting from a rural to a suburban area with much of the growth occurring in subdivisions at the wildland-urban interface. Wasatch County also was the site of a 1990 wildfire that killed two firefighters and destroyed 18 summer homes, a circumstance that seemed likely to exacerbate negative public reactions to the Cascade II incident.

Because Wasatch County has a much smaller population than the metropolitan counties, a stratified random sampling approach was used. Residents’ names were obtained from a private market research firm. Four-page surveys were mailed to 200 homes in Wasatch County and 500 in Salt Lake and Utah counties combined. We also mailed surveys to 113 Salt Lake and Utah County residents who had been surveyed in 2001 for an earlier study of social acceptability of fuels treatments (Brunson and Shindler 2004). Most questions were identical to those in the 2001 survey, so by comparing responses from members of this “longitudinal sample”—i.e., a group of persons whose views are measured over time—we could assess changes in responses that might reflect the influence of Cascade II on acceptability.

Surveys and cover letters were mailed in mid-Nov. 2003, followed 10 days later by a reminder/thank you postcard. For those households that had not responded by Jan. 1, 2004, a second survey and cover letter were mailed in early Jan. In Wasatch County, 19 surveys were not delivered because of address problems or because addressees had moved, and 90 of the 181 deliverable surveys were returned for a response rate of 50%. The metropolitan sample yielded a response rate of only 26%, with 117 responses from 454 delivered surveys.

Tests for nonresponse bias could not be completed due to financial constraints. We know that response rates for natural resource surveys have declined over time and tend to be lower when questions are complex or not salient to some respondents (Connelly et al. 2003). Surveys about wildland fuels address a relatively arcane topic and require some prior knowledge about natural resource issues. If low salience is also a factor in the metropolitan response rate, this may indi-

cate that smoke was less of an issue to average Salt Lake and Utah County residents than to public officials. At any rate, the respondents who took time to complete the survey are likely to be those to whom the issue is most salient. Those are also the persons most likely to take part in National Environmental Policy Act of 1969 (NEPA) processes for fuels management or to protest management actions they find unacceptable.

Of the 113 surveys mailed to people who had responded to the 2001 survey, 7 were undeliverable and 63 were returned, a 59% response rate. Because the longitudinal sample was small, we compared their responses to the larger metropolitan sample using  $\chi^2$  tests for categorical data and *t* tests for continuous data. We found no significant differences. Therefore, we are confident that the results of comparing 2001 and 2003 responses can be generalized to urban and suburban Utah residents generally.

## Results

Studies of public perceptions of natural resource management often find that segments of the public are entirely unaware of the issues, no matter how controversial, but that was not true in this case: 98% of Wasatch County respondents and 95% of those in both the longitudinal and metropolitan samples had heard about Cascade II. Moreover, most respondents indicated that the fire had influenced how they feel about the use of prescribed fire (Table 1). Nearly half said that the incident had made them feel more negative about the use of prescribed fire, and a majority—including 85% of respondents from Wasatch County—said it made them more skeptical about the ability of land managers to effectively use prescribed fire as a tool.

Table 2 presents results of the basic acceptability measure. Respondents were given a brief description of two treatment methods, prescribed fire and mechanical vegetation removal, then shown a set of statements about each treatment and asked which best represented their opinion. They could also indicate they had no opinion. For prescribed fire, 26–35% offered unconditional support, while about half of the respondents in each sample judged it acceptable only in certain situations. Mechanical treatment received unqualified acceptance from a higher percentage of respondents; however, the percentage of respondents who offer at least conditional acceptance is roughly the same (about 80%) for each

**Table 1. Reported influence of the Cascade II fire on perceptions of prescribed fire use.**

	Wasatch	Metropolitan	Longitudinal
Did Cascade II influence feelings about prescribed fire?			
Yes	75%	66%	68%
No	25%	34%	32%
How did it influence feelings? <sup>a</sup>			
Felt more negative about prescribed fire	46%	42%	47%
Felt more positive about prescribed fire	5%	14%	16%
Want to learn more about prescribed fire	23%	30%	37%
Feel more skeptical about agencies' ability to use it <sup>b</sup>	85%	62%	51%

<sup>a</sup> Respondents could choose more than one response.

<sup>b</sup> Significant difference between samples ( $\chi^2 = 18.0, P < 0.05$ ).

**Table 2. Acceptability judgments for two approaches to fuels management.**

Longitudinal	Wasatch	Metropolitan	2001	2003
Prescribed fire				
Use wherever managers see fit	35%	30%	33%	26%
Use only infrequently in selected areas	45%	52%	53%	57%
Do not use due to negative impacts	12%	6%	2%	7%
Do not use—unnecessary	2%	1%	2%	3%
No opinion	6%	12%	10%	8%
Mechanical vegetation removal				
Use wherever managers see fit	42%	44%	48%	37%
Use only infrequently in selected areas	39%	34%	32%	44%
Do not use due to negative impacts	7%	9%	0%	5%
Do not use—unnecessary	2%	2%	3%	3%
No opinion	11%	12%	17%	11%

treatment. There were no significant differences between samples in acceptability judgments.

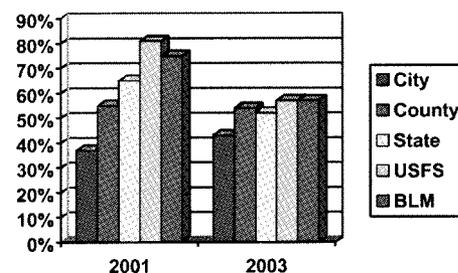
A separate question asked respondents to choose between prescribed fire and mechanical treatment for managing wildland fuels, assuming each was appropriate from a management standpoint. Basically the result was a toss-up: Prescribed fire was the preferred choice of 33% of Wasatch residents, 29% of the metropolitan sample, and 28% of the longitudinal sample, while mechanical treatment was the preferred choice of 30% of the Wasatch sample and 35% of the other two samples. The remainder of respondents indicated they were neutral on the subject or didn't know. There were no significant differences between samples.

Despite the large number of respondents who indicated that the Cascade II fire had negatively influenced their opinions about the use of prescribed fire, this effect was not detectable using the basic acceptability item. Table 2 also shows a comparison of responses to the 2001 and 2003 surveys. While the data show a slight shift from unconditional to conditional support for prescribed fire, the difference in frequency

distribution is not statistically significant. Further examination of the data showed that about one-third of respondents gave a different answer in 2001 than in 2003, with nearly as many people shifting from conditional to unconditional acceptance as the other way around.

In contrast to the acceptability data, comparison of responses to items about trust in agencies did show significant differences for two federal agencies. When asked to indicate the level of trust in various agencies "to make good decisions about wildfires and fire prevention," respondents were significantly less likely to indicate "moderate" or "full" trust in the Forest Service ( $\chi^2 = 22.6, P < 0.01$ ) or Bureau of Land Management ( $\chi^2 = 19.5, P < 0.01$ ), although trust in city, county, and state officials was unchanged (Fig. 1). Trust levels for both federal agencies were significantly lower in Wasatch County than among respondents from the metropolitan or longitudinal samples (Forest Service,  $\chi^2 = 23.2, P < 0.01$ ; Bureau of Land Management,  $\chi^2 = 18.0, P = 0.02$ ).

Other differences in responses between 2001 and 2003 were primarily related to



**Figure 1. Percentage of respondents indicating "moderate" or "full" trust in officials of different agencies to make good decisions about wildfire and fire prevention, 2001 and 2003.**

smoke. In 2001, a question measuring levels of concern about potential impacts of prescribed fire found that the greatest sources of concern were deteriorated public water supply, private property damage, and risk to human safety, as measured by the percentage of respondents indicating each was of "moderate" or "great" concern (Table 3). In 2003, increased smoke levels were of greatest concern. Although concern about most factors increased slightly, the only statistically significant differences were about smoke and economic loss of burned timber.

A separate survey item listed a series of statements about smoke from prescribed fires and asked respondents to check any statement that applied to them (Table 4). Slightly more than half of each sample checked statements that expressed concern about the effects of smoke on public health. However, roughly one-third indicated that smoke from prescribed fires is a necessary inconvenience, and another 12–23% indicated that smoke has never been an issue, even after the Cascade II fire. Relatively few respondents indicated agreement with a statement that "because of the smoke, prescribed fire isn't worth it." There were no significant differences in responses to these items within samples, but there were two significant differences between 2001 and 2003 responses among the longitudinal sample: Respondents were more likely after Cascade II to indicate that they are concerned about health impacts of smoke and less likely to indicate that smoke is managed acceptably.

Finally, respondents were asked their levels of concern about whether a prescribed fire would reach their property or a place they care about. For all three samples, respondents were likely to register "moderate" concern as soon as they could see smoke, and "great" concern when the fire was within 1

**Table 3. Longitudinal comparison of the percentage of respondents expressing “great” or “moderate” concern about potential impacts of prescribed fire.**

Source of concern	2001	2003
Deteriorated public water supply	53%	61%
Damage to private property	53%	62%
Risk to human safety	53%	62%
Loss of fish/wildlife habitat	52%	59%
Increased levels of smoke	50%	71% <sup>a</sup>
Reduced scenic quality	49%	57%
Effects on recreation uses	45%	51%
Economic loss of usable timber	32%	51% <sup>b</sup>

<sup>a</sup> Significant difference between years ( $\chi^2 = 9.4, P = 0.02$ ).

<sup>b</sup> Significant difference between years ( $\chi^2 = 9.2, P = 0.03$ ).

**Table 4. Percentage of respondents indicating they have concerns about smoke from prescribed fires.**

Longitudinal	Wasatch	Metropolitan	2001	2003
Smoke has never been an issue for me	12% <sup>a</sup>	23%	21%	17%
Smoke is a necessary inconvenience	35%	33%	44%	34%
Smoke is a concern, but it is managed acceptably	26%	27%	41%	26% <sup>b</sup>
I worry about effects of smoke on public health	54%	51%	39%	54% <sup>c</sup>
I worry about effects of smoke on travel safety	31%	18%	25%	24%
Because of smoke, prescribed fire isn't worth it	15%	11%	12%	13%

<sup>a</sup> Responses total more than 100% because respondents could indicate agreement with any of the statements.

<sup>b</sup> Significant difference between years ( $\chi^2 = 4.8, P = 0.03$ ).

<sup>c</sup> Significant difference between years ( $\chi^2 = 4.0, P = 0.05$ ).

mile. The percentage of respondents who expressed “great” concern when the fire is within 10 miles rose from 19 to 44% between 2001 and 2003 ( $\chi^2 = 14.5, P < 0.01$ ), suggesting that after Cascade II respondents have changed their perceptions about the potential for a prescribed fire accident.

## Discussion and Conclusions

Forest managers who are choosing among alternative fuels management approaches are understandably wary of employing practices that are opposed by adjoining landowners. Public land managers in particular must consider the acceptability of all practices and policies. Because the effects of prescribed fire can reach well beyond administrative boundaries, it is important to understand how unplanned events influence social acceptability. Our findings suggest that events like the Cascade II wildfire do influence public perceptions of wildfire and fuels management, but the effects may be less drastic and more complex than predicted.

The escaped prescribed burn at Cascade Springs prompted considerable public outcry at the time, including criticism from news media and local government officials.

Yet as little as 2 months after the fire ignited, citizens' responses to the incident were more measured than would be expected based on media reports or agency contacts with displeased stakeholders. Although a large majority of respondents said Cascade II had influenced their opinions about prescribed fire—mainly by making them feel more negative toward the practice and by reducing trust in persons who employ the practice—comparison of 2001 and 2003 results found no statistically significant difference in the overall acceptability of prescribed fire or mechanical treatment. Moreover, if asked to choose between prescribed fire and mechanical removal, respondents were equally likely to select either option. So one might wonder: How do these results fit with respondents' self-appraisals that their views about prescribed fire have changed?

The lack of difference in acceptability ratings simply reflects the fact that citizens tended to offer conditional acceptance of prescribed fire before Cascade II and continued to do so afterward. What changed was public awareness of factors that can affect the acceptability of prescribed fire, and thus the conditions under which its use may be judged acceptable. Citizens in the study area have gained greater awareness of the poten-

tial for smoke from prescribed fires to have impacts on populated areas, including impacts that can negatively affect public health as well as those that are merely a temporary nuisance. They also have been made more aware of the potential for prescribed burns to go beyond prescription, and this awareness is reflected in their greater levels of concern about fires within 10 miles of home.

Perhaps most importantly, Utah residents have been reminded that fire managers are fallible. They are significantly less likely to believe that federal land managers can use prescribed fire effectively, or that they can minimize the negative effects of smoke. This change in belief was greatest in more rural Wasatch County, possibly reflecting a tendency for rural citizens to have less trust of federal officials generally, or perhaps indicating that wildfire is a more salient issue in a rural county—especially one where wildland firefighters were killed just 13 years earlier.

Because trust is a critical factor in determining social acceptability of forest and range management practices (Shindler et al. 2002), this loss of confidence is a particularly important factor for managers who are contemplating the potential impacts of an unplanned event in the use of prescribed fire. For public forest managers in northern Utah, and indeed anywhere where such an event occurs, the challenge is to begin to restore that confidence.

We believe the way to regain that trust is not to avoid use of prescribed fire altogether, but instead to take advantage of the continued conditional acceptance that prescribed fire enjoys with the public. Controlled burning should remain part of the fuels management toolkit in northern Utah, but for the moment should be employed in places where smoke or an escaped burn are unlikely to affect communities, and where a temporary loss of scenic quality or recreation opportunity is likely to affect fewer visitors. Rather than trying to minimize potential adverse publicity by quietly resuming a burning program, it will be necessary to gain enough publicity that successes can become more widely known, just as the failures already have been. Trust, while negatively affected, remains high enough in Utah that prior levels may be restored with judicious use of fire over the next few years.

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