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Wildfire risk information sources and the acceptability of fuels treatments near select WUI communities in the Western United States

Kelly Wallace[a,*], Hannah Brenkert-Smith[a], Patricia A. Champ[b], James R. Meldrum[c], Grant Webster[a], Christine Taniguchi[a], Julia B. Goolsby[a,1], Colleen Donovan[d], Carolyn Wagner[d], Christopher M. Barth[e], Josh Kuehn[d], Suzanne Wittenbrink[d]

[a] University of Colorado Boulder, Institute of Behavioral Science, 1440 15th St, Boulder, CO 80309, United States of America
[b] USDA Forest Service, Rocky Mountain Research Station, 240 W Prospect Rd, Fort Collins, CO 80526, United States of America
[c] U.S. Geological Survey, Fort Collins Science Center, 2150 Centre Ave Bldg C, Fort Collins, CO 80526, United States of America
[d] Wildfire Research (WiRē) Center, Virtual, United States of America
[e] USDA Forest Service, Washington Office, Fire and Aviation Management, National Incident Management Organization (NIMO), Virtual, United States of America

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ABSTRACT

Fuels treatments intended to reduce fuel loads and improve forest health on public lands offer one way to reduce wildfire hazards in the wildland-urban interface (WUI), where the natural and built environments meet. However, for fuels treatment implementation to be successful, it must comply with regulatory and scientific standards and be supported by local communities, as lack of acceptance can lead to alterations, delays, or abandonment. To foster support, public land managers can engage directly with residents in communities near treatment areas through various communication channels or engage indirectly through trusted local partners. This research uses paired household survey and observed parcel-level wildfire risk assessment data to investigate wildfire risk information sources' role in the acceptability of fuels treatment approaches on public lands near select WUI communities in the Western United States. We find that information deemed useful from sources is often positively correlated with acceptability, while information deemed not useful is sometimes negatively correlated. Local sources of information tend to be widely received, perceived as useful, and have positive correlations with acceptability, while nonlocal sources vary in their receipt, perceived usefulness, and correlations with acceptability. Public land managers, particularly those from national organizations, may benefit from leveraging and aligning messaging with trusted local partners. Developing fuels treatment plans that consider existing local sentiments may facilitate public trust in managers and acceptability of treatments.

1. Introduction

Over the past several decades, wildfires in the Western United States (US) have become larger and more frequent (Dennison et al., 2014; Weber and Yadav, 2020) and cost billions of dollars annually in management and losses (Thomas et al., 2017). Trends in wildfire occurrence and destruction are due to a combination of climate change (Abatzoglou and Williams, 2016), an accumulation of fuels (Mercer et al., 2008), and an expansion of the wildland-urban interface (WUI), an area where human development meets and intermingles with wildland vegetation (Radeloff et al., 2018; USFS, 2022). Public land managers call for reducing wildfire risk through strategic "fuels management" or "fuels treatments," which involves using machinery and fire to reduce fuel loads. Fuels treatments are natural resource management tools for maintaining public safety on both public and private lands. For example, the U.S. Department of Agriculture (USDA) Forest Service's 10-year Wildfire Crisis Strategy targets high-risk areas by prioritizing fuels and forest health treatments that are strategically placed to reduce the

* Corresponding author.
E-mail addresses: kelly.wallace@colorado.edu (K. Wallace), hannahb@colorado.edu (H. Brenkert-Smith), patricia.a.champ@usda.gov (P.A. Champ), jmeldrum@usgs.gov (J.R. Meldrum), grant.webster@colorado.edu (G. Webster), christine.taniguchi-1@colorado.edu (C. Taniguchi), jbg322@cornell.edu (J.B. Goolsby), colleen@wildfireresearchcenter.org (C. Donovan), carolyn@wildfireresearchcenter.org (C. Wagner), christopher.barth@usda.gov (C.M. Barth), josh@wildfireresearchcenter.org (J. Kuehn), suzanne@wildfireresearchcenter.org (S. Wittenbrink).
[1] Present address: Cornell University, Communication Department, 450 Mann Library Bldg, 237 Mann Dr., Ithaca, NY 14853, United States of America.

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likelihood of catastrophic wildfires, focusing on infrastructure and communities most vulnerable to wildfire (USFS, 2022). The strategic placement of fuels treatments near communities is an important means of mitigating the effects of and increasing resiliency to wildfires in WUI areas (e.g., Minas et al., 2014; Murray et al., 2023; Schoennagel et al., 2017). Although the efficacy of different fuels treatments is difficult to quantify (e.g., Harrod et al., 2007; Hiers et al., 2020; Huggett Jr et al., 2008; Mercer et al., 2008), reviews of wildfire science in the Western US find that thinning with prescribed or pile burning has been shown to generally meet the goal of reducing fire severity (Davis et al., 2024; Kalies and Kent, 2016).

Fuels management actions within the WUI take place among complex social and ecological conditions and inherently affect nearby communities. The salience of fuels treatments subject them to public scrutiny. The *acceptability* of treatments—referring to the degree to which fuels treatments are perceived as favorable, appropriate, and effective by WUI residents—is central to their implementation. Understanding not only the acceptance of treatments, but why they are accepted or not, helps land managers identify which strategies align with local populations' expectations and how to communicate with residents. The perspectives of the public provide valuable insight into the challenges and opportunities of implementing treatments. Public engagement provides an opportunity for meaningful dialogue, where differing opinions and valid concerns can contribute to thoughtful and effective land management strategies. Still, the Wildfire Crisis Strategy notes that "federal land managers have sized and placed their treatments based on available funding and social constraints (such as public aversion to logging or smoke) rather than on the needed location at the right scale" (USFS, 2022, p. 10). This highlights the challenge of balancing ecological needs with social acceptability.

1.1. Acceptability of fuels treatments

Wildfire social science literature highlights complexity associated with the social acceptability of fuels treatments. Acceptability can vary within communities, across communities, and by type of treatment, underscoring the need for tailored approaches to address these varied perspectives and foster broader acceptance. The acceptability of fuels treatments can vary widely within a given location (e.g., Brenkert-Smith et al., 2023) and is driven by interconnected and multifaceted personal experiences and opinions. Previous studies have identified multiple factors that can influence public perceptions of fuels treatments, including trust in agencies (e.g., Gordon et al., 2014), experiences with wildfire and fuel management (e.g., Toman et al., 2014), location of treatments (e.g., Winter et al., 2002), knowledge of treatment methods (e.g., Loomis et al., 2001), the perceived effectiveness of management strategies (e.g., Shindler et al., 2009), aesthetic or cultural values (e.g., Clement and Cheng, 2011), and to some extent socio-demographic characteristics (e.g., Mylek and Schirmer, 2016).

Furthermore, acceptability can vary across locations due to a range of factors such as cultural norms, economic conditions, social structures, and historical contexts (Brenkert-Smith et al., 2023; Bright and Newman, 2006; Bright et al., 2007; Brunson and Shindler, 2004; Clement and Cheng, 2011; Mylek and Schirmer, 2016; Ostergren et al., 2008; Paveglio and Edgeley, 2023; Toman et al., 2014). For example, Toman et al. (2014) conducted a longitudinal survey of public opinion on fire management and fuels treatments in Arizona, Colorado, Oregon, Utah, Michigan, Minnesota, and Wisconsin. They find that the acceptability of fuel treatments varies significantly based on geographic location, local experiences with wildfires, and a range of social and environmental factors. Communities with higher wildfire risk were generally more supportive of fuel management efforts but concerns about specific treatments and methods still existed.

Treatment type also can affect the level of acceptance of a fuels management plan (Absher and Vaske, 2007; Brenkert-Smith et al., 2023; Brunson and Shindler, 2004; Clement and Cheng, 2011; Gordon et al., 2014; Kaval et al., 2007; McCaffrey et al., 2008; McCaffrey et al., 2012; Molina et al., 2021; Mylek and Schirmer, 2016; Ostergren et al., 2008; Shindler and Toman, 2003; Shindler et al., 2009; Shindler et al., 2011; Vogt et al., 2005). Specifically, treatments like prescribed burns may face more opposition, while mechanical treatments or thinning may be viewed more favorably (Absher and Vaske, 2007; Brenkert-Smith et al., 2023; Brunson and Shindler, 2004; Shindler et al., 2011). This can be due to concerns over perceived risks, air quality, or aesthetic or scenic effects (Brunson and Shindler, 2004; Vogt et al., 2005). Thus, understanding the social acceptability of fuel treatments requires a nuanced approach that considers the varied and dynamic factors influencing public opinion across treatment types, locations, and individuals within communities.

Although fuels treatments are generally supported (Brenkert-Smith et al., 2023; McCaffrey, 2010; McCaffrey and Olsen, 2012; McCaffrey et al., 2012; Mylek and Schirmer, 2016; Shindler et al., 2009; Vaske et al., 2007), public sentiment can be quickly swayed by incidents or mishandlings, such as escaped prescribed fires (Brunson and Evans, 2005) or a lack of meaningful and effective opportunities for public engagement (Olsen and Shindler, 2010). In addition, opposition to treatments can be from a vocal minority. This phenomenon is well-documented in studies that highlight how a small but vocal group can disproportionately influence public perceptions and policy decisions related to land management (e.g., Brenkert-Smith et al., 2019; Olsen et al., 2017; Paveglio et al., 2009; Rieman et al., 2010). Public resistance, often stemming from concerns about smoke, safety, aesthetics, or environmental effects (Calkin et al., 2014; McCaffrey, 2004; Olsen et al., 2017), can lead to delays, alterations, or even abandonment of proposed actions, which may result in treatments that are suboptimal for wildfire risk reduction and forest health (Brenkert-Smith et al., 2019; Charnley et al., 2015; Jahn et al., 2020; Paveglio et al., 2009; Paveglio and Edgeley, 2023; Remenick, 2018; Shindler et al., 2014). Understanding and attending to public opposition, however small, can increase the likelihood of a successful fuels treatment project.

1.2. Resident-agency trust and communication

In WUI communities, collaboration among many actors–including Federal agencies, local organizations, and homeowners–is essential to foster cross-boundary wildfire risk management. Wildfires do not adhere to property ownership or jurisdictional boundaries, so comprehensive wildfire risk reduction efforts require collaborative actions across these divisions (Ager et al., 2019; Calkin et al., 2014; Davis et al., 2021; USFS, 2022). By working together, these different groups can address wildfire risks more holistically, ensuring that strategies are integrated, resources are shared, and risks are mitigated across both public and private lands.

Social science literature on fuels management consistently emphasizes that trust is crucial for building and maintaining partnerships between agencies and communities (e.g., Absher and Vaske, 2011; Lachapelle and McCool, 2012; Winter et al., 2004). Trust in this context can involve belief in agencies' competence, resources, and commitment to acting for the public good (Ascher et al., 2012; Brunson and Evans, 2005; Czaja et al., 2016; Grimmelikhuijsen, 2012; McCaffrey and Olsen, 2012; Shindler and Toman, 2003; Shindler et al., 2014; Toman et al., 2011; Winter et al., 2004). Another key component of trust is that agencies' communications or behavior are honest, transparent, and sincere (Grimmelikhuijsen, 2012; Lachapelle and McCool, 2012; Rasch and McCaffrey, 2019; Shindler et al., 2014; Vaske et al., 2007; Wagner and Fernandez-Gimenez, 2008). Recipients of communications must have confidence not only in the content of messages, but also in the source. Crisis literature more broadly finds that key characteristics related to communication include creating honest and trustworthy messages and leveraging credible sources (Balog-Way et al., 2020; Seeger, 2006; Sellnow et al., 2008). Face-to-face interactions and providing localized, specific information are also critical for fostering trust and strengthening relationships (Olsen and Sharp, 2013; Paveglio et al., 2009; Paveglio et al., 2015; Shindler et al., 2014; Toman et al., 2006). Ultimately, trust is foundational to fostering positive relationships between agencies and communities and is in part influenced by communications.

Literature on the acceptability of fuels treatments finds that trust in management agencies is often identified as a key factor in communities' acceptance of and attitudes toward forest and fuels management practices on public lands (Czaja et al., 2016; Davis et al., 2018; Gordon et al., 2014; McCaffrey, 2010, 2015; Mylek and Schirmer, 2016; Shindler and Toman, 2003; Toman et al., 2011; Vaske et al., 2007; Winter et al., 2002; Winter et al., 2004). For example, in a longitudinal survey of residents, Gordon et al. (2014) find that trust in agencies' ability to implement a land management practice aimed at restoring sagebrush rangeland in the Great Basin in the Western US was the best predictor of acceptance of that practice. Additionally, over two time periods, individuals who became more trusting of agencies to implement a practice also became more accepting of that practice. In Australia, Mylek and Schirmer (2016) find that similar to the multitude of North American studies, the acceptability of three fuels management strategies (prescribed burning, livestock grazing, and mechanical thinning) was most strongly associated with trust in fire management agencies and knowledge of management activities. Other factors such as feeling vulnerable to wildfires, experience with wildfire, location of residence, and several socio-demographic characteristics were also associated with acceptability, though less so than trust and knowledge. Effective communication and outreach programs can increase both wildfire knowledge and improve attitudes toward wildfire and forest management actions (Crow et al., 2015; Loomis et al., 2001; McCaffrey, 2004, 2015; Paveglio et al., 2009; Toman et al., 2006; Vaske et al., 2007). Therefore, fostering trust through transparent communication, consistent behavior, and meaningful community engagement is crucial for enhancing public acceptance and ensuring effective wildfire risk management.

Information about wildfire risks, fuels treatments, and other land management information can originate from formal sources (e.g., local fire departments or the USDA Forest Service) and informal sources (e.g., neighbors or homeowners' associations), both of which can increase information exchange and trust (McCaffrey, 2015). Disaster literature on public perspectives of information sources broadly finds that people are more likely to believe or respond to official or formal sources (e.g., Baker, 1991) and that media is highly used but is generally disliked (Brenkert-Smith et al., 2013; McCaffrey, 2004; Toman et al., 2006). Social interactions, such as unmediated interpersonal conversation, can also play an important role in risk communication (Binder et al., 2011; Brenkert-Smith et al., 2013; Crow et al., 2015; Dickinson et al., 2015; Masuda and Garvin, 2006; Scherer and Cho, 2003; Steelman et al., 2015). In a survey of populations near five large wildfire events in the Western US (Hat Creek Fire in northern California, Tecolote Fire in New Mexico, Schultz Fire in Arizona, Bull Fire in southern California, and Fourmile Canyon Fire in Colorado), Steelman et al. (2015) explore recipient perspectives on what information was used, useful, and trustworthy following those wildfire events. The authors find that there is a gap between reported use and the usefulness or trustworthiness of sources during a wildfire event. Some highly used sources, such as family, friends, and neighbors, are cited less often as useful or trustworthy. In contrast, some less-used sources, such as public meetings with officials, are cited more often as useful or trustworthy. However, sources are often similarly rated in their trustworthiness and usefulness.

1.3. Research goals

Little research has explored how homeowners' perceptions of the usefulness of wildfire risk information relates to their acceptance of different fuels treatment methods. Understanding this connection is essential for managers to optimize communication strategies to reach those most affected by treatments. This paper contributes to the literature on communication, trust, and acceptance, by examining how the perceived usefulness of information—whether from agencies, neighbors, or other sources—correlates with homeowners' acceptance of fuels treatment approaches. Using data from Western WUI communities, we provide insights that transcend individual community differences into how information shapes acceptance, offering practical implications for improving public support for wildfire risk mitigation efforts.

Specifically, we focus on the correlation between the acceptability of four types of fuels treatments (removing trees and vegetation, prescribed fire, pile burning, and managed fire) and the receipt and usefulness (if formal) or use (if informal) of wildfire risk information sources. We investigate information sources that message about wildfire risk in general rather than about any one treatment in particular. WUI residents receive information about wildfire from many different sources with overlapping messages about wildfire risk and mitigation at the property, community, and landscape levels. The conceptual framework depicted in Fig. 1 posits multiple factors that may be related to how acceptable a resident deems different types of fuels treatments. We test the relationships posited in the conceptual model with multivariate analyses models. In each multivariate model, the acceptability of a fuels treatment approach is a function of wildfire risk information sources and other control variables, including parcel-level wildfire risk, wildfire risk perceptions, experience with nearby wildfires, home occupancy, tenure, and demographics, as well as differing community characteristics. This approach allows for understandings about the relationships between wildfire risk information sources and the acceptability of fuels treatments that go beyond individual and community-specific factors. The central questions we explore are: from what sources do survey respondents receive wildfire risk information and how useful do they find that information; how acceptable are different fuels treatment approaches to respondents; how does the perceived usefulness (if formal) or use (if informal) of different wildfire risk information sources correlate with acceptability; and what are other factors related to acceptability?

This research expands on past work by Brenkert-Smith et al. (2023) who describe the same survey data used in this study, finding that the acceptability of fuels treatment types varies within and across locations. However, the authors aggregated the data to broader study areas and did not investigate factors correlated with residents' support or opposition of fuels treatments. The present study considers the data at a more granular community level and explores factors that may be related to acceptance, particularly as it relates to communication modes. Furthermore, while many studies might focus on one or a few communities or locations, this paper leverages data from 41 communities across the Western US, allowing for a broad investigation into how residents' relationships with different information sources transcend local differences. In addition to advancing the wildfire social science literature related to fuels treatment acceptability, this research provides information that land managers can leverage to effectively communicate with those who will be most affected by planned treatments.

2. Materials and methods

In this section, we describe the study context, data sources, and approach to analysis.

2.1. Study context and data

Our data come from a dataset compiled by The Wildfire Research (WiRē) Center,[2] originating from multiple projects conducted in partnership with wildfire education organizations (e.g., fire departments, regional wildfire councils, state forest services, non-governmental organizations) in select WUI communities in six western states between 2018 and 2023 (WiRē, 2024). Study communities within each project

[2] https://wildfireresearchcenter.org/

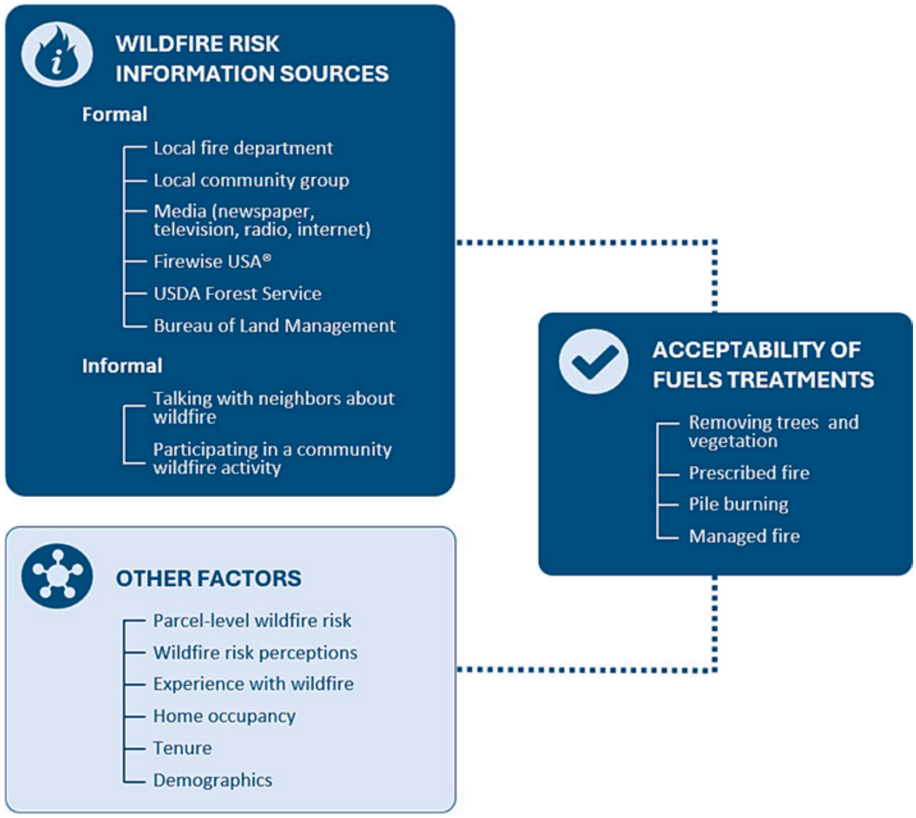

Fig. 1. Conceptual framework used to investigate wildfire risk information sources' role in the acceptability of fuels treatment approaches on public lands near select wildland-urban interface (WUI) communities in the Western United States. Formal and informal wildfire risk information sources, along with other factors, are hypothesized to be related to WUI homeowners' acceptability of fuels treatments.

were selected by practitioner organizations to inform their programmatic needs, often motivated by the goal to better understand their communities' wildfire risk. The boundaries of each community were determined by a combination of geographic and social factors (including county assessor naming, fire protection service areas, and local knowledge) and always in consultation with the local partner with familiarity of the communities. All communities were considered as facing high wildfire risk, but they varied in many ways, including exposure to wildfire hazards, the extent of existing wildfire education and outreach programs, and existing levels of property- or community-level mitigation efforts. A map of community locations is shown in Fig. 2. All projects followed a standardized data collection procedure involving a rapid parcel-level wildfire risk assessment performed by trained assessors for all residential properties within a study community and a household survey delivered to the mailing address on record for all assessed properties (described in more detail in Champ et al., 2021). The household surveys were administered using a modified Dillman approach (Dillman, 2011) involving four mailings: a letter introducing the project, a survey packet including a postage-paid return envelope, a reminder/thank you postcard, and a second survey packet. More details of the projects, including key summary statistics and citations to full project reports, are provided in Table A.1.

After filtering the data for complete and usable surveys and a minimum number of responses per community, we are left with 41 communities and $N = 3641$.[3] Table 1 shows variable descriptions and summary statistics. Panel A describes our dependent variables, Panels B and C describe our main variables of interest, and Panel D describes several other control variables.

Our dependent variables are the acceptability of four types of fuels treatments including *removing trees and vegetation*, *prescribed fire, pile burning,* and *managed fire* (Table 1, Panel A). Respondents were provided the definitions in Table 1, Panel A, and rated each fuels treatment on a 5-point scale of extremely, very, moderately, slightly, or not at all acceptable. We group these responses to distinguish between respondents who rated a treatment extremely or very acceptable (high acceptance) versus those who rated a treatment moderately, slightly, or not acceptable (low or no acceptance). We adopt a binary representation of acceptance because any response other than high acceptance would likely necessitate effort from land managers to improve public perceptions before management activities could be carried out.

Next, we focus our analysis on eight common sources used to convey wildfire risk information. These include six formal sources (*local fire department, local community group, media, Firewise USA®, USDA Forest Service*, and *Bureau of Land Management*) (Table 1, Panel B) as well as two informal sources (talking with neighbors about wildfire [*talk fire*] and engaging in a community wildfire activity [*community activity*]) (Table 1, Panel C). We define formal sources as organizations or platforms that may communicate wildfire risk information, while informal sources are social interactions among community members who are not communicating in an official capacity. In addition to formal vs. informal, information sources can be local or nonlocal at an organizational level. Local sources include *local fire department*, *local community group*, *talk fire*, and *community activity*. Nonlocal sources include *media*, *Firewise USA®*, *USDA Forest Service*, and *Bureau of Land Management*. It is important to note that the sources we describe as "nonlocal" have, in some cases, local representatives. Furthermore, there may be a potential overlap between formal and informal sources. For example, formal organizations such as fire departments or Firewise USA® may host community wildfire activities. Still, respondents were asked to rate each

[3] Reduced to 38 communities and $N = 3284$ for models including the Bureau of Land Management as an information source (not asked on every community survey).

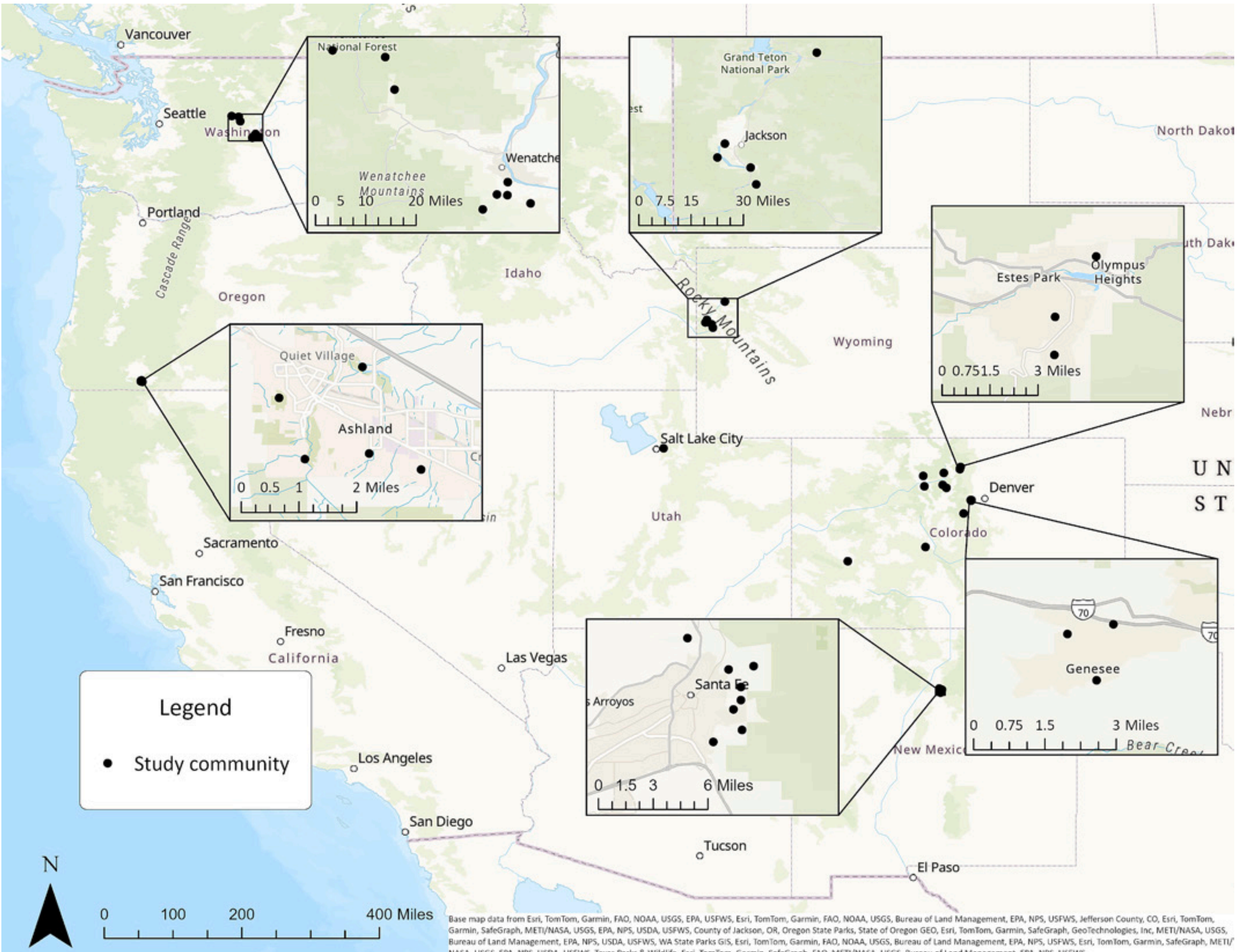

Fig. 2. Map showing points representative of Wildfire Research (WiRē) study communities in the Western United States. Inset maps show zoom-ins on communities in close proximity to one another for clarity. Map image is the intellectual property of Esri and is used herein under license.

source separately.

For each formal source, respondents indicated whether they received wildfire risk information from a source or not (base case) and, if received, rated the usefulness of the information on a 5-point scale of extremely, very, moderately, slightly, or not at all useful. To support concise presentation, we collapse these responses to three groups: very useful (extremely or very), moderately useful (moderately or slightly), or not useful. For each informal source, respondents were asked only whether they used a source or not (base case). Information on the usefulness of formal sources was collected because they are sources that partner practitioner organizations can influence, leverage, or collaborate with to communicate with residents. However, they have less control over informal sources, so usefulness measures of informal sources were not deemed beneficial enough to partners to include on the survey. In addition, our measures of information sources do not explicitly refer to information about fuels treatments, rather, respondents are asked about the receipt and usefulness of wildfire risk information from a range of sources.[4] Because the sources in our study are not focused on specific treatments, this strengthens the generalizability of our approach. A key priority in wildfire preparation and management is increasing the pace and scale of treatments to protect the most at-risk places and communities, as highlighted by the Wildfire Crisis Strategy (USFS, 2022). Treatments are continuously planned, initiated, and adjusted across a range of landscapes. By examining the use and perceived usefulness of information from various sources in general, our approach provides valuable insights that can be applied to future communications about fuels treatments. This makes our findings applicable not only to the current landscape of wildfire management but also to upcoming efforts and strategies. Because a key component of trust in organizations or sources involves honest, transparent, and sincere communications (Grimmelikhuijsen, 2012; Lachapelle and McCool, 2012; Rasch and McCaffrey, 2019; Shindler et al., 2014; Vaske et al., 2007; Wagner and Fernandez-Gimenez, 2008), we argue that the perceived usefulness of sources that provide information about wildfire risk broadly can also provide insight into respondents' trust in those sources. If respondents perceive information from a given source as useful, they likely have some level of trust in that source. Trust in organizations may mean that respondents perceive that the entity is competent to reduce wildfire risk on public land.

Finally, we include as controls several other variables that might relate to the acceptability of fuels treatment approaches. These include a

[4] Survey question: "The following sources provide information about wildfire risk. If you have received information from one of these sources, how useful has it been?"

Table 1
Dependent and independent variable descriptions and summary statistics. Data are from household surveys conducted by multiple partners and supported by The Wildfire Research (WiRē) Center in select communities across the Western United States 2018–2023 (N = 3641). USDA = U.S. Department of Agriculture.

Variable name	Variable description	Variable levels	Mean	S.d.
Panel A: Dependent variables[a]				
Removing trees and vegetation	Removing trees and reducing other vegetation (thinning/fuel breaks) on nearby public lands	=1 if high acceptance (very or extremely acceptable); =0 if low or no acceptance (moderately, slightly, or not acceptable)	0.79	0.41
Prescribed fire	Conducting a prescribed fire ignited by fire professionals/managers on nearby public lands		0.63	0.48
Pile burning	Burning piles of vegetation (slash piles) on nearby public lands		0.70	0.46
Managed fire	Allowing a naturally ignited fire to burn on nearby public lands, when and where appropriate, for forest management and fire mitigation purposes		0.71	0.45

Variable name	Variable levels (categorical)	%	N
Panel B: Formal wildfire risk information sources[b]			
Local fire department	Not received (base)	33 %	3641
	Not useful	1 %	
	Moderately useful	22 %	
	Very useful	45 %	
Local community group	Not received (base)	52 %	3641
	Not useful	2 %	
	Moderately useful	22 %	
	Very useful	24 %	
Media (newspaper, TV, radio, internet)	Not received (base)	37 %	3641
	Not useful	5 %	
	Moderately useful	44 %	
	Very useful	14 %	
Firewise USA®	Not received (base)	73 %	3641
	Not useful	1 %	
	Moderately useful	11 %	
	Very useful	15 %	
USDA Forest Service	Not received (base)	77 %	3641
	Not useful	2 %	
	Moderately useful	12 %	
	Very useful	10 %	
Bureau of Land Management[c]	Not received (base)	87 %	3284
	Not useful	2 %	
	Moderately useful	7 %	
	Very useful	4 %	

Variable name	Variable description	Variable levels	Mean	S.d.
Panel C: Informal wildfire risk information sources				
Talk fire[d]	Talking about wildfire issues with a neighbor	=1 if used; =0 if not used	0.64	0.48
Community activity[e]	Participation in a community wildfire activity		0.29	0.45

Variable name	Variable description	Variable levels	Mean	S.d.
Panel D: Other variables				
High risk rating	Overall parcel-level wildfire risk (using attributes such as slope, defensible space, roofing materials, etc.) determined by a trained assessor	=1 if very high or extreme; =0 if low, moderate, or high	0.34	0.47
Chance fire on property	The chance a respondent thinks that there will be a wildfire on their property in the next 12 months	0–10	2.3	1.7
Chance fire damage property	The chance a respondent thinks that if there is a wildfire on their property in the next 12 months, it will destroy or severely damage their home	0–10	4.7	2.8
Fire less 2 mi	Experience with how far a wildfire has come from current residence	=1 if <2 miles; =0 if >2 miles	0.24	0.43
Not full time	Occupying home less than full time (full time = occupy home 9 or more months out of the year)	=1 if not full time, =0 if full time	0.19	0.4
Tenure	Length of time living at residence (if tenure is greater than age [e.g., generational family home], tenure is equal to age of respondent)	-1 – 80[f]	16	13
Age	Age of respondent	23–94	64	12
Female	Gender of respondent	=1 if female; =0 if male or other	0.38	0.48
College	College graduate (undergraduate or higher)	=1 if college graduate; =0 otherwise	0.8	0.4
Retired	Retirement status	=1 if retired, =0 otherwise	0.51	0.5
Medium or low income	Medium or low household income (<$100 k per year)	=1 if low or medium income; =0 if high income	0.43	0.5

[a] Survey question: "How acceptable to you are the following approaches to reducing wildfire risk on nearby public lands?" Responses were reported on a scale of 0 = not at all acceptable, 1 = slightly acceptable, 2 = moderately acceptable, 3 = very acceptable, 4 = extremely acceptable, and coded =1 for response levels 3 or 4.
[b] Survey question: "The following sources provide information about wildfire risk. If you have received information from one of these sources, how useful has it been?" Responses were reported on a scale of 1 = not at all useful, 2 = slightly useful, 3 = moderately useful, 4 = very useful, 5 = extremely useful.
[c] Not asked in every community.
[d] Survey question: "Have you ever talked about wildfire issues with a neighbor?"
[e] Survey question: "Have you done any of the following wildfire-related activities?"

[f] -1 corresponds to respondents who report they will move into the residence in the year following the survey.

parcel-level wildfire risk rating as determined by trained assessors (*high risk rating*), homeowners' perceptions of wildfire risk (*chance fire on property* and *chance fire damage property*), experience with nearby wildfires (*fire less 2 mi*), occupancy and tenure information (*not full time* and *tenure*), and demographics (*age, female, college, retired,* and *medium or low income*) (Table 1, Panel D).

2.2. Analysis

We estimate several community-level fixed effects logit models to evaluate the level of acceptability for each of the four fuels treatments approaches as a function of wildfire risk information sources and other variables. For each fuels treatment approach, we estimate the following specification with each of the eight potential wildfire risk information sources:

$$Accept_{ic} = \beta_1 Source_{ic} + \beta_2 X_{ic} + \gamma_c + \epsilon_{ic} \tag{1}$$

where $Accept_{ic}$ is the probability of individual i in community c to has high acceptability of a given fuels treatment (i.e., to rate it very or extremely acceptable), $Source_{ic}$ represents a factor variable for the level of perceived usefulness (formal sources) or a binary variable for the use of (informal sources) a given information source, X_{ic} is a vector of control variables, γ_c is the community-level fixed effects, and ϵ_{ic} is the error term clustered at the community level.

Fixed effects estimation is preferred when clusters or groups of observations within the data are suspected to be correlated with one or more of the explanatory variables (Wooldridge, 2019, p. 481). Therefore, community-level fixed effects account for the within-community correlation we know to be present from the data and previous studies (e.g., Brenkert-Smith et al., 2023; Paveglio and Edgeley, 2023). Additionally, due to the high correlation among information source variables, each information source is tested separately for our main results to avoid multicollinearity.[5] The information source varies in each model for our main findings, but the control variables in X_{ic} remain constant.

3. Results

3.1. From what sources do respondents receive wildfire risk information and how useful do they find that information?

In general, local wildfire risk information sources are more widely received and perceived as useful, while nonlocal sources vary in their receipt and usefulness (Table 1, Panels B and C). Fig. 3 shows the distribution of respondents' reported receipt and perceived usefulness (if formal) or use (if informal) of each wildfire risk information source. Local formal sources such as fire departments and community groups were relatively frequently received (67 % and 48 %, respectively) and found to be highly useful (67 % and 50 % of respondents who received the source rated it very or extremely useful, respectively). Media was a frequently received source (63 %) but had a relatively low rate of perceived usefulness (23 % of respondents who received it rated it very or extremely useful). Conversely, Firewise USA®, a nonlocal wildfire risk education and preparedness program, had somewhat low rates of being received (27 %) but those that did tend to find it useful (56 % of respondents who received it rated it very or extremely useful). Federal information sources such as the USDA Forest Service and the Bureau of Land Management had the lowest rates of being received (23 % and 13 %, respectively) and similar relatively low levels of perceived usefulness (42 % and 31 % of respondents who received the source rated it very or extremely useful, respectively). For informal sources, most people had talked with their neighbors about wildfire issues (64 %), while fewer had participated in a community wildfire activity (29 %).

3.2. How acceptable are different fuels treatment approaches to respondents?

On average, all four fuels treatment approaches were rated as highly acceptable to respondents. The fuels treatment with the highest rate of acceptability was *removing trees and vegetation* (79 % of respondents rated this treatment very or extremely acceptable), while the treatment with the lowest rate was *prescribed fire* (63 % of respondents rated this treatment very or extremely acceptable) (Table 1, Panel A). *Pile burning* and *managed fire* have similar levels of acceptability with 70 % of respondents rating *pile burning* as very or extremely acceptable and 71 % of respondents rating *managed fire* as very or extremely acceptable (Table 1, Panel A).

3.3. How does the perceived usefulness or use of different wildfire risk information sources correlate with the acceptability?

We find that to have a positive correlation with acceptability, residents must receive information from a source and perceive that information as very (or moderately in some cases with Firewise USA®) useful. When residents perceive information from a source as not (or moderately for one case with media) useful, it can have a negative correlation with acceptability. Therefore, providing information that residents do not find useful is not always benign. We find that engaging with informal sources has no negative correlations with acceptability.

Fig. 4 summarizes the main findings from our econometric models (full model results and coefficient estimates are in Appendix Tables A.2 to A.5). Significant correlations between survey respondents' ratings of wildfire risk information sources and the probability that respondents find a given fuels treatment approach highly acceptable, holding other variables constant, are shown. Positive (+) correlations imply that compared to not receiving information from a source, a given level of usefulness of a source (if formal) or the use of a source (if informal) is correlated with a higher chance of a given fuels treatment being acceptable to respondents. Conversely, negative (−) correlations imply lower acceptability of a given fuels treatment for a given level of usefulness or use of a source.

Overall, we find that a large portion of respondents interact with local information sources (Fig. 3), and those sources tend to be associated with the acceptance of most, if not all, fuels treatment approaches. Specifically, respondents who rated information from local fire departments and local community groups as very useful were more likely to accept all four fuels treatments. For respondents who rated information from local fire departments very useful, the odds of acceptance are 70 % higher for *removing trees and vegetation* ($\beta = 0.531$), 37 % higher for *prescribed fire* ($\beta = 0.314$), 43 % higher for *pile burning* ($\beta = 0.357$), and 24 % higher for *managed fire* ($\beta = 0.219$), compared to those who had not received information. For respondents who rated information from local community groups very useful, the odds of acceptance are 62 % higher for *removing trees and vegetation* ($\beta = 0.481$), 31 % higher for *prescribed fire* ($\beta = 0.269$), 32 % higher for *pile burning* ($\beta = 0.276$), and 24 % higher for *managed fire* ($\beta = 0.217$), compared to those who had not received information. However, information from community groups perceived as not useful is negatively correlated with acceptability for both *removing trees and vegetation* and *pile burning.* For those who found information from community groups not useful, the odds of acceptance are 43 % lower for *removing trees and vegetation* ($\beta = -0.559$) and 42 % lower for *pile burning* ($\beta = -0.540$), compared to those who had not received information. Talking with neighbors about wildfire issues is

[5] The Appendix reports an additional combined model with all information sources included simultaneously for each fuels treatment (Tables A.2 to A.5).

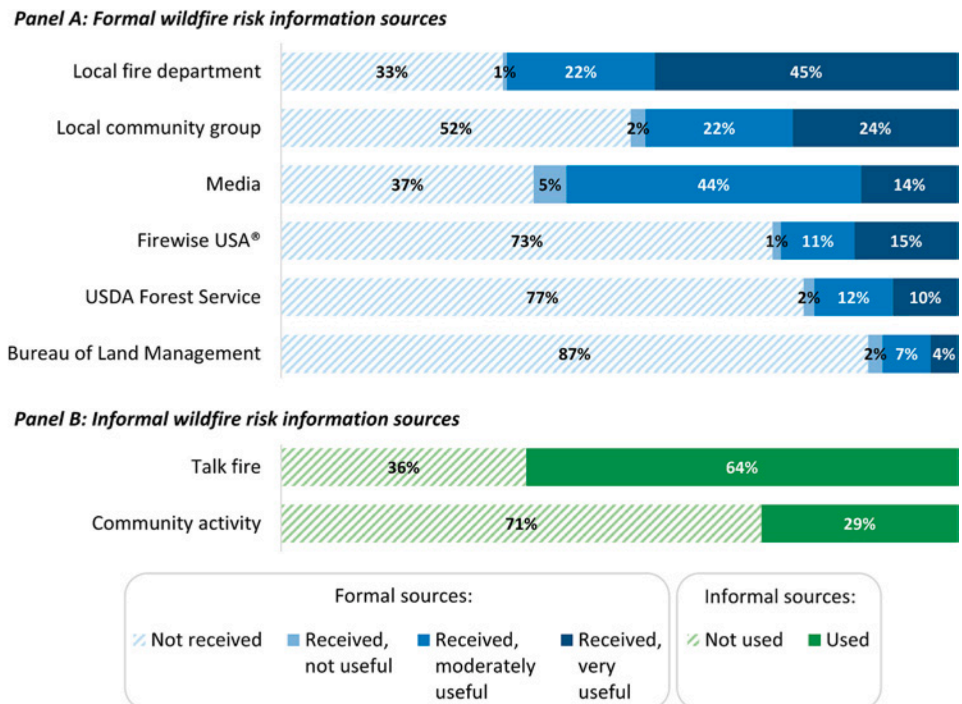

Fig. 3. Panel A: Survey respondents' reported receipt and rating of the usefulness of information from various formal wildfire risk information sources. Panel B: Survey respondents' reported use of various informal wildfire risk information sources. Data are from household surveys conducted by multiple partners and supported by The Wildfire Research (WiRē) Center in select communities across the Western United States 2018–2023. $N = 3641$; $N = 3284$ for models including the Bureau of Land Management as an information source (not asked on every community survey).

associated with a greater probability of acceptance for three out of four fuels treatments, with the odds of acceptance being 40 % higher for *removing trees and vegetation* ($\beta = 0.336$), 18 % higher for *pile burning* ($\beta = 0.165$), and 23 % higher for *managed fire* ($\beta = 0.210$), compared to those who had not talked with neighbors about wildfire issues. Participation in a community wildfire activity is associated with a greater probability of acceptance for *removing trees and vegetation*, with the odds of acceptance being 62 % higher ($\beta = 0.481$) compared to those who had not participated.

Contrary to local sources, nonlocal sources of information vary in their receipt and usefulness (Fig. 3) and have mixed associations with acceptability. First, media (newspaper, TV, radio, internet) have only negative correlations with acceptability. Information perceived as not useful from media correlates negatively with acceptance for three out of four fuels treatments, with the odds of acceptance being 43 % lower for *prescribed fire* ($\beta = -0.566$), 41 % lower for *pile burning* ($\beta = -0.526$), and 40 % lower for *managed fire* ($\beta = -0.519$) compared to those who had not received information. Additionally, even respondents who perceive information from media as moderately useful are less likely to be accepting of *prescribed fire*, with the odds of acceptance being 16 % lower ($\beta = -0.176$) compared to those who had not received information. In contrast, very useful information from Firewise USA® has strongly positive associations with the acceptability of all fuels treatments, with the odds of acceptance being 127 % higher for *removing trees and vegetation* ($\beta = 0.818$), 38 % higher for *prescribed fire* ($\beta = 0.324$), 47 % higher for *pile burning* ($\beta = 0.385$), and 26 % higher for *managed fire* ($\beta = 0.235$) compared to those who had not received information. Information deemed moderately useful from Firewise USA® is similarly positively correlated with acceptance of *prescribed fire* and *managed fire*, with the odds of acceptance being 21 % ($\beta = 0.190$) and 25 % ($\beta = 0.222$) higher, respectively, compared to those who had not received information. The only negative association for Firewise USA® is between respondents who find information not useful and the acceptance of *managed fire*, with the odds of acceptance being 60 % lower ($\beta = -0.919$), compared to those who had not received information. Finally, Federal sources including the USDA Forest Service and the Bureau of Land Management have mixed correlations with acceptability. Information deemed not useful from the USDA Forest Service is negatively correlated with the acceptance of *pile burning* and *managed fire*, with the odds of acceptance being 52 % ($\beta = -0.742$) and 42 % ($\beta = -0.544$) lower, respectively, while information deemed very useful is positively correlated acceptance for *removing trees and vegetation* and *prescribed fire*, with the odds of acceptance being 73 % ($\beta = 0.548$) and 47 % ($\beta = 0.384$) higher, respectively, compared to those who had not received information. Respondents who perceive information from the Bureau of Land Management as not useful are less likely to be accepting of *removing trees and vegetation, pile burning*, and *managed fire*, with the odds of acceptance being 51 % ($\beta = -0.706$), 60 % ($\beta = -0.909$), and 51 % ($\beta = -0.716$) lower, respectively, while very useful information correlates with the acceptability of *removing trees and vegetation*, *prescribed fire*, and *managed fire*, with the odds of acceptance being 67 % ($\beta = 0.513$), 106 % ($\beta = 0.723$), 48 % ($\beta = 0.390$) higher, respectively, compared to those who had not received information. It is important to note that these findings hold even though the sources we describe as “nonlocal” may have local representatives.

3.4. What are other factors related to acceptability?

Across all models, several other variables have significant correlations with the acceptability of each fuels treatment type, though information sources (particularly local fire departments, local community groups, and Firewise USA®) are among the most consistent significant predictors of acceptance across treatments (Tables A.2 to A.5). First, variables that are statistically significant and positively correlated with a greater likelihood of acceptance of a given fuels treatment include respondents who believe there is a higher chance of wildfire on their property in the next year (associated with *removing trees and vegetation, prescribed fire,* and *pile burning*) and college graduates (associated with *pile burning* and *managed fire*). For respondents who believe there is a higher chance of wildfire on their property in the next year, depending

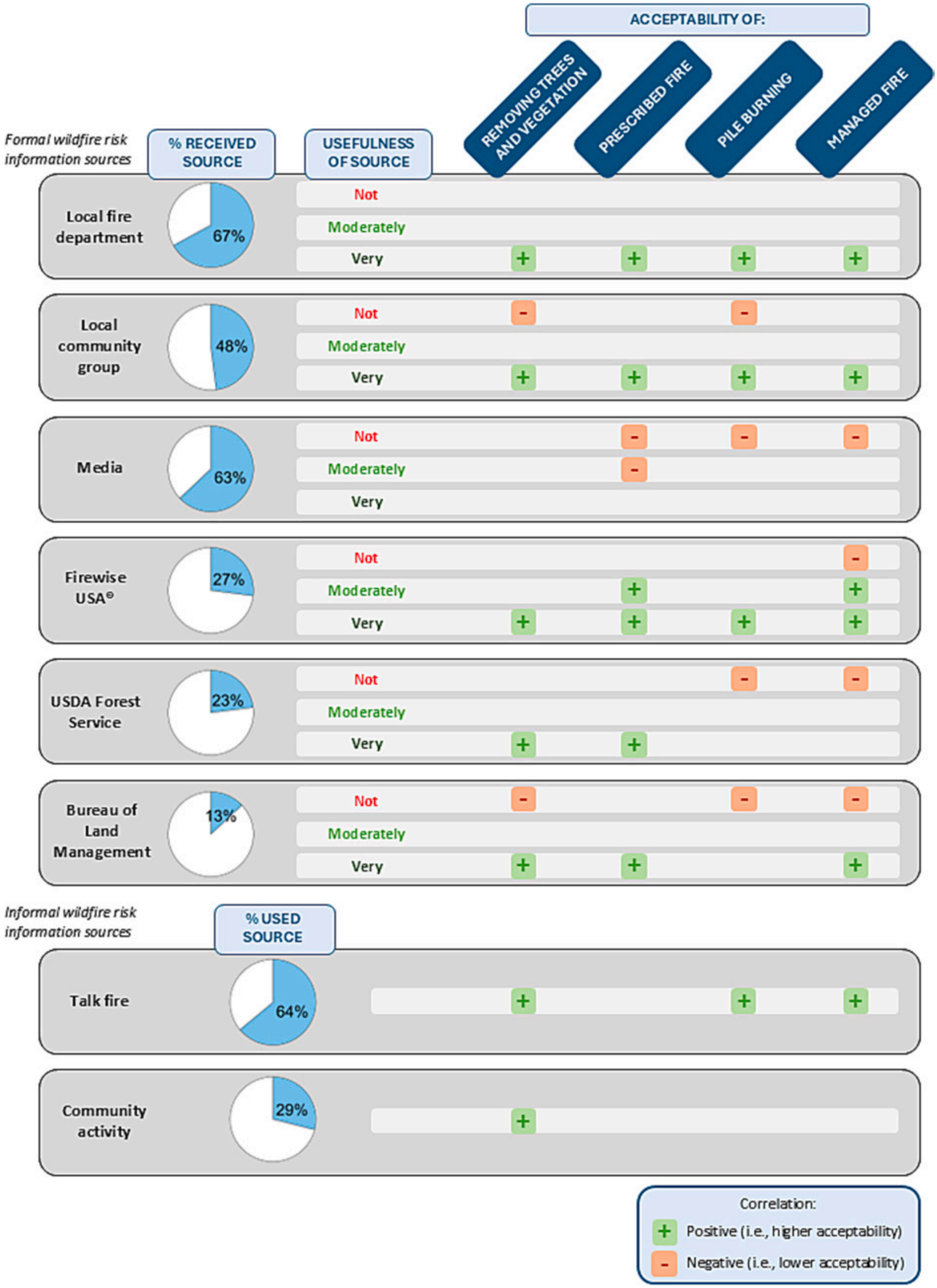

Fig. 4. Key results from a series of fixed effects logit models estimating the correlation between the usefulness or use of wildfire risk information sources on the acceptability of fuels treatments by homeowners compared to the baseline of not receiving a formal or using an informal information source. Only results with a *p*-value of 0.05 or less are displayed. Data are from household surveys conducted by multiple partners and supported by The Wildfire Research (WiRē) Center in select communities across the Western United States 2018–2023. N = 3641; N = 3284 for models including the Bureau of Land Management as an information source (not asked on every community survey).

on the information source modeled, the odds of acceptance increase between 8 % (β = 0.081) and 11 % (β = 0.105) for *removing trees and vegetation*, between 9 % (β = 0.088) and 10 % (β = 0.097) for *prescribed fire*, and between 8 % (β = 0.074) and 9 % (β = 0.085) for *pile burning*. For college graduates, the odds of acceptance increase between 32 % (β = 0.274) and 38 % (β = 0.320) for *pile burning* and between 23 % (β = 0.208) and 30 % (β = 0.259) for *managed fire*. Conversely, variables that are statistically significant and negatively correlated with acceptance of a given fuels treatment include greater age (associated with *removing trees and vegetation, prescribed fire,* and *pile burning*), female (associated with *removing trees and vegetation, prescribed fire,* and *pile burning*), longer tenure (associated with *prescribed fire* and *pile burning*), low or medium income (associated with *removing trees and vegetation* and *prescribed fire*), retired (associated with *pile burning*), and those with homes with a very high or extreme wildfire risk (associated with *removing trees and vegetation*). For older respondents, the odds of acceptance decrease between 1 % (β = −0.013) and 2 % (β = −0.019) for *removing trees and vegetation*, approximately 1 % (β = −0.013 to −0.015) for *prescribed fire*, and approximately 1 % (β = −0.012 to −0.014) for *pile burning*. For female respondents, the odds of acceptance decrease between 20 % (β = −0.223) and 24 % (β = −0.276) for *removing trees and vegetation*, between 26 % (β = −0.304) and 29 % (β = −0.342) for *prescribed fire*, and between 33 % (β = −0.396) and 38 % (β = −0.479) for *pile burning*. For respondents with a longer tenure, the odds of acceptance decrease approximately 1 % (β = −0.010 to −0.011) for *prescribed fire* and approximately 1 % (β = −0.010 to −0.011) for *pile burning*. For low- or medium-income respondents, the odds of acceptance decrease between 18 % (β = −0.196) and 21 % (β = −0.240) for *removing trees and vegetation* and between 17 % (β = −0.189) and 21 % (β = −0.240) for *prescribed fire*. For retired respondents, the odds of acceptance decrease between 17 % (β = −0.185) and 18 % (β = −0.199) for *pile burning*. For respondents with a very high or extreme wildfire risk, the odds of acceptance decrease between 24 % (β = −0.274) and 29 % (β = −0.348) for *removing trees and vegetation.* Variables that had no significant effects in any specification include experience with a wildfire coming within 2 miles of respondents' residence, residency less than full time, and respondents who believe that if a wildfire is on their property in the next year, there is a higher chance it will destroy or severely damage their home.

4. Discussion

Fuels treatments and fire management plans aimed at risk reduction are one avenue to enhance the safety of people living in and around the WUI. To implement the number and scale of fuels treatments scientists and policymakers suggest are necessary to reduce wildfire risk and increase forest health, it is important to understand the social dynamics operating in locations where these treatments might be considered (Steelman, 2016). In this study, we explored the correlation of several formal and informal wildfire risk information sources with the acceptability of fuels treatment approaches. We used survey data and parcel-level wildfire risk assessment data across 41 WUI communities in six Western US states to identify larger trends in communication channels that transcend locational differences. For these cross-community differences, our findings support existing literature that finds that fuels treatments on public lands are generally highly accepted (Brenkert-Smith et al., 2023; McCaffrey, 2010; McCaffrey and Olsen, 2012; McCaffrey et al., 2012; Mylek and Schirmer, 2016; Shindler et al., 2009; Vaske et al., 2007), but acceptance varies by type of treatment (Absher and Vaske, 2007; Brenkert-Smith et al., 2023; Brunson and Shindler, 2004; Clement and Cheng, 2011; Gordon et al., 2014; Kaval et al., 2007; McCaffrey et al., 2008; McCaffrey et al., 2012; Molina et al., 2021; Mylek and Schirmer, 2016; Ostergren et al., 2008; Shindler and Toman, 2003; Shindler et al., 2009; Shindler et al., 2011; Toman et al., 2006; Vogt et al., 2005).

Furthermore, we find that local sources of wildfire risk information are more widely received and perceived as useful, whereas nonlocal sources vary in their receipt and usefulness. This finding is supported by previous studies that find respondents tend to prefer personal and local sources of information such as fire departments, local Federal government representatives, or friends and family over nonlocal sources such as media (Brenkert-Smith et al., 2013; McCaffrey, 2004; Steelman et al., 2015; Toman et al., 2006). Although information from Firewise USA®, a nonlocal source, was often perceived as useful and information was positively correlated with acceptability, it was not received by as many people as the local sources were and has been found to only resonate with certain populations (e.g., Steinberg, 2011), highlighting the need to tailor materials and strategies to local populations. Interpreting the perceived usefulness of sources as a proxy for trust in those sources may help explain why engagement with local sources of wildfire risk information was positively correlated with the acceptability of treatments on nearby public lands. Although we examined the usefulness (if formal) or use (if informal) of information delivered by different organizations, rather than the usefulness of or trust in the organizations themselves, the results still suggest a need to leverage sources of communication that residents find useful and trustworthy when messaging about fuels treatments. This supports existing literature that finds that trust is a key component in resident-agency communication and the acceptability of fuels treatments (Czaja et al., 2016; Davis et al., 2018; Gordon et al., 2014; McCaffrey, 2010, 2015; Mylek and Schirmer, 2016; Shindler and Toman, 2003; Toman et al., 2011; Vaske et al., 2007; Winter et al., 2002; Winter et al., 2004), and that communication and education materials can increase both wildfire knowledge and improve attitudes toward wildfire and forest management actions (Crow et al., 2015; Loomis et al., 2001; McCaffrey, 2004; Paveglio et al., 2009; Toman et al., 2006; Vaske et al., 2007). Thus, it might be productive for local trusted wildfire risk information sources to message about wildfire risk reduction on both public land and private land.

In general, respondents who found a source's information useful were more likely to accept fuels treatments, compared to those who did not receive that source. Conversely, respondents who found a source's information not useful were less likely to accept fuels treatments, compared to those who did not receive that source. In other words, providing information that is not deemed useful is not necessarily benign. An important observation to note is that the sources that were both generally rated useful and positively correlated with the acceptance of fuels treatments (fire departments, community groups, Firewise USA®) are sources whose work is typically aimed at wildfire risk communication and mitigation, rather than implementing treatments. Information from sources that typically implement treatments (the USDA Forest Service and Bureau of Land Management) was less likely to be positively associated with acceptance. Thus, existing communication strategies regarding fuels treatments may benefit from changing the messenger.

This research extends the conclusions of existing disaster literature, which finds that leveraging trusted, credible sources during crisis events is essential to effective communication (Seeger, 2006; Sellnow et al., 2008) by emphasizing that wildfire risk communication outside of times of disaster also benefits from local sources. This research may be relevant to land managers and policymakers involved in communicating about fuels treatments on public lands. Our findings on the varying receipt and perceived usefulness or use of information sources underscore the importance of local engagement and communication in wildfire management efforts. For example, the USDA Forest Service Wildfire Crisis Strategy emphasizes an integrated approach to wildfire prevention and response, with a key focus on increasing collaboration and public engagement at the local level (USFS, 2022). Our results suggest that local sources of information are not only more frequently received but also viewed as more useful by survey respondents across different locations. This aligns with the USDA Forest Service's emphasis on tailoring messaging and treatments to local communities, recognizing that region-specific knowledge and context are crucial for effective fire management strategies.

Moreover, the varying reception and utility of nonlocal sources highlight the potential challenges in scaling up communication and treatment strategies across regions. Land managers may have to balance national-level guidance with localized approaches, ensuring that broader initiatives, such as large-scale fuels treatments, are communicated in ways that resonate with local populations. The perceived value of local information suggests that to be effective and successful, wildfire management efforts by land managers may benefit from leveraging local networks and knowledge, reinforcing the need for a decentralized approach to information dissemination and decision-making. In other words, while national-level strategies and policies are important, they may benefit by being adapted and delivered through local channels that are trusted by communities.

This work has several important limitations. First, our modeling approach allows for the examination of associations and correlations among variables, not causality. We have determined in this study that there are significant relationships between different wildfire risk information sources and fuels treatment approaches. However, we cannot assert that the usefulness or use of these sources causes respondents to view fuels treatments in certain ways. Like any study, our results might not generalize beyond the study population. That said, our results are from many communities across the Western US and we use community fixed effects to control for cross-community variation in levels. Lastly, our findings rely on survey data which may be prone to non-response or other biases.

This work supports and adds to existing social science literature that emphasizes the importance of capitalizing on existing trusted organizations and resident networks for wildfire mitigation outreach (e.g., Crow et al., 2015; Rasch and McCaffrey, 2019). If managers planning fuels treatments on public lands near communities start their planning by considering how residents feel about fuels treatments, they may avoid contentious battles that could result in ecologically suboptimal treatment plans rather than the needed location and scale. Comprehensive risk reduction requires collective actions on both public and private lands, as wildfires do not stop at property boundaries. Resident-agency collaboration and trust is essential to the implementation of ecologically sound and socially acceptable wildfire risk-reducing actions. Although we focused on the interaction of information sources and fuels treatments, future research examining other factors related to acceptability such as proximity to treatment, proximity to public land, local fire ecology, experience with smoke, the visibility of treatments or burns, and other factors could provide further insights for building fuels treatment plans that align with understandings of acceptability. Additionally, modeling techniques that allow investigations into causal relationships between the usefulness of wildfire risk information sources and the acceptability of fuels treatments may be helpful to explain further the correlations found here.

Disclaimers

The findings and conclusions in this report are those of the authors and should not be construed to represent any official USDA determination or policy. The household surveys described in this report were organized and implemented by non-Federal partners and were not conducted on behalf of the U.S. Geological Survey.

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CRediT authorship contribution statement

Kelly Wallace: Writing – original draft, Writing – review & editing, Formal analysis, Conceptualization, Investigation, Methodology, Visualization, Data curation. **Hannah Brenkert-Smith:** Funding acquisition, Writing – review & editing, Supervision, Conceptualization. **Patricia A. Champ:** Funding acquisition, Writing – review & editing, Supervision, Conceptualization. **James R. Meldrum:** Writing – review & editing, Supervision, Conceptualization. **Grant Webster:** Writing – review & editing. **Christine Taniguchi:** Visualization. **Julia B. Goolsby:** Visualization. **Colleen Donovan:** Data curation. **Carolyn Wagner:** Data curation. **Christopher M. Barth:** Conceptualization, Data curation. **Josh Kuehn:** Data curation. **Suzanne Wittenbrink:** Data curation.

Declaration of competing interest

Hannah Brenkert-Smith reports a relationship with The Wildfire Research (WiRē) Center that includes: board membership. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A

A summary of the 15 Wildfire Research (WiRē) Center projects (Table A.1) and full model specifications for each of the fuels treatments tested are detailed here (Tables A.2 to A.5).

Table A.1
Summary of the 15 Wildfire Research (WiRē) Center projects used to investigate wildfire risk information sources' role in the acceptability of fuels treatment approaches on public lands near select wildland-urban interface (WUI) communities in the Western United States. The number of responses retained for study is less than the total number of paired survey responses because of filtering for complete and usable surveys. Additional survey responses are filtered out for models including the Bureau of Land Management as an information source (not asked on every community survey).

Lead practitioner organization	State	Location description	Year	Community	Total paired survey responses	Responses retained for study	Average project response rate	Citation
Chelan County Fire District 1	Washington	Squilchuck drainage; Chelan County	2018	Buezer Boodry	5	0	46 %	Brenkert-Smith, Champ, et al. (2020)
				Forest Ridge	48	32		
				Methow	51	36		
				Squilchuck Valley	113	74		

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Table A.1 (*continued*)

Lead practitioner organization	State	Location description	Year	Community	Total paired survey responses	Responses retained for study	Average project response rate	Citation
				Wenatchee Heights	76	52		
Colorado State Forest Service	Colorado	Chalk Creek Canyon; Chaffee County	2019	Chalk Creek Drainage	204	129	50 %	Champ et al. (2021)
Grand County Wildfire Council	Colorado	Grand County	2020	Aspen Canyon Ranch	13	0	50 %	Brenkert-Smith et al. (2022)
				Bighorn Park	31	24		
				Columbine Lake	226	137		
				Copper Creek	14	11		
				Winter Park Highlands	133	91		
				Winter Park Ranch	140	95		
Ashland Fire and Rescue	Oregon	City of Ashland	2019	Beswick	295	189	56 %	Brenkert-Smith, Chambers, et al. (2020)
				North Mountain	226	139		
				Reservoir	35	23		
				Strawberry	291	198		
				University Hillside	272	180		
Platte Canyon Fire Protection District	Colorado	Platte Canyon; Park County	2020	Platte Canyon FPD Select Areas	417	327	36 %	Brenkert-Smith, Champ, et al. (2023)
Teton Area Wildfire Protection Coalition	Wyoming	Teton County	2021	Fall Creek Corridor	103	78	38 %	Goolsby et al. (2022)
				Game Creek	34	27		
				Hoback Nation	40	28		
				Moran	34	27		
				Skyline Ranches	32	22		
Utah Division of Forestry, Fire and State Lands	Utah	Emigration Canyon	2021	Emigration Canyon	245	177	45 %	Goolsby et al. (2023)
City of Santa Fe Fire Department	New Mexico	Santa Fe	2021	Arroyo Chamiso	73	43	46 %	Meldrum et al. (2024)
				Cerro Gordo East	14	13		
				Hyde Park, Santa Fe Summit	79	45		
				Los Cerros Colorados	43	28		
				Monte Sereno	37	25		
				Sierra Del Norte	68	43		
				Talaya Hill, Ponderosa Ridge, Wilderness Gate	27	20		
				Upper Canyon Road	70	44		
Genesee Fire Rescue	Colorado	Genesee Fire Protection District	2021	Genesee Foundation, Ridge Townhomes, The Preserve	423	279	45 %	Brenkert-Smith, Dalton, et al. (2023)
				Genesee Mtn Estates, Chimney Creek	55	38		
				Genesee Village	103	77		
Wenatchee Valley Fire Department	Washington	Stemilt Basin	2022	Stemilt Basin	36	22	42 %	Goolsby, Champ, Wittenbrink, Donovan, Heard, et al. (2024)
Lake Wenatchee Fire and Rescue	Washington	Lake Wenatchee Fire and Rescue District	2022	Lake Wenatchee East	248	160	45 %	Goolsby, Champ, Wittenbrink, Donovan, King, et al., (2024)
				Lake Wenatchee West	84	55		
Chelan County Fire District 3	Washington	Chelan County	2022	Chumstick Corridor	178	133	38 %	(Forthcoming). Living with wildfire in Chelan County, Washington: 2022 data report.
West Region Wildfire Council	Colorado	Montrose Fire Protection District	2023	Montrose FPD Select Areas	268	171	25 %	(Forthcoming). Living with wildfire in Montrose Fire Protection District: 2023 data report.
Estes Valley Fire Protection District	Colorado	Town of Estes Park	2023	Carriage Hills	263	172	39 %	(Forthcoming). Living with wildfire in Estes Park, Colorado: 2023 data report.
				East Prospect Estates	156	105		
				Raven Ave	131	72		
					Total: 5148	**Total: 3641**	**Average: 41 %**	

Table A.2
Coefficients and standard errors estimated for community-level fixed effects logit models for the acceptability of removing trees and vegetation as a function of wildfire risk information sources and other factors. Data are from household surveys conducted by multiple partners and supported by The Wildfire Research (WiRē) Center in select communities across the Western United States 2018–2023. N = 3641; N = 3284 for models including the Bureau of Land Management as an information source (not asked on every community survey). USDA = U.S. Department of Agriculture.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Local fire dept.: not useful	0.339								0.749

(continued on next page)

Table A.2 (*continued*)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	(0.594)								(0.583)
Local fire dept.: moderately useful	−0.149								−0.216
	(0.130)								(0.131)
Local fire dept.: very useful	0.531***								0.327*
	(0.127)								(0.152)
Local community group: not useful		−0.559**							−0.513
		(0.211)							(0.267)
Local community group: moderately useful		0.066							0.074
		(0.099)							(0.123)
Local community group: very useful		0.481**							0.097
		(0.165)							(0.198)
Media: not useful			−0.391						−0.339
			(0.217)						(0.231)
Media: moderately useful			0.030						−0.078
			(0.100)						(0.096)
Media: very useful			0.240						−0.037
			(0.128)						(0.188)
Firewise USA®: not useful				−0.495					0.135
				(0.345)					(0.441)
Firewise USA®: moderately useful				0.144					0.211
				(0.150)					(0.154)
Firewise USA®: very useful				0.818***					0.503**
				(0.170)					(0.176)
USDA Forest Service: not useful					−0.386				0.673
					(0.310)				(0.503)
USDA Forest Service: moderately useful					0.097				0.318
					(0.137)				(0.229)
USDA Forest Service: very useful					0.548***				0.459**
					(0.142)				(0.171)
Bureau of Land Management: not useful						−0.706**			−1.056**
						(0.270)			(0.409)
Bureau of Land Management: moderately useful						−0.202			−0.530*
						(0.203)			(0.268)
Bureau of Land Management: very useful						0.513*			−0.228
						(0.210)			(0.278)
Talk fire							0.336***		0.173
							(0.092)		(0.109)
Community activity								0.481***	0.191
								(0.116)	(0.133)
High risk rating	−0.327**	−0.328**	−0.339**	−0.321**	−0.329**	−0.316*	−0.348**	−0.335**	−0.274*
	(0.110)	(0.110)	(0.112)	(0.109)	(0.111)	(0.130)	(0.112)	(0.111)	(0.124)
Chance fire on property	0.081*	0.091*	0.091*	0.084*	0.090*	0.105*	0.086*	0.089*	0.088*
	(0.034)	(0.036)	(0.038)	(0.037)	(0.037)	(0.043)	(0.036)	(0.036)	(0.039)
Chance fire damage property	0.000	−0.000	−0.001	−0.001	0.002	0.004	−0.001	−0.001	0.004
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)	(0.022)	(0.019)	(0.019)	(0.022)
Fire less 2 mi	0.121	0.141	0.140	0.114	0.138	0.244	0.106	0.113	0.163
	(0.189)	(0.190)	(0.190)	(0.190)	(0.188)	(0.181)	(0.189)	(0.182)	(0.187)
Not full time	−0.166	−0.226	−0.224	−0.196	−0.224	−0.176	−0.193	−0.197	−0.058
	(0.156)	(0.148)	(0.148)	(0.146)	(0.144)	(0.170)	(0.143)	(0.146)	(0.188)
Tenure	−0.004	−0.004	−0.004	−0.005	−0.005	−0.005	−0.005	−0.005	−0.005
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Age	−0.013**	−0.014**	−0.014**	−0.013*	−0.013*	−0.018***	−0.013*	−0.013**	−0.019***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Female	−0.223**	−0.236**	−0.244**	−0.230**	−0.226**	−0.276**	−0.223**	−0.242**	−0.274**
	(0.079)	(0.079)	(0.081)	(0.078)	(0.080)	(0.089)	(0.079)	(0.082)	(0.093)
College	0.175	0.163	0.176	0.173	0.164	0.202	0.143	0.134	0.166
	(0.101)	(0.101)	(0.101)	(0.101)	(0.103)	(0.113)	(0.097)	(0.099)	(0.126)
Retired	0.116	0.116	0.125	0.114	0.134	0.153	0.103	0.101	0.142
	(0.114)	(0.115)	(0.117)	(0.117)	(0.115)	(0.113)	(0.116)	(0.114)	(0.120)
Medium or low income	−0.224**	−0.210*	−0.226**	−0.207*	−0.240**	−0.196*	−0.231**	−0.218**	−0.197*
	(0.081)	(0.083)	(0.080)	(0.085)	(0.085)	(0.083)	(0.083)	(0.080)	(0.091)
Num. obs.	3641	3641	3641	3641	3641	3284	3641	3641	3284
Num. groups: wire_community	41	41	41	41	41	38	41	41	38
Deviance	3528.149	3550.989	3565.192	3538.312	3560.588	3121.135	3559.547	3552.675	3041.825
Log Likelihood	−1764.075	−1775.494	−1782.596	−1769.156	−1780.294	−1560.567	−1779.773	−1776.338	−1520.913
Pseudo R2	0.037	0.031	0.027	0.034	0.028	0.028	0.030	0.031	0.042

[*] $p < 0.001$.
[**] $p < 0.01$.
[***] $p < 0.05$.

Table A.3
Coefficients and standard errors estimated for community-level fixed effects logit models for the acceptability of prescribed fire as a function of wildfire risk information sources and other factors. Data are from household surveys conducted by multiple partners and supported by the Wildlife Research (WiRē) Center in select communities across the Western United States 2018–2023. N = 3641; N = 3284 for models including the Bureau of Land Management as an information source (not asked on every community survey). USDA = U.S. Department of Agriculture.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Local fire dept.: not useful	0.318								0.393
	(0.489)								(0.523)
Local fire dept.: moderately useful	−0.162								−0.173
	(0.087)								(0.106)
Local fire dept.: very useful	0.314***								0.221
	(0.093)								(0.123)
Local community group: not useful		−0.069							0.175
		(0.191)							(0.219)
Local community group: moderately useful		−0.118							−0.094
		(0.092)							(0.111)
Local community group: very useful		0.269**							0.064
		(0.093)							(0.126)
Media: not useful			−0.566**						−0.473*
			(0.192)						(0.189)
Media: moderately useful			−0.176*						−0.246**
			(0.082)						(0.078)
Media: very useful			0.256						0.079
			(0.131)						(0.144)
Firewise USA®: not useful				−0.201					0.101
				(0.291)					(0.372)
Firewise USA®: moderately useful				0.190*					0.347**
				(0.090)					(0.110)
Firewise USA®: very useful				0.324**					0.150
				(0.101)					(0.109)
USDA Forest Service: not useful					−0.183				0.487
					(0.324)				(0.533)
USDA Forest Service: moderately useful					−0.036				0.005
					(0.113)				(0.166)
USDA Forest Service: very useful					0.384**				0.043
					(0.121)				(0.182)
Bureau of Land Management: not useful						−0.509			−0.743
						(0.268)			(0.434)
Bureau of Land Management: moderately useful						−0.153			−0.161
						(0.153)			(0.202)
Bureau of Land Management: very useful						0.723***			0.431
						(0.203)			(0.243)
Talk fire							0.059		−0.020
							(0.077)		(0.082)
Community activity								0.136	0.060
								(0.100)	(0.107)
High risk rating	−0.033	−0.038	−0.046	−0.037	−0.040	−0.064	−0.047	−0.045	−0.049
	(0.084)	(0.084)	(0.084)	(0.086)	(0.085)	(0.092)	(0.084)	(0.084)	(0.091)
Chance fire on property	0.089***	0.094***	0.097***	0.091***	0.094***	0.097***	0.095***	0.095***	0.088***
	(0.019)	(0.019)	(0.019)	(0.019)	(0.018)	(0.018)	(0.019)	(0.018)	(0.019)
Chance fire damage property	−0.011	−0.012	−0.012	−0.011	−0.009	−0.000	−0.011	−0.011	−0.001
	(0.015)	(0.016)	(0.015)	(0.016)	(0.016)	(0.016)	(0.015)	(0.016)	(0.016)
Fire less 2 mi	−0.003	0.012	0.012	−0.003	0.008	0.044	0.004	0.001	0.035
	(0.103)	(0.102)	(0.102)	(0.101)	(0.102)	(0.085)	(0.101)	(0.101)	(0.083)
Not full time	−0.083	−0.118	−0.139	−0.104	−0.115	−0.108	−0.113	−0.111	−0.089
	(0.171)	(0.160)	(0.162)	(0.161)	(0.161)	(0.184)	(0.162)	(0.163)	(0.190)
Tenure	−0.011**	−0.011**	−0.011*	−0.011**	−0.011*	−0.010*	−0.011**	−0.011**	−0.010*
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.005)
Age	−0.013**	−0.014**	−0.014**	−0.013*	−0.013*	−0.014*	−0.013*	−0.013*	−0.015**
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.006)
Female	−0.308***	−0.313***	−0.342***	−0.304***	−0.309***	−0.315***	−0.307***	−0.311***	−0.332***
	(0.079)	(0.080)	(0.080)	(0.079)	(0.081)	(0.090)	(0.078)	(0.080)	(0.090)
College	0.128	0.121	0.138	0.126	0.119	0.101	0.117	0.112	0.115
	(0.087)	(0.086)	(0.091)	(0.085)	(0.087)	(0.090)	(0.081)	(0.082)	(0.091)
Retired	−0.116	−0.120	−0.099	−0.111	−0.098	−0.074	−0.111	−0.114	−0.078
	(0.101)	(0.103)	(0.102)	(0.102)	(0.103)	(0.108)	(0.104)	(0.102)	(0.113)
Medium or low income	−0.193*	−0.193*	−0.199*	−0.189*	−0.205*	−0.237*	−0.198*	−0.195*	−0.240*
	(0.093)	(0.094)	(0.094)	(0.095)	(0.097)	(0.102)	(0.094)	(0.095)	(0.101)
Num. obs.	3641	3641	3641	3641	3641	3284	3641	3641	3284
Num. groups: wire_community	41	41	41	41	41	38	41	41	38
Deviance	4341.624	4355.090	4344.242	4358.327	4358.867	3922.087	4367.785	4365.917	3876.176
Log Likelihood	−2170.812	−2177.545	−2172.121	−2179.164	−2179.434	−1961.044	−2183.892	−2182.959	−1938.088
Pseudo R2	0.075	0.072	0.074	0.071	0.071	0.077	0.070	0.071	0.080

* $p < 0.001$.
** $p < 0.01$.
*** $p < 0.05$.

Table A.4
Coefficients and standard errors estimated for community-level fixed effects logit models for the acceptability of pile burning as a function of wildfire risk information sources and other factors. Data are from household surveys conducted by multiple partners and supported by The Wildfire Research (WiRē) Center in select communities across the Western United States 2018–2023. N = 3641; N = 3284 for models including the Bureau of Land Management as an information source (not asked on every community survey). USDA = U.S. Department of Agriculture.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Local fire dept.: not useful	0.079								0.468
	(0.488)								(0.567)
Local fire dept.: moderately useful	−0.100								−0.106
	(0.117)								(0.120)
Local fire dept.: very useful	0.357***								0.280*
	(0.117)								(0.139)
Local community group: not useful		−0.540**							−0.346
		(0.201)							(0.275)
Local community group: moderately useful		−0.115							−0.077
		(0.083)							(0.104)
Local community group: very useful		0.276***							0.042
		(0.087)							(0.106)
Media: not useful			−0.526***						−0.357**
			(0.129)						(0.133)
Media: moderately useful			−0.079						−0.129
			(0.093)						(0.103)
Media: very useful			0.214						0.156
			(0.121)						(0.146)
Firewise USA®: not useful				−0.529					0.129
				(0.275)					(0.403)
Firewise USA®: moderately useful				0.041					0.207
				(0.105)					(0.129)
Firewise USA®: very useful				0.385**					0.191
				(0.133)					(0.127)
USDA Forest Service: not useful					−0.742*				0.033
					(0.348)				(0.531)
USDA Forest Service: moderately useful					−0.063				0.020
					(0.065)				(0.127)
USDA Forest Service: very useful					0.240				0.135
					(0.124)				(0.222)
Bureau of Land Management: not useful						−0.909***			−0.807*
						(0.259)			(0.400)
Bureau of Land Management: moderately useful						−0.141			−0.176
						(0.150)			(0.226)
Bureau of Land Management: very useful						−0.169			−0.269
						(0.152)			(0.283)
Talk fire							0.165*		0.078
							(0.069)		(0.077)
Community activity								0.153	0.023
								(0.082)	(0.096)
High risk rating	−0.028	−0.033	−0.041	−0.032	−0.033	−0.044	−0.046	−0.041	−0.021
	(0.093)	(0.092)	(0.093)	(0.091)	(0.093)	(0.103)	(0.092)	(0.092)	(0.107)
Chance fire on property	0.075***	0.082***	0.082***	0.078***	0.085***	0.085***	0.080***	0.082***	0.074***
	(0.019)	(0.020)	(0.020)	(0.019)	(0.020)	(0.020)	(0.019)	(0.019)	(0.020)
Chance fire damage property	0.004	0.003	0.003	0.003	0.004	0.013	0.003	0.003	0.013
	(0.014)	(0.015)	(0.014)	(0.014)	(0.014)	(0.013)	(0.014)	(0.014)	(0.014)
Fire less 2 mi	0.068	0.087	0.084	0.067	0.085	0.092	0.065	0.072	0.060
	(0.111)	(0.111)	(0.111)	(0.113)	(0.111)	(0.120)	(0.111)	(0.111)	(0.125)
Not full time	−0.026	−0.071	−0.080	−0.056	−0.072	−0.033	−0.053	−0.060	0.021
	(0.150)	(0.141)	(0.142)	(0.139)	(0.140)	(0.157)	(0.138)	(0.140)	(0.175)
Tenure	−0.011*	−0.011*	−0.010*	−0.011*	−0.011*	−0.009	−0.011*	−0.011*	−0.009
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Age	−0.012	−0.012*	−0.012*	−0.011	−0.011	−0.013*	−0.011	−0.011	−0.014*
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)	(0.006)	(0.006)	(0.006)
Female	−0.398***	−0.411***	−0.424***	−0.403***	−0.410***	−0.461***	−0.396***	−0.402***	−0.479***
	(0.083)	(0.081)	(0.079)	(0.080)	(0.083)	(0.085)	(0.080)	(0.083)	(0.089)
College	0.314**	0.308**	0.320**	0.312**	0.303**	0.274*	0.295**	0.297**	0.276*
	(0.106)	(0.105)	(0.108)	(0.105)	(0.106)	(0.108)	(0.101)	(0.105)	(0.115)
Retired	−0.196*	−0.199*	−0.182	−0.195*	−0.185*	−0.172	−0.198*	−0.196*	−0.181
	(0.095)	(0.094)	(0.094)	(0.094)	(0.093)	(0.101)	(0.096)	(0.094)	(0.101)
Medium or low income	−0.184	−0.181	−0.189	−0.171	−0.191	−0.201	−0.189	−0.185	−0.202
	(0.112)	(0.111)	(0.112)	(0.116)	(0.113)	(0.115)	(0.114)	(0.113)	(0.119)
Num. obs.	3641	3641	3641	3641	3641	3284	3641	3641	3284
Num. groups: wire_community	41	41	41	41	41	38	41	41	38
Deviance	3968.129	3974.971	3977.763	3978.444	3982.363	3598.996	3988.134	3989.272	3558.968
Log Likelihood	−1984.064	−1987.486	−1988.881	−1989.222	−1991.182	−1799.498	−1994.067	−1994.636	−1779.484
Pseudo R2	0.078	0.077	0.076	0.076	0.075	0.080	0.075	0.074	0.081

* $p < 0.001$.
** $p < 0.01$.
*** $p < 0.05$.

Table A.5

Coefficients and standard errors estimated for community-level fixed effects logit models for the acceptability of managed fire as a function of wildfire risk information sources and other factors. Data are from household surveys conducted by multiple partners and supported by The Wildfire Research (WiRē) Center in select communities across the Western United States 2018–2023. N = 3641; N = 3284 for models including the Bureau of Land Management as an information source (not asked on every community survey). USDA = U.S. Department of Agriculture.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Local fire dept.: not useful	−0.650								−0.200
	(0.530)								(0.581)
Local fire dept.: moderately useful	−0.083								−0.067
	(0.087)								(0.104)
Local fire dept.: very useful	0.219*								0.202
	(0.092)								(0.115)
Local community group: not useful		−0.449							−0.282
		(0.255)							(0.254)
Local community group: moderately useful		−0.040							−0.077
		(0.080)							(0.108)
Local community group: very useful		0.217*							−0.025
		(0.100)							(0.112)
Media: not useful			−0.519**						−0.339
			(0.180)						(0.188)
Media: moderately useful			−0.088						−0.129
			(0.082)						(0.103)
Media: very useful			0.176						0.072
			(0.111)						(0.135)
Firewise USA®: not useful				−0.919**					−0.314
				(0.308)					(0.380)
Firewise USA®: moderately useful				0.222*					0.331***
				(0.088)					(0.100)
Firewise USA®: very useful				0.235**					0.103
				(0.074)					(0.099)
USDA Forest Service: not useful					−0.544*				0.093
					(0.240)				(0.369)
USDA Forest Service: moderately useful					−0.096				−0.146
					(0.082)				(0.150)
USDA Forest Service: very useful					0.135				−0.216
					(0.122)				(0.197)
Bureau of Land Management: not useful						−0.716*			−0.478
						(0.280)			(0.424)
Bureau of Land Management: moderately useful						−0.099			−0.027
						(0.122)			(0.193)
Bureau of Land Management: very useful						0.390*			0.358
						(0.173)			(0.233)
Talk fire							0.210**		0.133
							(0.067)		(0.083)
Community activity								0.115	0.061
								(0.096)	(0.111)
High risk rating	−0.023	−0.023	−0.030	−0.022	−0.025	−0.052	−0.035	−0.029	−0.049
	(0.079)	(0.080)	(0.081)	(0.077)	(0.077)	(0.083)	(0.078)	(0.080)	(0.085)
Chance fire on property	−0.010	−0.004	−0.004	−0.006	−0.002	−0.022	−0.008	−0.004	−0.033
	(0.032)	(0.031)	(0.032)	(0.031)	(0.030)	(0.031)	(0.030)	(0.031)	(0.032)
Chance fire damage property	0.006	0.006	0.006	0.005	0.006	0.021	0.006	0.005	0.021
	(0.017)	(0.017)	(0.017)	(0.017)	(0.016)	(0.016)	(0.016)	(0.017)	(0.017)
Fire less 2 mi	0.003	0.014	0.015	−0.004	0.016	0.058	−0.012	0.005	0.031
	(0.100)	(0.102)	(0.103)	(0.102)	(0.101)	(0.106)	(0.105)	(0.098)	(0.109)
Not full time	−0.161	−0.185	−0.195	−0.178	−0.188	−0.164	−0.163	−0.175	−0.143
	(0.143)	(0.140)	(0.141)	(0.138)	(0.139)	(0.154)	(0.140)	(0.141)	(0.161)
Tenure	−0.004	−0.004	−0.004	−0.005	−0.004	−0.004	−0.005	−0.005	−0.004
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Age	−0.002	−0.002	−0.002	−0.001	−0.001	0.002	−0.001	−0.001	0.002
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Female	0.047	0.041	0.026	0.047	0.040	0.073	0.052	0.046	0.060
	(0.065)	(0.064)	(0.063)	(0.066)	(0.063)	(0.065)	(0.065)	(0.064)	(0.068)
College	0.225**	0.223**	0.234**	0.230**	0.220*	0.253**	0.208*	0.216**	0.259**
	(0.086)	(0.086)	(0.087)	(0.084)	(0.087)	(0.096)	(0.083)	(0.084)	(0.097)
Retired	−0.042	−0.042	−0.032	−0.044	−0.036	−0.060	−0.050	−0.043	−0.073
	(0.077)	(0.077)	(0.078)	(0.078)	(0.077)	(0.087)	(0.078)	(0.078)	(0.089)
Medium or low income	−0.050	−0.047	−0.055	−0.042	−0.054	−0.070	−0.056	−0.051	−0.063
	(0.090)	(0.090)	(0.090)	(0.091)	(0.091)	(0.103)	(0.091)	(0.090)	(0.102)
Num. obs.	3641	3641	3641	3641	3641	3284	3641	3641	3284
Num. groups: wire_community	41	41	41	41	41	38	41	41	38
Deviance	4207.079	4210.336	4206.132	4204.618	4214.874	3733.767	4213.514	4218.662	3704.500
Log Likelihood	−2103.540	−2105.168	−2103.066	−2102.309	−2107.437	−1866.883	−2106.757	−2109.331	−1852.250
Pseudo R2	0.018	0.017	0.018	0.018	0.016	0.016	0.017	0.016	0.015

* $p < 0.001$.
** $p < 0.01$.
*** $p < 0.05$.

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Data availability

The data that support the findings of this study are protected by IRB data use standards and can only be used through a data sharing agreement with the WiRē Center.

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