

Residents Warming Up to Fuels Management: Homeowners' Acceptance of Wildfire and Fuels Management in the Wildland-Urban Interface

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Introduction

Understanding how wildland-urban interface (WUI) residents perceive fire and specific fuels management approaches is essential to land managers' success in coordinating mutually acceptable fire management plans (Lichtman 1998, Manfredo *et al.* 1990). Successful implementation of fuels management necessarily involves two types of behavior change among WUI residents. Land managers want residents to invest in fire-safe landscaping and building practices and other Firewise activities. Land managers also seek support for fuels management efforts on public lands from those who may not currently be supporters. In these respects, our study suggests that wildland fire managers have reason to be optimistic.

Our research found that WUI residents relied on common factors to make decisions about whether or not to support particular fuels management approaches such as prescribed burning, mechanical fuels reduction, and defensible space. The study was also designed to create a standardized, yet locally adaptable, fuels management acceptance assessment tool for wildland fuels managers to use in their own neighboring communities. Our findings and survey methods should be useful to wildland fire managers and fire information officers who are eager to engage WUI residents in dialogues about and educational outreach in fuels management.

Key Findings

We used focus groups and surveys in diverse communities in four States (California, Florida, Michigan, and Missouri) to understand what variables were associated with approval of three fuels management approaches. Listening to WUI residents who live in diverse forest settings and analyzing their views and preferences within a social scientific framework lead us to several conclusions that can provide information for wildland fuels management and communication programs.

Where a fuels management approach is an established practice—and agency trust levels are not unusually low—public acceptance among WUI residents tends to be high. For defensible space ordinances, there was a strong contrast between the quite positive attitude and approval found at our California site—where defensible space ordinances are established—and the much less positive responses from the Michigan and Missouri sites—where defensible space is not regulated. Perhaps more importantly, compared to residents of the other study sites, WUI residents in California showed high levels of compliance with defensible space practices. Prescribed burning, a well-established practice in Florida and Missouri, enjoyed the most support at those two study sites. Mechanical fuels reduction was most frequently accepted in California where WUI residents were more likely to have experienced this practice near their homes.

Attitudes toward a fuels management approach are important predictors of acceptance.

Regression analysis performed on our data suggests that an increase in attitudes in a positive direction is associated with a similar increase in acceptance. Further, there is strong circumstantial evidence indicating positive attitudes are more widespread where the public is highly familiar with successful fuels management implemented over the long term.

Low levels of trust in those responsible for wildland fuels management can significantly reduce acceptance of fuels management approaches. Along with attitude, trust had a consistently positive association with acceptance at all four sites. Although social science researchers do not completely agree about what constitutes trust, evidence suggests that with respect to different fuels management approaches, homeowners will place more trust in land managers who are *competent*, *credible*, and *share their values* that relate to natural resource management (see Winter *et al.* 2004).

Outcomes beliefs are associated with approval, but not consistently across sites or fuels management approaches. Managers need to consider local variability when developing their communication strategies. We found WUI residents' beliefs about likely outcomes (such as a burn escaping, smoke, and effect on wildlife conditions) of a fuels management approach often were linked with attitude toward the associated practice. This finding provides useful guidance for public communication and outreach programs. In forming their attitudes, and, in turn, their acceptance decision, the local public needs to know how proposed fuels management approaches will affect them and their forest community (e.g., cost effectiveness, wildlife and scenery impacts, chance of escaped fire). However, there was a reasonable level of variability between fuels management approaches as well as between study sites. For instance, belief that a prescribed burn improved wildlife conditions had a positive association with approval in California and Michigan but no effect in Florida and Missouri. Ultimately, the only way to fully learn how local WUI residents view a fuels management approach is to ask them.

Demographic characteristics and wildland fire experience were not directly associated with acceptance, particularly when other factors such as personal importance, trust, and attitudes are held constant. Still, it is possible that some of these variables indirectly affect acceptance by moderating attitudes or personal importance—both important influences on acceptance.

Detailed Findings

The research for this study was done in two phases. The first phase involved focus groups of WUI residents. To ensure that our findings would be broadly applicable, we conducted the focus groups in diverse communities in four States (California, Florida, Michigan, and Missouri). From these discussions, we developed a model of factors that were likely influential in approval levels. To test our model, we then surveyed a broader range of WUI residents in each site.

Based on what we heard, we hypothesized WUI residents' acceptance of fuels management approaches is largely related to three factors:

- **Trust in the responsible agency**, a complex factor that may be further divided into several types of trust, including *perceived agency competence*, *credibility*, and the degree to which residents and the agency *share common values* (Winter *et al.* 2004).
- **Attitudes¹ toward individual fuels management approaches**—whether an individual's evaluation of an approach is favorable or unfavorable. Attitudes are largely determined by **perceived forest management outcomes**, which are the results they believe are likely to happen as a result of each fuels management strategy.
- **Personal importance** of fuels management approaches. Personal importance accounts for WUI residents' perceptions of how a fuels management approach will affect them or the degree to which they are personally invested in the approach. Research has shown personal importance is positively associated with attitudes—whether an object (e.g., a fuels management approach) is seen as positive or negative (Bright and Manfredo 1995, 1997; Liberman and Chaiken 1996; Sorrentino *et al.* 1988)—and attitudes are, in turn, strongly associated with intentions to support that object.

We also suspected certain personal characteristics of WUI residents were related to attitudes toward and acceptance of fuels management approaches. For example, residents with more wildland fire experiences

¹ Note that our model treats attitudes (positive or negative feelings toward a fuels management approach) and personal importance (an indirect measure of the perceived degree to which an approach will affect a respondent or that they are involved/invested in a fuels management approach) as associated but separate acceptance factors.

(Vogt *et al.* 2003), longer term residents, permanent (as opposed to seasonal) residents (Vogt 2003), and those who have worked in natural resource-related fields would be more apt to have high acceptance levels.

Respondent Demographics

The California and Michigan samples were similar in several demographic characteristics (table 1). For both samples, approximately 7 out of 10 respondents were male, one-third of the respondents had college degrees, 3 out of 10 respondents earned \$80,000 or more for an annual household income, and 3 out of 10 households had someone with a respiratory ailment. Michigan homeowners were more likely to be seasonal residents. Florida respondents were the most likely to be female, and a greater proportion (35%) of Florida households had someone with a respiratory ailment. Missouri respondents were notable for having lower levels of formal education and income and tended to be long-term residents who had lived in small towns and rural areas most of their lives.

Table 1.—Respondent demographics by study site

	CA site N=544 (percent)	FL site N=357 (percent)	MI site N=1,244 (percent)	MO site N=715 (percent)
Male	70	60	71	75
College graduate	36	16	32	20
\$80,000+ household income	32	18	29	9
Respiratory ailment	30	35	28	31
Long-term resident (over 10 years)	60	67	68	74
Seasonal resident	7	1	38	2
Lived most of life in medium to large city	46	38	36	13

Wildland Fire Experiences and Actions

WUI residents' wildland fire experiences and actions are indicative of a region's wildland fire history and management policies. Of residents at the four sites, California respondents were the most informed about fire, more involved in protecting their own homes, more likely to have participated in community fire protection activities, and more familiar with mechanical treatment (fig. 1). Florida respondents were the most familiar with prescribed burning and the most likely to have experienced a road closure due to wildland fire. Michigan respondents were more likely to know someone who suffered damages to property and more likely to have been evacuated due to wildland fire.² Overall, Missouri respondents

² The three counties surveyed in Michigan contained the area where the Mack Lake fire (an escaped prescribed fire that killed a firefighter and destroyed 44 houses) had occurred. This fire was often discussed in focus groups as if it had just occurred.

were the least likely to have experienced negative wildland fire effects: feeling fear or anxiety, experiencing a road closure, or suffering discomfort from smoke.

Compared to respondents from the other sites, California WUI residents have been involved more frequently in wildland fire-related actions (fig. 2). They were at least twice as likely to have practiced

Figure 1.—Respondent wildland fire experiences

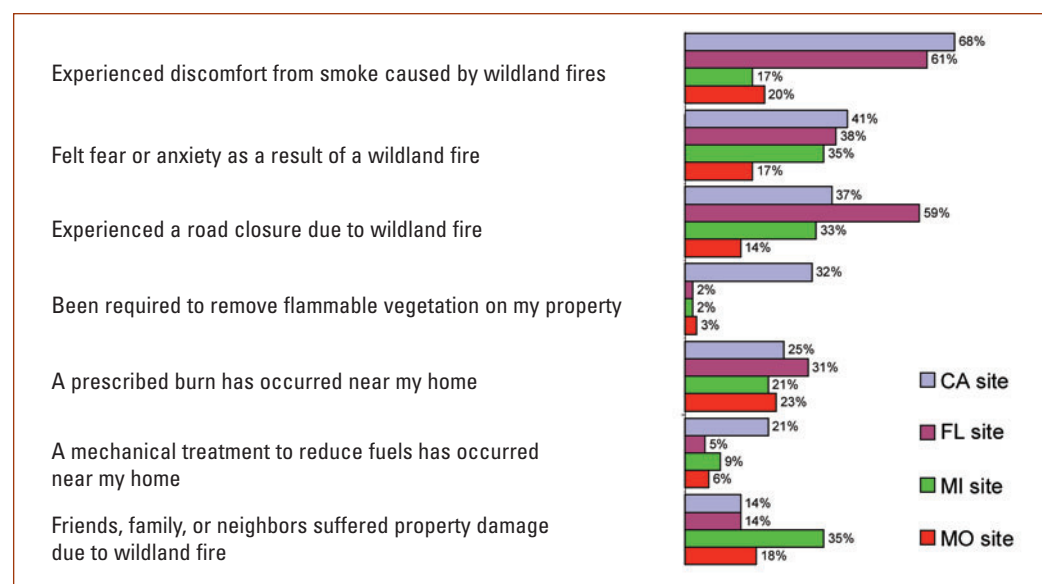
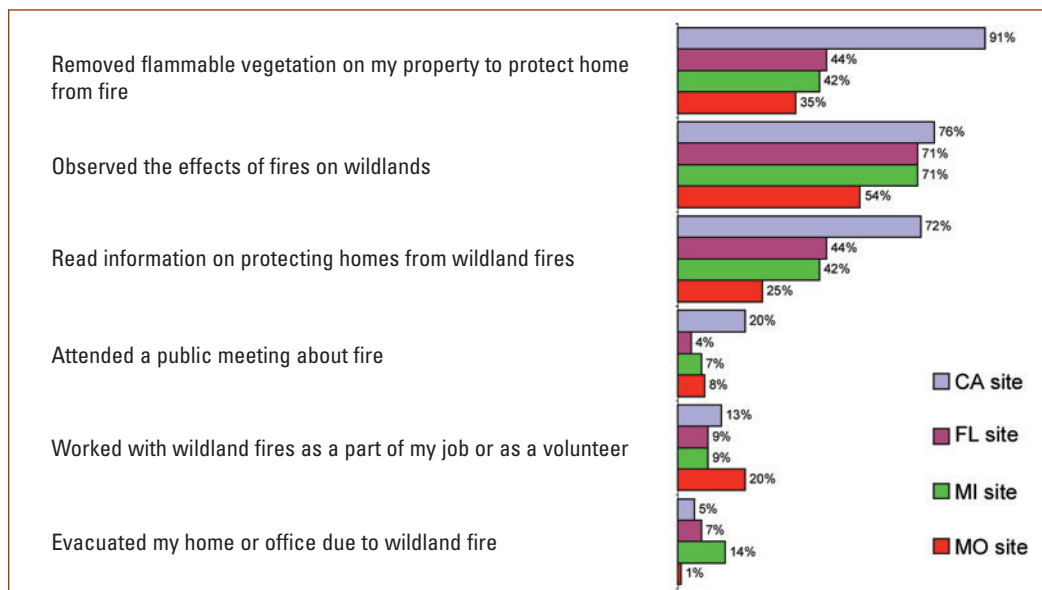


Figure 2.—Respondent wildland fire actions



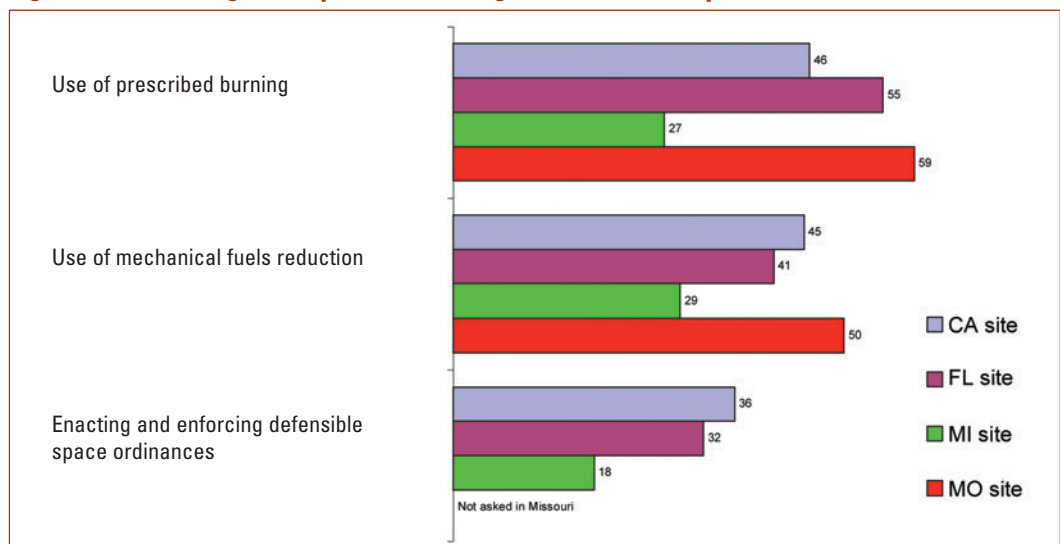
defensible space landscaping and were significantly more likely than WUI residents at one or more of the other sites to have observed the effects of fire on wildlands, read information on defensible space practices, or attended a public meeting about wildland fire. Respondents at the Missouri site, on the other hand, were among the least likely to have engaged in those activities, yet they were the most likely to have worked with wildland fire as part of a job or as a volunteer.

These wildland fire action results are consistent with local wildland fire laws and custom. The California site residents are required by law to maintain defensible space. Homeowner education and enforcement practices by State and local jurisdictions and Fire Safe Councils in California are familiar to most WUI homeowners. In areas lacking these institutions, defensible space experiences and actions are much less evident.

Trust

It may come as a surprise to some that, generally speaking, the proportions of WUI residents at two of the four sites (FL and MO) who trust the government to make decisions about the use of prescribed burning are larger than the proportions who say the same for mechanical fuels reduction (fig. 3). At the California site, the proportions are essentially equal. Michigan was an obvious anomaly among these sites; WUI residents there exhibit significantly lower proportions of trust for each of the three fuels management approaches. Missouri respondents showed the highest trust for the two fuels management approaches examined there: prescribed burning and mechanical fuels reduction.

Figure 3.—Percentage of respondents who agree with trust component statements



Fuels Management Approach Attitude

Attitude toward a fuels management approach varied widely among and within communities. The proportion of WUI residents with a positive attitude toward prescribed burning ranged from 42 percent in Michigan to nearly twice that many in Florida (78%). Positive attitude toward mechanical fuels reduction ranged from 52 percent in Missouri to 78 percent in California. Nearly twice as many California WUI residents (79%) held positive attitudes toward defensible space ordinances as residents in either Florida (42%) or Michigan (42%).

Personal Importance

California and Florida WUI residents assigned high levels of personal importance to mechanical fuels reduction and prescribed burning. Compared to Florida and Michigan WUI residents, those from the California site were much more likely to assign a high level of personal importance to defensible space ordinances, a finding consistent with their familiarity with defensible space practices through experiences and actions and with the region's defensible space laws.

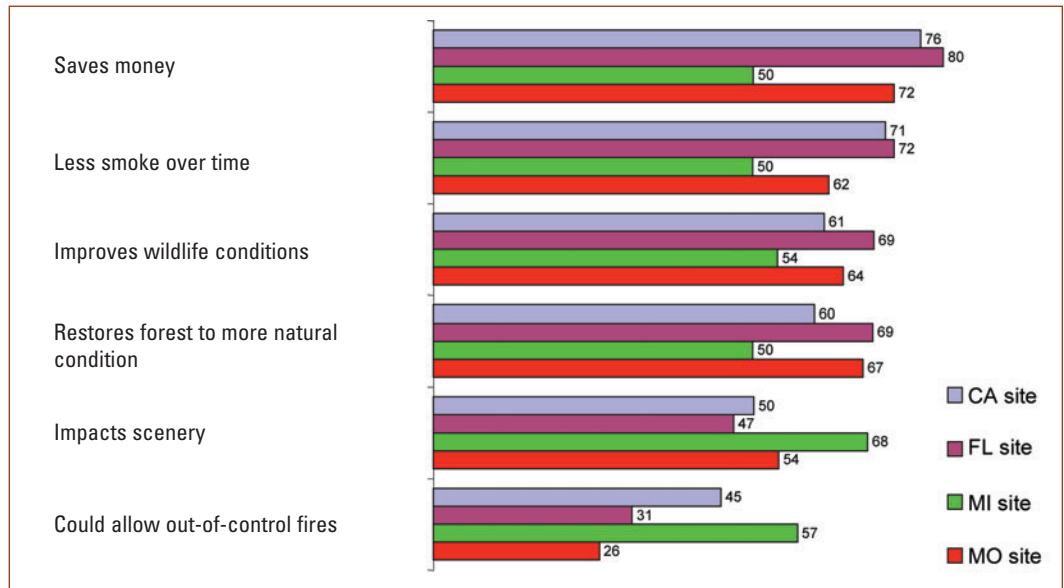
Perceived Forest Management Outcomes

Although the strength of WUI residents' beliefs about probable fuels management approach outcomes likely influences acceptance, cost-benefit analyses used to evaluate fuels management approaches often do not consider public opinion (Kline 2004). In an effort to introduce public opinion to fuels planning, we began our research with focus groups to uncover salient beliefs about expectations of fuels management outcomes or impacts. We discerned from the focus groups that particular outcomes are associated with certain, but not always all, fuels management approaches.

Prescribed burning

California, Florida, and Missouri respondents are similar in the strength of several beliefs about prescribed burning outcomes (fig. 4). Large proportions of WUI residents from each site believed it highly likely that prescribed burning results in reduced costs of future firefighting, less smoke over the long term, and that it improves conditions for wildlife and helps restore forests to a more natural condition. Michigan WUI residents believed most strongly that negative prescribed burning outcomes (i.e., escaped fires) will occur, and they believed least strongly that positive outcomes will occur.

Figure 4.—Percentage of respondents who believe prescribed burning outcomes are very likely to certain



Mechanical fuels reduction

Of respondents at the four sites, Californians held the strongest beliefs about each of the four positive mechanical fuels reduction outcomes: saves money on future firefighting, extracts usable wood products, improves wildlife conditions, and restores the forest to a more natural condition (fig. 5). As with prescribed burning, Michigan respondents were the most likely to believe mechanical fuels reduction will have negative scenery impacts and the least likely to believe that this fuels management approach will have three of the four positive outcomes.

Defensible space ordinance.³

More than two-thirds (71%) of California WUI residents believed a defensible space ordinance saves money by reducing the cost of fighting a future wildfire (fig. 6), a proportion much higher than at the Florida (46%) and Michigan (39%) sites. California respondents were also the most likely to believe that other positive outcomes will follow from such an ordinance, and they were least likely to believe negative scenery impacts will result.

³ Note that Missouri residents were not asked about defensible space ordinances. Phase I focus group research at this site showed little history of wildland fire causing home loss and little outreach about defensible space in this region. Focus group respondents were nearly universally against an enforced ordinance for which they saw no need.

Figure 5.—Percentage of respondents who believe mechanical fuels reduction outcomes are very likely to certain

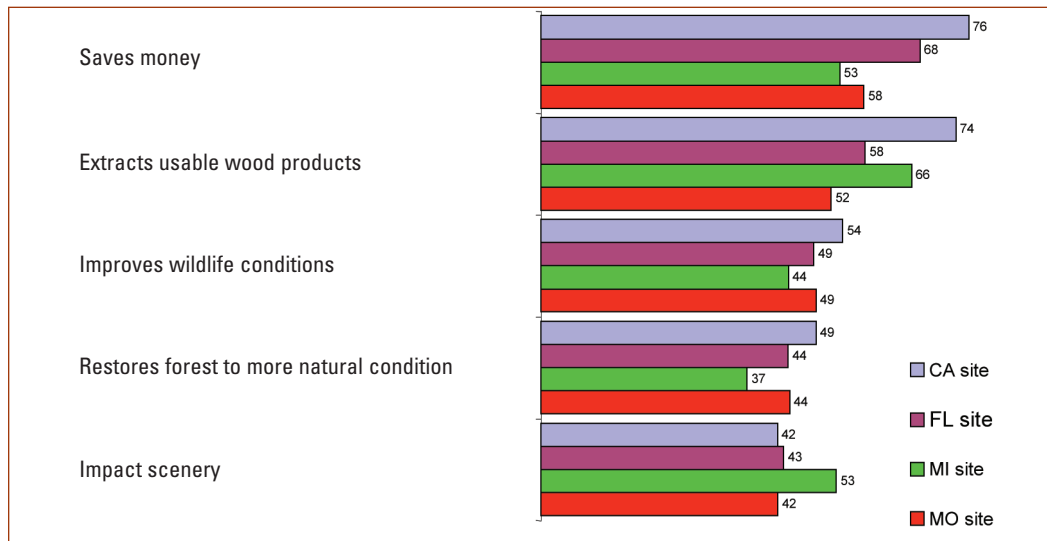
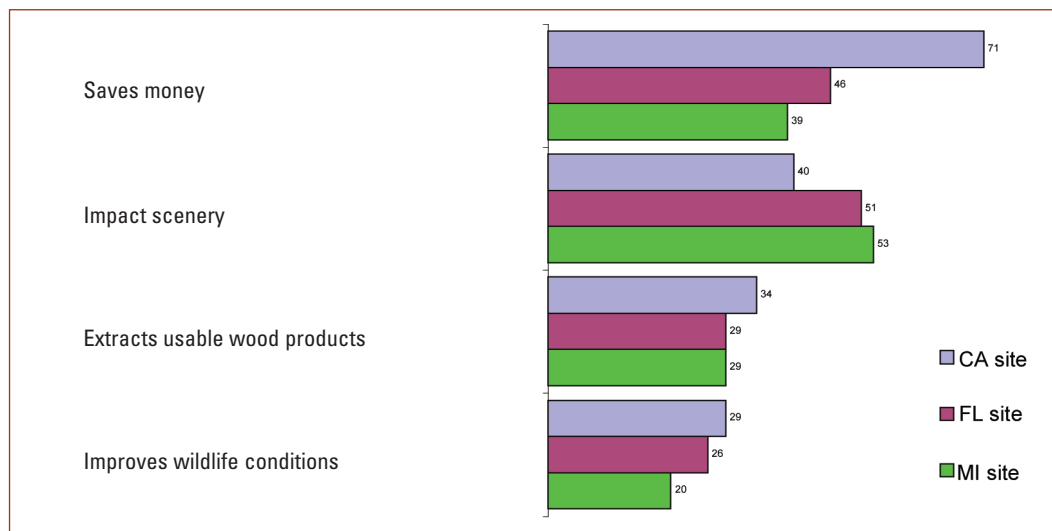


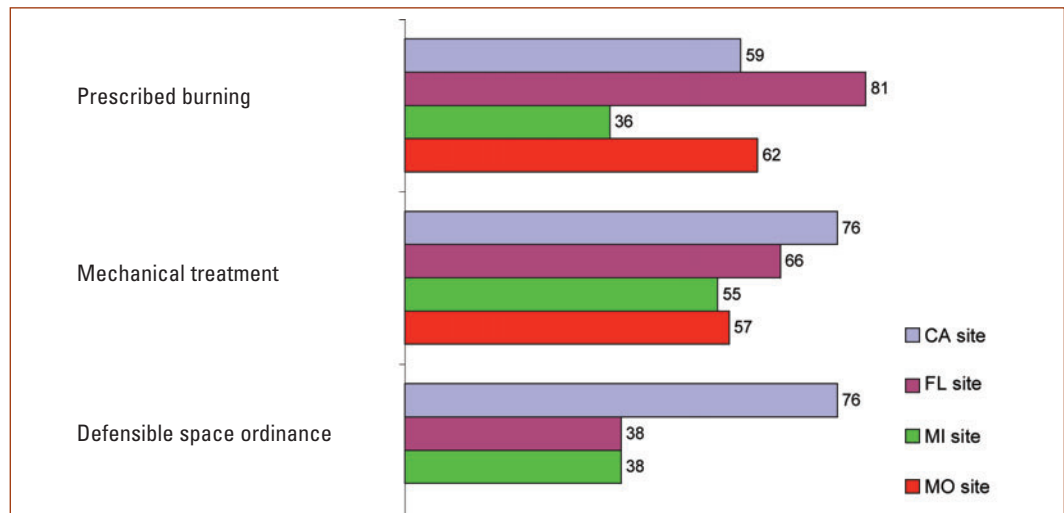
Figure 6.—Percentage of respondents who believe defensible space ordinance outcomes are very likely to certain



Approval

Approval varied considerably among study sites (fig. 7). The proportions of WUI residents who approved of particular approaches were very similar to the proportions with positive attitudes toward that approach. At the Florida site, where prescribed burning on privately held timber land was a common practice, approval of this approach was significantly higher than at the other sites (the next highest is the Missouri site where prescribed burning is also a longstanding practice). Mechanical fuels reduction had a high approval rating in California where residents were significantly more likely to have experienced a mechanical treatment near their homes. Compared to Michigan and Missouri respondents, twice as many California WUI residents approved of defensible space where it is an established and mandatory practice.

Figure 7.—Percentage of respondents who approve of fuels management approach in their local area



Predictive Acceptance Factors

Earlier, we reviewed the proposed conceptual model for explaining acceptance of different fuels management approaches. Multivariate analysis was used to determine which model variables (e.g., agency trust, fuels management approach outcome beliefs) explain the approval level for each approach when controlling for all other model variables. Separate models were tested for each fuels management approach at each study site. The summary results are shown in table 2.

Attitude and trust are strong predictors of individuals' intentions to approve of all three fuels management approaches at each applicable site. WUI residents who rated a fuels management approach as positive and those who trusted the government to make good decisions about its use were more likely

Table 2.—Statistically significant predictors of acceptance of fuels management approaches

Acceptance of...	Prescribed burning				Mechanical fuels reduction				Defensible space ordinance		
	CA	FL	MI	MO	CA	FL	MI	MO	CA	FL	MI
Attitude toward fuels management approach	+	+	+	+	+	+	+	+	+	+	+
Trust in agency with fuels management approach	+	+	+	+	+	+	+	+	+	+	+
Personal importance of fuels management approach	+	+	+	+	+	+	+	+	+	+	+
Outcome beliefs for...											
Cost-effective	+	+	+		+	+	+		+	+	+
Risk of escaped fire	–	–	–	–	NA	NA	NA	NA	NA	NA	NA
Negative scenery impacts	–				–		–			–	–
Improves wildlife conditions	+		+					+			
Less smoke in long term				+	NA	NA	NA	NA	NA	NA	NA
Restores wildlands to natural condition			+	+			+		NA	NA	NA
Extracts valuable wood products								+	NA	NA	NA

⊕ = positive relationship; – = negative relationship; empty cells imply no relationship was found at the 0.05 significance level.

to express approval for that approach. Additionally, personal importance was a significant predictor of approval: respondents who assigned a high personal importance to an approach were more likely to approve of its use in their local communities.

Outcome beliefs were also associated with approval but not consistently; beliefs that were significant varied across study sites and fuels management approaches. Cost-effectiveness, or whether or not WUI residents believe that an approach will save money by reducing the cost of fighting wildfires—was a significant predictor of approval for prescribed burning and mechanical fuels reduction at all sites except Missouri. Cost-effectiveness was also a predictor of approval of defensible space ordinances at all three sites where that approach was tested. For prescribed fire, the strength of respondents' belief that escaped fire is a likely outcome is inversely predictive of approval level at all four sites. The belief strength in the remaining outcomes varied considerably across study sites and fuels management approaches. For example, strength of beliefs about negative scenery impacts had weak but statistically

significant association with approval for prescribed burning only in California, for mechanical fuels reduction in California and Michigan, and for defensible space ordinances in Florida and Michigan.

Demographics

Our exploration of the association between demographic characteristics (e.g., gender, residency tenure, education, property value, proximity to high hazard fuels areas) and acceptance of fuels management approaches revealed no direct relationships. Surprisingly, the same is true for our investigation of relationships between WUI residents' wildland fire experiences and actions and acceptance, particularly when other factors such as personal importance, trust, and attitudes are held constant. Still, some of these variables may indirectly affect acceptance by moderating attitudes or personal importance—both important influences on acceptance.

Methods

The research for this study was done in two phases. During the first phase, we interviewed randomly selected WUI residents in a focus group setting where participants were encouraged to talk about their experiences with, knowledge about, and opinions of wildland fire-related issues (Winter *et al.* 2002). To ensure that our findings would be broadly applicable, we conducted the focus groups in very diverse communities in four States (California, Florida, Michigan, and Missouri). Next, to measure how well the model explained WUI residents' acceptance of fuels management approaches, we developed a community survey methodology. The purpose of the survey was to test whether our first-phase findings and conclusions could be generalized to other communities.

Survey Sites

The study population for each site consisted of homeowners living in areas abutting or near large tracts of public land with a high potential for wildland fire. The four survey sites were selected to represent a diversity of socioeconomic, ecological, fire history, and land management characteristics. The California site, including Placer and El Dorado Counties, contains federally managed forest with frequent wildfires and rare prescribed burns. The Clay County, Florida, site is primarily privately owned and has frequent wildland fires and prescribed burns. The Michigan site, including Oscoda, Crawford, and Ogemaw Counties, contains forests that are largely managed by Federal and State agencies. The Missouri site, including six counties near or within the Mark Twain National Forest, features a national forest unit where increased prescribed fire activity is being planned for fuels management. At all four survey sites combined, 6,731 households received the survey and 2,869 responded, for an overall response rate of 43 percent (this ranged from 31 percent at the Florida site to 53 percent at the Michigan site).

For more information on the study and the results, including links to publications completed to date, more details about study methodologies, and a tool kit for monitoring fuels management approach acceptance in your community, please see the Social Acceptance of Fuel Treatments Web site at <http://www.fire-saft.net/index.htm>.

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