

# Public Perceptions and Tolerance of Smoke from Wildland Fire

Jarod Blades

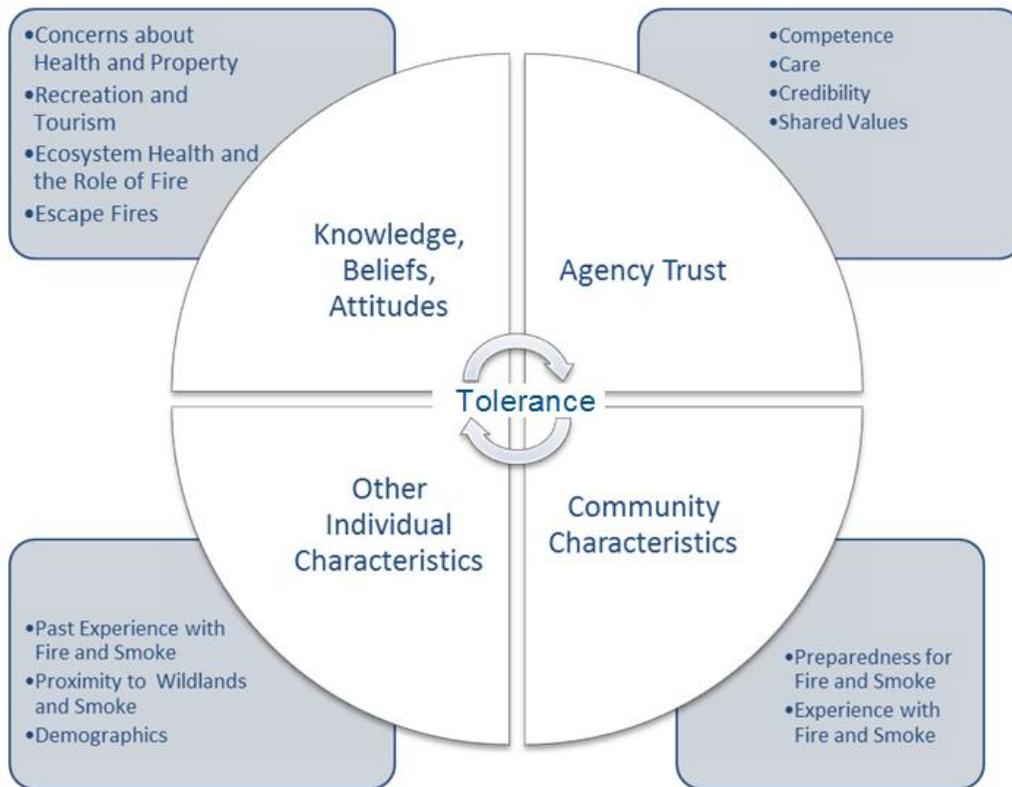
Troy Hall

Sarah McCaffrey

## Introduction

Land managers and officials need to understand the diverse public opinions toward smoke from wildland fires; however, a very limited amount of research has been conducted on this topic. Hence, land and fire managers are largely uncertain about society's willingness to tolerate smoke in the short-term for long-term benefits, and they need effective ways to describe the likely smoke outcomes of alternative fire management programs (e.g., prescribed burning treatments vs. suppression) and why these programs serve the public interest (Potter et al., 2007). Information about values, attitudes, and beliefs can be used to inform land management decisions and tailor public communication strategies that better align with local and regional perspectives. Additionally, there has been a recent call from the fire management community to improve the scientific understanding of how people value personal health and ecosystem health, notably where fire, climate change and increasing populations are interconnecting (Riebau & Fox, 2010). This chapter provides a brief overview of the research that has been conducted to date on public perceptions of smoke.

It is difficult to disentangle public perceptions and tolerance of smoke from tolerance of wildland fire – the source of the smoke. This chapter reviews the limited literature exploring the complex factors that influence public tolerance of smoke (Figure 1); many of the cited sources come from studies focused primarily on wildland fire, where smoke was a smaller and secondary focus. This review will address the following: 1) public knowledge, beliefs, and attitudes about smoke from wildland fires; 2) agency trust and advanced warning; and 3) selected individual and community characteristics (e.g., past experience with smoke, preparedness, and sociodemographic characteristics).



**Figure 1.** A framework for public tolerance of smoke from wildland fires.

### **Public Knowledge, Beliefs, and Attitudes about Smoke from Wildland Fire**

Different levels of knowledge, beliefs, and understanding of current fire and smoke issues can influence public smoke tolerance and support for fire management. Higher tolerance has been found to be associated with knowledge about the necessity of the action involving smoke, the positive effects of wildland fire (e.g., improving forest health, reducing wildfire risk, and improving wildlife habitat), and steps agencies have taken to minimize smoke impacts on communities (Blades & Hall, 2012; Jacobson et al., 2001; Ryan & Wamsley, 2008; Shindler & Toman, 2003; Winter et al., 2004, 2006). However, greater knowledge does not always lead to higher tolerance because other factors may be more important, as explored below.

### **Concerns about Personal Health and Property**

Smoke from wildland fires can impact community residents in a variety of ways, through health effects, ash deposition (soiling of materials), public nuisance, impaired visibility, and economic

impacts (see Chapter 3). For most people, smoke from wildland fires does not have a noticeable impact on health; however, certain segments of the population and people at greater risk of exposure to smoke (e.g., WUI residents, outdoor enthusiasts, firefighters) are more vulnerable to health risks (Fowler, 2003). Individuals, households, and communities that have existing health problems are more aware of smoke health impacts and are typically less tolerant of smoke from wildland fires.

**KEY POINT:** A small percentage of the U.S. population considers smoke from wildland fires to be a serious issue. However, these individuals often have an existing health condition and can be the most vocal about health concerns – which can affect current and future management activities.

Fears about human safety and apprehension about increased levels of smoke can be a primary concern surrounding wildland fire (Brunson & Shindler, 2004; Kneeshaw et al., 2004); however, general population surveys show that the majority of residents do not consider smoke to be a serious issue (Blades & Hall, 2012; Brunson & Evans, 2005; Jacobson et al., 2001; Loomis et al., 2001; McCaffrey et al., 2008; McCaffrey & Olsen, 2012; Ryan & Wamsley, 2008).

Nevertheless, smoke from wildland fires is highly salient for people with existing health issues (e.g., asthma), which has been shown to be approximately 30% of households (McCaffrey and Olsen 2012, ). These individuals are often more vocal about concerns, although some people with health issues have accepted smoke as a reality of where they live (Weisshaupt et al., 2005). Given rising asthma rates and an aging U.S. population, the issue of health impacts from wildland fire smoke will be an increasing concern.

### **Concerns about Recreation and Tourism**

People travel to National Forests and protected areas to enjoy solitude and scenery – both of which can be impacted by fire and smoke. The wildfire season often coincides with the peak tourism and recreation season, increasing the likelihood of smoke impacts to

**KEY POINT:** Community concerns about the impacts of smoke on recreation, tourism, and outdoor activities can be greater than other concerns.

outdoor-related businesses. Smoke is sometimes perceived as a negative impact to aesthetic quality and recreation, and can result in substantial revenue losses if visitation declines (Brunson & Shindler, 2004; Ross, 1988; Sandberg et al. 2002; Thapa et al. 2004; Winter et al. 2002).

Recent research in the U.S. northern Rocky Mountains has found that the public perceives the

likelihood of smoke impacts on outdoor recreation, scenery, and school recess to be greater than the likelihood of impacts to personal health and people from rural areas are more concerned about such impacts than people from urban areas (Blades & Hall, 2012). Given that many rural communities, notably in the western U.S., are shifting from commodity to amenity based-economies (Winkler et al. 2007), impacts to recreation, tourism, or other amenity-based lifestyles are an increasing concern.

**KEY POINT:** The public is more tolerant of smoke when there is an accurate understanding of the positive effects of wildland fire, such as improving forest health and wildlife habitat.

### **Ecosystem Health and the Role of Fire**

Many people value natural landscapes and agree that ecosystem health is important. However, there are divergent opinions about what defines a healthy ecosystem, the appropriate role of fire, and whether smoke is an inevitable natural consequence of living near wildlands. For some people, concerns about prescribed fire impacts on fish and wildlife are higher than concerns about health effects of smoke or the cost of conducting the treatment (Bowker et al. 2008; Jacobson, et al., 2001). Reinforcing and improving public understanding about the role of fire in improving ecosystem health and reducing community wildfire risk should be a focal point of public communication aimed at increasing public tolerance of smoke.

### **Public Trust in Land Management Agencies**

Trust has long been established as an important component of public land management. In any aspect of life, trust is difficult to establish, easy to lose, and very hard to regain. Expectations for land managers are higher now than in the past because fire and smoke management have more direct impacts on citizens living in rural WUI communities, largely due to population growth and greater opportunities for people to experience wildland fire effects.

Public acceptance of fuel treatments that involve smoke is often related to the degree to which people trust the implementing agencies (Vogt et al. 2003). Several dimensions of trust related to land management and fire have emerged as being most salient to the public, notably competence, credibility, care, and shared values (Absher et al. 2009; Winter et al., 2004, 2006). Care and credibility are established by agency efforts to communicate with the public about current and

future agency actions, especially regarding the risks associated with wildland fire and smoke. Proving the public with *advanced warning* about smoke provides an opportunity for citizens to ask questions early, conduct personal and community preparations, and maintain relationships with fire management professionals (see section 11.2, Local Situational Analysis). Advanced warning was identified in one regional study as the most important aspect of public tolerance of smoke from wildland fire (Blades et al. 2012). Further, a personal phone call from an agency representative that provided advanced warning about potential smoke impacts was considered much more preferable to a radio, television, or newspaper public service announcement. Credibility and competency increase public trust and acceptance of forest treatment activities, resulting in a belief that the agency is able to manage the burn safely (Winter et al., 2002). Social trust is enhanced when people perceive that they share similar goals, thoughts, values, and opinions with the agency (Absher, et al., 2009; Winter, et al., 2004). Feelings of involvement, ownership, and shared responsibility have also been found to be key components of trust (Blanchard & Ryan, 2007).

### **The Controllability of Fire and Escaped Fires**

As stated at the beginning of this chapter, it is often difficult to separate perceptions of smoke from perceptions of fire – where beliefs about wildland fire are intertwined with beliefs about the resulting smoke. Public support for wildland fire and smoke management is often dependent on whether people believe that the fire and smoke can be effectively *controlled* – either during a fire event or when using fuels treatments to modify future fire behavior. Does the public believe that prescribed burning will reduce the likelihood of an extreme wildfire (very unhealthy, dense smoke) and reduce future risks to ecosystems and/or human health and property? People from various parts of the U.S. have been found willing to trade-off the negative aspects of smoke from prescribed fires conducted now for the future benefits of less smoke and reduced threat of extreme wildfires (Blades & Hall, 2012; Weisshaupt et al., 2005; Winter et al., 2006). Overall, people are more tolerant of smoke from prescribed fires if they believe that it ensures greater control over present or future fires, benefits the ecosystem, and reduces the risks to personal health and property.

On the other hand, sometimes the threat of an escaped fire and widespread smoke is perceived as being greater than the potential benefits of burning. Stated another way, the cure is perceived to be worse than the disease. People who have concerns about the possibility of a prescribed fire escaping have a lower tolerance for its use (Absher, et al., 2009; Blanchard & Ryan, 2007; Brunson & Evans, 2005; Fried et al. 2006; Weisshaupt, et al., 2005;).

To address public concerns, it is important to communicate all the trade-offs associated with fuel treatments clearly because vague or incomplete discussion of smoke risks could jeopardize public trust and support. Face-to-face personal contact helps to promote trust. Shindler (2004) recommends that communications should clearly reflect land managers' understanding of public concerns and reflect a public-management relationship commitment over the long-term. Building and maintaining trust between land managers and public stakeholders is not a new concept; however, a stronger focus on advanced warning and personal communications about potential smoke impacts and smoke mitigation strategies could enhance public trust surrounding smoke management.

**KEY POINTS:** Trust has long been established as an important factor of effective land and fire management, and the same holds true for smoke management. **Advanced warning** about potential smoke impacts is one of the most important aspects of public tolerance of smoke from wildland fires.

People are often willing to trade-off the negative short-term consequences of smoke from prescribed fires if they **believe that it could reduce the threat of extreme wildfire and smoke events in the future, and trust that the likelihood of an escaped fire is low.**

## **Other Individual and Community Characteristics Related to Tolerance of Wildland Fire Smoke**

### **Past Experience with Fire and Smoke**

The past experiences of an individual, community, and region with wildland fire and smoke have been suggested as driving differences in support for prescribed fire practices (Loomis, et al., 2001), and the same is likely true for tolerance of smoke. Individuals or communities with more

wildland fire experience and those individuals who have worked in natural resource-related fields are more accepting of fuel treatments (Blanchard & Ryan, 2007; McCaffrey, 2002; ; Winter et al., 2006). Moreover, people who have experienced recent and severe wildfire smoke may believe that prescribed burning is an effective technique for reducing wildfire and smoke risks (Weisshaupt et al., 2005). On the other hand, less personal experience with wildland fire and smoke has been linked to beliefs about negative outcomes of prescribed fire, such as escaped fires, and lower support for forest treatments (McCaffrey, 2002; Winter et al., 2006). This is an important consideration because the lack of wildland fire could actually increase the risk of severe wildfire and smoke in the future, as well as the need for treatment. Therefore, understanding the type of individual and community past experiences with wildland fire and smoke (e.g., good or bad experience, short- or long-term impacts) is important to understanding public tolerance of smoke and support for management actions involving smoke.

### **Community Type and Proximity to Wildlands**

How does the location of a person's home (e.g., urban, suburban, exurban, or rural) and proximity to wildlands influence perception and tolerance of smoke from wildland fires? A public preference for lower-risk treatments (i.e., mechanical thinning) near developed areas and perceived higher-risk treatments (i.e., prescribed fire) in remote rural areas has been documented in some instances (e.g., Bright & Newman, 2006; Weisshaupt et al., 2005). Recent research in the northern U.S. Rocky Mountains found that residents of both rural and urban communities understood the benefits of prescribed fire, trusted management agencies, were somewhat tolerant of smoke from wildland fires, and supported prescribed fire management activities; however, rural communities were significantly lower in all of these categories than urban communities (Blades & Hall, 2012). It is not surprising to find a difference between urban and rural residents, but it is encouraging that their beliefs and attitudes generally trend in the same direction, and that a consistent communication strategy could be effective regardless of location and proximity to wildlands.

## Community Preparedness for Fire and Smoke

There are important relationships among space, community, and culture that define a WUI community and its level of preparedness for wildland fire and smoke (e.g., Bowker et al., 2008; Jakes et al., 1998,

**KEY POINT:** The *amount* and *type* of **past experience** with fire and smoke can influence beliefs and attitudes about fire management and smoke.

2007; Lee, 1991; Paveglio et al., 2009). Does a community's level of preparedness for fire (e.g., completed and following through with a Community Wildfire Protection Plan, coordination between structural and wildland firefighters, or formation of a WUI committee) result in differing levels of tolerance for smoke from wildland fires? Recent research (Blades & Hall, 2012) has shown that communities that are more prepared for wildland fire are significantly more tolerant of smoke than less-prepared communities, and more supportive of fuels management involving smoke (i.e., prescribed fire and wildfire use). This is likely related to the positive association, discussed earlier, between knowledge levels and support for prescribed fire.

## Sociodemographic Characteristics

Demographic characteristics have rarely been documented as having a strong relationship to the public level of support for fire management activities or policies (e.g., Absher et al., 2009; Blades & Hall, 2012; Fried et al., 2006; McCaffrey and Olsen 2012; Shindler & Toman, 2003). This is not altogether surprising in that issues of smoke and fire are often complex and impacted by geographic, social, and other contextual factors, as this chapter has established. Nevertheless, some studies have indicated that women (notably African-American and Hispanic) are more concerned than men about the environment in general, and certainly more concerned about the potential adverse effects of prescribed fire and smoke (e.g., Bowker et al., 2008; Lim et al., 2009; Ryan & Wamsley, 2008)

## Summary and Conclusions

This chapter has focused on the complex factors that influence public perceptions and tolerance of smoke from wildland fires. The studies reviewed here suggest that public perceptions and tolerance of smoke may be similar at regional levels for some aspects (e.g., support for the use of

prescribed fire, awareness of prescribed fire benefits, general tolerance of smoke from wildland fires, moderate trust of public land and fire managers), but also vary significantly among different types of communities and individuals. Often public communication materials are developed for a homogenous audience, yet these studies are a useful reminder of the variability that exists within communities and regions, and that locally tailored messages may be more effective for achieving stronger public tolerance or acceptance of smoke from wildland fire management. In summary, wildland fire smoke management programs and plans should take into account some key points about public perceptions and tolerance of smoke:

1. **Public beliefs and attitudes about the benefits or detriments of wildland fire directly influence tolerance of smoke** — The strength of different beliefs and attitudes about the consequences of fire and smoke influence tolerance of smoke and support for management strategies that produce smoke. Public concern about health impacts appears to be the main issue for wildland fire smoke. However, where concerns are present they can be substantial, to date this appears to be a concern for around one-third of households. Health issues related to smoke are anticipated to increase in the future, so an early and ongoing relationship with individuals who have existing health conditions is advisable in order to mitigate concerns and reduce management complications from a vocal public. Community concerns about the impacts of smoke on recreation, tourism, and outdoor activities can be greater than other concerns. The public is generally more tolerant of smoke when there is an accurate understanding of the positive effects of wildland fire, such as improving forest health and wildlife habitat.
2. **Build and maintain trust, and validate concerns about controlling fire and smoke** — The development of trust and maintaining a relationship with the public has always been an important aspect of effective land and fire management, and the same holds true for smoke management. Advanced warning about potential smoke impacts is one of the most important contributors to public tolerance of smoke from wildland fires and agency trust. People are often willing to trade-off the negative short-term consequences of smoke from prescribed fires if they believe that this will reduce the threat of extreme wildfire and smoke events in the future, and if they trust that the likelihood of an escaped fire is low.

Managers should clearly communicate all trade-offs surrounding wildland fire smoke because vague, untimely, incomplete or glossed-over representations of smoke effects and exaggerated expectations of safety could jeopardize public trust and support (see **section 11.1**).

3. **The devil's in the details, so understanding each audience is important** — Of course, this is not a new suggestion, but individual and community characteristics such as past experience, community preparedness, and individual characteristics influence perceptions and tolerance of smoke in complex ways. Because there is a mosaic of varying interests and lifestyles that are intermixed, often without clearly delineated boundaries, it is important to dive into the details of each community in an attempt to understand contextual and spatial differences that could influence perceptions and tolerance of smoke.

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