

Research Article - social sciences

The “Strings Attached” to Community Difference and Potential Pathways to Fire Adaptiveness in the Wildland Urban Interface

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Abstract

This article identifies specific social characteristics in two wildland urban interface communities that may have significant impacts on the ability of those communities to adapt to wildfire. Researchers used a mixed-methods approach to triangulate results to identify potential views and motives surrounding three important behaviors and values related to crafting potential strategies to mitigate wildfire risk. The analysis of quantitative data in the form of responses to Likert-type questions and qualitative data in the form of responses to questions asked during focus group sessions yielded a deeper understanding of the way the terms independence and trust are conceptualized from one community to another. Understanding what these concepts mean in the context of a given community is essential to understanding how to move forward with strategies to reduce risk and eliminate potential barriers to doing so.

Study Implications: Two important social characteristics of wildland urban interface (WUI) communities are trust and independence. Trust and independence look different in different types of communities. The two terms also encapsulate a range of meanings that vary depending on local social context. Being able to identify what types of trust and independence are present in a particular WUI community can help practitioners craft wildfire risk reduction strategies that are most likely to be well received and successfully integrated into individual WUI communities. This article offers examples of how these characteristics manifest themselves in two different communities in the Pacific Northwest.

Keywords: trust, independence, social complexity, wildfire, WUI

Communities located where human settlement intermingles with undeveloped wildland vegetation, referred to as the wildland urban interface (WUI) ([Radeloff et al. 2005](#)), contend with increasing risk of damages from wildfire ([Schoennagel et al. 2017](#)), including life safety, home or property loss, and damage to ecosystem function. Yet there is also a growing consensus that the ever-increasing

investment in fire suppression is an insufficient antidote to the challenges posed by wildfire management. Rather, there is an evolving understanding that a multipronged approach is needed to address wildfire risk and that an important component of such an approach is to increase the adaptiveness of human communities in fire-prone localities ([National Wildfire Coordinating Group 2018](#)).

Fire-adapted communities are broadly considered those human populations whose social and biophysical conditions are managed in such a way that if wildfire does occur, it is a manageable event rather than a potential disaster (Newman et al. 2013, Toman et al. 2013, Paveglio and Edgeley 2020). Although advancing fire-adapted communities often involves the management of potential fuels in and around human infrastructure, it also frequently includes improving aspects of community preparedness such as resident notification and evacuation planning, the provision of local emergency services, and the protection of local water supplies, to name a few (Toman et al. 2013, Paveglio et al. 2019b). Real-world experience and research concerning the social impacts of wildfire indicate that increasing human community adaptation to wildfire is far from a simple matter (Paveglio et al. 2012, 2015c). However, one major challenge for stakeholders is that not all WUI populations are the same. The values, perspectives, histories, and cultures of human populations at risk from fire vary across places and interact with the diverse biophysical conditions that combine to characterize the realities of wildfire risk. Thus, strategies intended to increase fire adaptiveness must account for the social complexity that exists across the myriad of communities that comprise the WUI. Paveglio et al.'s (2009b, 2012, 2015c, 2018) interactional approach for understanding community adaptation to fire risk provides one method for identifying key influences and divergent approaches across a spectrum of WUI community types. This approach stresses systematic documentation of the unique characteristics influencing the local context of communities at risk of wildfire and the tailoring of adaptation strategies to those place-specific characteristics or conditions. This article examines some of those characteristics and how they are conceptualized differently in two different communities. Furthermore, it is important to recognize how, based on various characteristics, residents of communities characterize their responses to potential or proposed risk reduction strategies or pathways based on a perception of "strings attached" (i.e., what residents believe they might lose in terms of power or control over their property) to those proposals.

This article contributes to the understanding of social complexity and wildfire preparedness in the WUI through a comparison of two WUI communities in the US Pacific Northwest with respect to the plausibility of select strategies for fire adaptation.

We use an existing approach for revealing the social context of each location. We use those insights to help explain the unique forms of adaptation that would likely be required across similar diverse communities in the WUI.

Literature

A relatively new body of literature documents how the unique social context of diverse places, including local landscape use and how humans respond to wildfire risk, can lead to different potential avenues for wildfire adaptation (see Paveglio et al. 2018, 2019b for overviews). The actions residents are willing to take to mitigate wildfire risk, the actions they are able (physically and financially) to take, and the scale (small group, community, or drainage) at which collective problem solving occurs exemplify why social context is important when considering how WUI communities respond to wildfire risk (Norris et al. 2008, Carroll et al. 2014, Paton et al. 2015). Social complexity manifests itself in multiple ways (demographic characteristics, local culture, formal and informal knowledge about fire, prior fire experience, ability of different local groups to work together, financial resources, physical abilities, and "know how" of residents, and so on). This developing literature reflects and extends insights from a long history of case study research indicating that existing wildfire risk reduction strategies may be supported or adopted differently across the broad range of fire-prone communities that comprise the landscape (see Ascher et al. 2013, Carroll et al. 2014, Champ and Brenkert-Smith 2016 for other examples). An important theme in this growing literature is the need to systematize our understanding of WUI community social complexity as it influences practical, realistic strategies for advancing fire adaptation in various communities. Such understanding, however, requires not only documenting differences "on the ground" but also understanding them as patterns of linked conditions.

The Interactional Approach to Understanding Community Adaptation to Fire Risk

One approach that has been used to advance an understanding of social characteristics of communities in the WUI and how they affect collective action in formulating wildfire risk reduction strategies is the interactional approach to community adaptation (hereafter the interactional approach) (Rodriguez et al. 2003,

Paveglio et al. 2012, 2015c, 2019a, Paveglio and Edgeley 2017).

Built on Wilkinson's (1991) community field theory to explore local social complexities, the interactional approach uncovers patterns that could be used to better understand differential responses to fire risk often observed in existing research. Later efforts introduced 22 adaptive capacity characteristics (ACC) relevant to understanding local response to wildfire risk (Paveglio et al. 2012, 2016, 2018). Adaptive capacity in the interactional approach is conceived as the combination of local social characteristics and external factors that affect how human communities recover from, and adjust to, current and past hazard events to reduce future impacts from those events (Paveglio et al. 2009b, 2019a, Paveglio and Kelly 2018). Likewise, ACCs are observable traits that influence the abilities and preferences of community members to adapt to wildfire and, therefore, reduce risk (Paveglio et al. 2017, 2019b). The absence or presence of ACCs within a community highlights differences and similarities regarding social context among dispersed WUI communities and assists researchers and policymakers in aiding fire adaptation efforts in WUI communities (Paveglio et al. 2015c).

In attempting to come to grips with the social complexity found in communities in fire-prone landscapes, Paveglio et al. (2015c) conducted a meta-analysis of fire adaptation case studies across locations using the ACCs. The results suggest that communities can be usefully arrayed on a spectrum that advances classic notions of the urban-rural continuum from rural sociology (Bell 1992) and the Old West–New West continuum (Winkler et al. 2007). Using this approach, the authors observed that certain communities along portions of the spectrum shared similar characteristics, influences, and perspectives relevant to fire risk adaptation. They used this to articulate the existence of four preliminary community “archetypes” that comprise a continuum of common social context characteristics, as follows: (1) formal subdivision, (2) high amenity/high resource, (3) rural lifestyle, and (4) working landscape (Paveglio et al. 2015b) (Figure 1).

The archetypes were conceived as a heuristic device rather than a specific representation of actual localities.

They were intended to suggest categories of communities that are more like each other and less like their counterparts in other categories (Carroll and Paveglio 2016, Paveglio and Edgeley 2017, Paveglio et al. 2019b). Using such a scheme can be useful because it helps “tailor” combinations of common adaptation strategies across the diverse array of WUI communities. Paveglio et al. (2018) describe these tailored combinations of coordinated actions, incentives, and policies as “pathways” to fire adaptation. Varying these pathways might prove more effective in different communities by considering the ACCs operating in a place. The underlying objective in all this is to move beyond a “one-size-fits-all” approach to fostering community adaptation to wildfire risk in favor of a more nuanced approach that can lead to development of more realistic pathways that incorporate the unique social characteristics of different types of communities.

Variance in ACCs across Communities

The degree to which ACCs are present or absent in a community, and their expression in place-specific contexts, influences differences in the way communities are likely to respond to wildfire. However, certain characteristics may vary more consistently than others and thus serve as useful indicators of broader social context that will come to bear on their specific choices about fire management policies, programs, or incentives. In this article, we focus on the examination of select ACCs that existing research suggests play an influential role in indicating different expressions of community adaptive capacity, and that often result in the need for different pathway components (e.g., programs, policies, incentives, and others) in diverse communities. Specifically, we examined *communication networks, local independence or distrust of government, willingness/ability to pay for fire mitigation actions, and local ability to reduce wildfire risk*. An example of the importance of these ACCs is a working landscape community that would be more responsive to informal modes of communication that use increased face-to-face personal interactions (Dickinson et al. 2015). A formal subdivision community, on the other hand, would prefer formal, “top-down” communication approaches (Gootee et al. 2010). In both



Figure 1. Archetypes along the continuum (Paveglio et al. 2015c).

cases, *communication networks* have an impact on how effectively information will be received (Paveglio et al. 2009a, 2019a).

Local independence or distrust of government can manifest itself in several different ways depending on the local social context of a given community. Rural communities have developed a need to be self-sufficient (Mellow 2005, Paveglio et al. 2015a), which promotes independence in rural lifestyle and working landscape communities, but independence also occurs (to some degree) in all community archetypes in the form of a rejection of outside interference from externally generated rules and regulations (Marshall et al. 2007, Carroll et al. 2014). Trust can also be conceptualized differently across archetypes (Davenport et al. 2007, Idrissou et al. 2013). Some communities (e.g., rural lifestyle and working landscape) may have very little *political* trust in government agencies but have relatively high *social* trust in individual agency personnel (i.e., local forest ranger) or neighbors (Stasiewicz and Paveglio 2017, 2018). Other communities (i.e., formal subdivision and high amenity) are more likely to have *political* trust in government agencies and relatively low *social* trust in neighbors (Newton 2001, Davenport et al. 2007).

Numerous social factors can affect the *willingness to perform or pay for mitigation actions*, including perceptions of personal responsibility for reducing risk, social pressure, and preferences for how to spend one's time (Brenkert-Smith 2010, McCaffery et al. 2011, Dickinson et al. 2015). Factors such as aesthetic values (i.e., preference for dense stands of trees and privacy), perceived effectiveness, perceived benefits, and the cost of mitigation measures can play roles in a landowner's ability and willingness to pay for mitigation actions (Meldrum et al. 2014). Furthermore, the way in which mitigation strategies are communicated to residents can affect willingness to pay (Paveglio et al. 2015c). The *local ability to reduce wildfire risk* is emblematic of certain community archetypes, in that as we move across the continuum of community archetypes, community members encompass the skills, experience, and equipment necessary to complete tasks related to reducing wildfire risk to property and human lives (Meldrum et al. 2014).

Although there is growing evidence supporting the linkage of ACCs and support for differential "pathway" components, there remains a need to evaluate use of the interactional approach in directed applications across diverse communities. More specifically, there are fewer efforts that explore support for common "pathway"

components across locations using a consistent methodology (see Paveglio et al. 2016, 2018, 2019b for broader argument). We address this by evaluating how local social context might coincide with support for a subset of fire adaptation strategies commonly described in existing literature, with a focus on those described above. We studied two different WUI communities in the inland US Pacific Northwest, using Paveglio et al.'s (2009b, 2012, 2015c, 2018) interactional approach as a general framework. Because pathways or strategies to increasing fire adaptiveness depend on participation and cooperation by multiple parties (Dean 1960, Finley et al. 2006, Bridger et al. 2011), we also set out to explore which entities residents preferred to work with in achieving their stated fire mitigation goals.

The interactional approach, with its increasingly mixed method and locally focused approach to data collection, is concerned with the "why" question and thus is aimed at engaging local people in the collaborative identification of potential pathways to fire adaptiveness that fit local conditions (Paveglio et al. 2009b, 2017, 2019a). Specifically, the interactional approach aims to uncover the specific interrelationships between community members, local culture, and social characteristics that define local peoples' relationship to a landscape and to therefore yield a more grounded, systemic understanding of social complexity in WUI communities that are at risk from wildfire (Paveglio et al. 2015c, 2016, 2018).

Methods

We used a mixed methods approach for data collection by simultaneously gathering quantitative (numeric) data based on responses to Likert-type (i.e., survey) questions and qualitative (text-based) responses to semistructured and open-ended probing questions exploring respondents' ratings. Although it may be intuitive to say that not all WUI communities are the same, the mixed methods approach used in this article explores "how" communities from different locations on the archetype continuum (Paveglio et al. 2015c, 2018) are different and moves us toward the goal of answering "why" they are different. This approach made it possible to explore two linked goals in each case: to ascertain whether results from both sets of data were complimentary, which would improve the overall validity of the study, and to examine whether emergent patterns in the two sets of data presented new insights about the interplay of various social characteristics or

reasons for community support of different adaptation strategies.

Site Selection

Researchers began the site selection process by attempting to find two study sites that were likely to reflect different “archetype communities” as described by [Paveglio et al. \(2015c, 2018\)](#). Researchers conducted initial interviews with representatives from local or state government agencies and community members in western Montana and eastern Oregon to narrow down potential case study communities and to provide regional variation in the initial sample frame. Researchers selected two communities based on initial interviews, the Bull River drainage of Montana and a neighborhood of La Grande, Oregon. Comparison of these communities was likely to provide illustrative contrasts of community characteristics that would in turn provide potentially instructive examples of differences in pathways needed for adaptation to fire risk in similar communities across the WUI.

Bull River, MT

The Bull River (BR) community is located near the border of northwestern Montana. The community consists of a scattered collection of residents that live along the southern 11 miles of the BR, located just north of Noxon, MT. There are approximately 129 privately owned land parcels and 84 residential units within the study area community identified by respondents ([Montana State Library 2018](#)).

Residents of the BR area are somewhat isolated and proximal to large swaths of USDA Forest Service public lands. There is no cell phone service in the area, and emergency services are as much as 15 miles away. The population consists primarily of retired people and a few younger families that live in the area. Approximately one-third of the residences are occupied by seasonal/snowbird inhabitants. Respondents indicated that most full-time residents have lived in the area for 15–20 years or longer and have long-standing ties related to timber harvest, which was historically a significant portion of the economy.

Historically, the BR area has a fire return interval of 30–35 years, but fires are now occurring at a more frequent rate ([Guyette et al. 2012](#)). BR residents had most recently experienced fire activity during the 2015 Clark Fork Complex Fire, which threatened but did not damage any residential structures.

La Grande, OR

The La Grande (LG) study area consists of neighborhoods on the western edge of the LG city limits. Parcel sizes in LG are relatively small (25,000 sq ft) when compared with their counterparts in BR (2- to 60-acre lots) ([Montana State Library 2018](#), [State of Oregon 2019](#)). The study area is comprised of a mix of residents ranging from college students to retired people. There are approximately 200 parcels and 194 residential units within the study area, and residents in the area refer to it as “old town” LG ([State of Oregon 2019](#)). The edge of the LG community sits between 500 and 2,000 feet from forested lands, whereas BR residents’ homes are generally surrounded by dense forest.

Fire in the LG area occurred historically every 14–18 years ([Guyette et al. 2012](#)). However, the most recent fire that threatened homes (and destroyed several) took place in 1973. There is increased fire activity in outlying areas around LG, and residents reported being affected by those fires mainly in the form of smoke.

Researchers were interested in two populations within each of the study communities: residents and locally based land management or fire professionals with specific knowledge of the communities in question. Researchers used online databases (Cadastral mapping, Google Maps, Zabasearch, and White Pages) to compile all the available names, addresses, and phone numbers of every household in each study area with the goal of having a representative cross section of each community present in the focus groups. Residents were contacted via phone, in person (knocking door-to-door), and through door hangers. In some cases, snowball sampling was used to contact residents who would have been otherwise unreachable and to ensure that a wide cross section of participants with different opinions and experiences were included ([Biernacki and Waldorf 1981](#), [Lindlof and Taylor 2010](#)). This process continued until researchers had a list of participants that were diverse in age, gender, location, opinion, and experiences within the communities. In addition, researchers conducted focus groups during the winter and summer in an effort to include seasonal residents. For the expert groups, researchers developed a comprehensive list of relevant agencies and organizations that have a stake in land management, wildfire issues, or the general welfare of the community in question. Participants were contacted by phone and e-mail. In each community, researchers attempted to include a representative from as many agencies as possible.

Focus Groups

Focus groups are a useful way to explore influences on adaptive capacity or its characteristics because they allow for rich description of influences and dialogue with other participants, which fosters opportunities for more detailed and expressive opinions. Also, the exchange of information and social interaction between participants can affect how participants view their responses in light of alternative perspectives by other participants (Lincoln and Guba 1985, Lindlof and Taylor 2010).

Researchers conducted three focus groups (one “professional” focus group and two resident focus groups) in LG and four focus groups (one “professional” and three resident) in BR. Researchers conducted the professional focus groups separate from resident groups to ensure that each group could speak freely about their level of trust in one another and to minimize pressure on either group to respond in ways that were favorable to other group members (i.e., “expert assessment bias” or “social desirability”). Focus groups took place in December 2016, July 2017, and March 2018. Each group session lasted approximately 90 minutes and was composed of between seven and 13 participants. All sessions were audio recorded and later transcribed word for word. Preliminary questions asked in each focus group concerned the geographic boundaries of the community to ensure researchers had identified most, if not all, possible community members in the study area and to assist participants in framing their answers within the context of their community.

The sessions were conducted in phases. In the first phase, a video projector was used to display Likert-scale (survey) questions using Turning Technologies Turning Point polling software. The format of the questions consisted of a root question (e.g., “How effective or ineffective would the following practices be in reducing wildfire risk in your community?”) followed by three to eight stem statements (e.g., “Increasing the pace and scope of timber harvest”) that were rated anonymously by each participant using a five-point Likert scale (e.g., very ineffective to very effective, with a neutral position, neither effective nor ineffective). Taken together, these questions were designed to identify the local presence or absence of particular ACCs or which approaches participants felt were more or less useful in improving fire adaptation in the community. Participants answered the Likert-type questions via a Turning Technologies Response Card handheld remote (“clicker”) for each question and were able to see aggregated group responses in real time. The second

phase consisted of displaying results via projector to the group, and researchers asked participants to describe their preferences and why they selected one option over another. This process allowed researchers to get immediate data (on site) to important questions concerning the community ACCs and then ask relevant follow-up questions to obtain a deeper understanding of why the participants answered the way they did.

Analysis

Data analysis consisted of three overarching foci: quantitative analysis, qualitative analysis, and an analysis of both in tandem. Of interest for the quantitative portion of the analysis were three questions relating to pathway components that previous research (Paveglio et al. 2015c, 2018) identified as resulting in differential support across archetypes. The first question concerned the effectiveness or ineffectiveness of increasing the pace and scope of timber harvest in the area as a fire risk reduction measure. The second question concerned the “requirement of vegetation mitigations on private properties that are enforced with fines or penalties.” The final question used in this analysis was a root question with five different stems: “How supportive or unsupportive would people in this community be of the following options for organizing wildfire risk reduction?” The stem statements evaluated by respondents included: (1) *federal agencies*; (2) *state agencies*; (3) *local governments*; (4) *grassroots local efforts*; and (5) *agencies and locals coleading* (hereafter referred to as *comanagement*).

Researchers explored nonparametric statistics because of the ordinal nature of the quantitative data. Comparisons made between two groups on a single variable where distributions are unequal can be measured using a Mann-Whitney *U* test. In this case, comparisons were being made between BR and LG regarding the three characteristics of interest, and each test was completed independently of one another. We performed a Kruskal-Wallis test with a Dunn’s post hoc analysis to assess differences between government preferences within the two communities. A Kruskal-Wallis test with a Dunn’s post hoc analysis is appropriate for testing for differences among more than two variables, which is the case for the question analyzed (McKnight and Najab 2010). In one case, a participant in the BR focus group answered fewer than half of the Likert questions. All the responses for that participant were removed from analysis. All calculations were completed using R, version 3.4.1. An α level of 0.05 was used to determine significance.

Qualitative analysis included a multistage process consisting of discussions among researchers to identify emergent themes followed by three phases of increasingly restrictive coding. The coding phases were completed using QSR NVivo 11 software. During the discussion stage, researchers reviewed elements of local social context relating to community preferences for adaptation strategies and general adaptive capacity. Researchers also discussed potential barriers to adaptation emerging from the discussions, gaps in understanding, and additional questions that could help better home in on potential themes in subsequent focus groups.

Formal analysis of the data employed a systematic process of analytic induction, which helps develop an understanding of phenomena by providing causal explanations emerging from detailed exploration of the data (Ryan and Bernard 2000). Analytic induction is often paired with thematic analysis, which employs multiple rounds of coding in which ideas expressed in the data are organized in categories and lessons from those categories emerge as overarching themes (Glesne 2016).

NVivo 11 software was used to complete the first round of “topic coding” (Richards 2005) for each of the two communities. Topic coding organizes data based on broad topics that are discussed by participants and present in segments of the focus group transcripts. The second round of coding consisted of using “a priori codes” approximating the ACCs identified by Paveglio et al. (2012, 2015b). After completing the second round of coding, the first author performed a reread of all focus group transcripts using a general inductive approach (Thomas 2006) in an attempt to identify any categories or possible themes that fell outside the a priori framework. The first and third authors individually analyzed qualitative data following the same procedures to provide intercoder reliability.

The final round of analysis consisted of recoding transcripts from both communities in contrast. More specifically, researchers compared community-specific results from the phase 2 coding strategies against existing lessons or results of previous archetype research using the interactional approach (Paveglio et al. 2015c, 2018, Paveglio and Edgeley 2017). Pattern coding is useful in looking for similarities or differences across the two communities to identify additional themes (Saldana 2009).

The robust sampling method and the use of a mixed methods approach in this study adhered to the accepted norms of qualitative research (Lincoln and Guba 1985,

Glesne 2016). They are appropriate ways to reach theoretical saturation and provide a rich description of the context of the communities selected for this study (Glesne 2016). The lessons learned through the use of this methodology are in-line with case studies that have used similar approaches (Carrol et al. 2014, Paveglio et al. 2015c, 2016, 2017, 2019b, Carroll and Paveglio 2016). The authors are confident in the transferability (i.e., theoretical generalizability) of those lessons.

Results

Quantitative Comparisons

Results of the comparisons between the two communities for the five governance preference options are presented in Table 1. LG residents rated the federal government as the least preferred level of government for organizing fire risk reduction efforts ($\bar{x} = 2.97$). The most preferred strategy for organizing fire risk reduction efforts was comanagement ($\bar{x} = 4.17$). All other options (state, local, and grassroots) were roughly the same ($\bar{x} = 3.41$, $\bar{x} = 3.48$, and $\bar{x} = 3.45$, respectively) (Table 2). In BR, comanagement was the management option with the highest mean rating among participants ($\bar{x} = 3.82$), with the next highest rating being local government ($\bar{x} = 3.6$). The remaining three options (federal, state, and grassroots) were roughly the same ($\bar{x} = 3.29$, $\bar{x} = 3.23$, and $\bar{x} = 3.33$, respectively). There were no statistically significant differences between participants of the two communities for any of the management preferences. However, an “in-group” analysis showed a significant preference for comanagement (chi-square = 23.43, $p \leq .001$) among respondents in the LG case (Table 3). There were no statistically significant preferences for any of the governance options among respondents in the BR case (Table 4).

Table 1. Management preference: La Grande versus Bull River.

Management	La Grande Mean \pm SE	Bull River Mean \pm SE
Federal	2.97 \pm 0.21 (n = 29)	3.29 \pm 0.23 (n = 34)
State	3.41 \pm 0.16 (n = 29)	3.23 \pm 0.26 (n = 35)
Local	3.48 \pm 0.17 (n = 29)	3.6 \pm 0.2 (n = 35)
Grassroots	3.45 \pm 0.18 (n = 29)	3.33 \pm 0.22 (n = 33)
Comanagement	4.17 \pm 0.09 (n = 29)	3.82 \pm 0.17 (n = 33)

Variability in “n” for the Bull River group is due to nonresponse to certain questions. Preference rated on a scale of 1–5 with 5 being most acceptable. SE, standard error.

Table 2. Adaptive capacity characteristics (ACC) adapted from [Paveglio et al. \(2015c\)](#).

ACC	Description
Community organizations	Existence of formal groups organized around land management or conservation
Community fire organizations	Presence of organizations focused on fire risk reduction (i.e., Firewise)
Locals understanding of fire suppression/fire suppression responsibility and limitations	Level of expectation for firefighting services versus the level of person responsibility
Local peoples' experience with wildfire	Community members' previous experiences with fire and its impacts
Local awareness of fire risk	Local understanding of fire risk and frequency
Local wood products industry capacity	Local connection (socially and economically) to logging or milling industries
Proximity and capacity of mill facilities	Distance to or presence of mill facilities
Place and community attachment	Strength of bonds to physical landscape, community, or relationships
Perceptions and actions related to forest health or aesthetics	Preferred approach to increasing forest health
Land use, buildings, or fuel reduction standards	Municipal requirements for fire risk reduction attributes on private properties
Amenity migration	Number of people moving into area
Diversity of people/skills in a locality	Heterogeneity of a population affects its ability to complete tasks related to reducing risk
Collective identity/collective action	Assemblages of "like-minded" individuals at various scales (i.e., small, community, or drainage)
Risk reduction initiative among agencies and locals	Evidence of community-wide risk reduction strategies
Local firefighting capacity supported by community volunteerism	Number of firefighters (profession and volunteer) and level of community support
Development patterns/landscape fragmentation	Community size and composition in relation to fuel location and amount
Number of second or seasonal homeowners and turnover rate	Proportion of full-time to non-full-time residents
Presence of local champions	People who lead risk reduction efforts (i.e., Firewise leaders or agency personnel dedicated to community outreach)

This table represents 18 of the 22 ACCs. The remaining four characteristics are described in more depth within the body of the article.

Table 3. La Grande preference for comanagement.

Groups	Z	p Adj.
Comanagement—federal	4.67	<.001
Comanagement—state	3.18	.01
Comanagement—local	3.05	.02
Comanagement—grassroots	3.22	.01
Federal—state	-1.49	1.00
Federal—local	-1.62	1.00
Federal—grassroots	-1.45	1.00
State—local	-0.13	1.00
State—grassroots	0.04	1.00
Local—grassroots	0.17	1.00

Dunn's post hoc analysis of Kruskal-Wallis test (chi-square = 23.43, df = 4, $p \leq .001$).

Comparisons of community support for timber harvest as a risk reduction strategy are presented in [Table 5](#). Results indicate a significantly higher preference for increasing timber harvest to reduce the risk of wildfire in BR ($\bar{x} = 4.21$) when compared with LG ($\bar{x} = 3.07$) (Mann-Whitney U , $W = 700$, $p \leq .001$) ([Table 5](#)). Results also indicate a significant difference between the LG and BR participants with respect to support for mandatory fuel mitigation measures (Mann-Whitney U , $W = 178.5$, $p \leq .001$) ([Table 5](#)). More specifically, there is a significantly higher support for *mandatory* mitigation efforts on private land in and around the LG community and less acceptance among BR residents ($\bar{x} = 3.79$ and $\bar{x} = 2.23$, respectively).

Qualitative Analysis as Context for Quantitative Results

Although LG participants describe themselves as being “very independent people” who are able to “do it for themselves,” the most common theme pertaining to self-sufficiency among residents was a lack of knowledge and resources for addressing large-scale problems such as wildfire. For instance, one LG resident remarked: “...that big pile of juniper in your front yard is a danger. How am I going to get that out of there myself?”

Participants stated repeatedly that their community needed additional education and resources that they believed federal or state government agencies could and should provide for them to gain self-sufficiency. As one participant articulated:

I think a lot of people around here, if they understood the problem, and saw the problem on their own land, they would probably go ahead and take care of it themselves.

LG participants expressed some concern about interference from formal government organizations (local,

Table 4. Bull River preference for comanagement.

Groups	Z	p Adj.
Comanagement—federal	1.56	1.00
Comanagement—state	1.41	1.00
Comanagement—local	0.67	1.00
Comanagement—grassroots	1.56	1.00
Federal—state	-0.16	1.00
Federal—local	-0.90	1.00
Federal—grassroots	0.01	1.00
State—local	-0.75	1.00
State—grassroots	0.17	1.00
Local—grassroots	0.91	1.00

Dunn’s post hoc analysis of Kruskal-Wallis test (chi-square = 3.80, df = 4, p = .43).

Table 5. Comparison of differences in two characteristics between Bull River and La Grande.

	BR Timber	LG Timber	BR Mitigation	LG Mitigation
Mean ± SE	4.21 ± 0.16	3.07 ± 0.25	2.23 ± 0.22	3.79 ± 0.16
n		59		61
W		700		178.5
p Value		<.001		<.001

Mann-Whitney U tests of the differences in preference for *Increasing the pace and scope of timber harvest* (Timber) and *Mandatory fuels mitigation to reduce wildfire risk* (Mitigation) between the communities of Bull River (BR) and La Grande (LG). SE, standard error.

state, and federal) and a preference for limiting additional regulations that would affect them individually. As one participant noted, “We have enough bureaucratic cops running around town.” However, a common concern among LG participants was that community members other than themselves were acting in ways that threatened the safety of the community at large. Concerned residents expressed general support of formal regulations (or “programs”) that would force other community members to address issues they believe are dangerous to the community as a whole. As one participant summarized:

Maybe if there were some sort of program, you know like, giving people some importance to straighten out their properties. Make sure things are cleaned up and not ready to burn.

LG participants expressed a lack of social trust in fellow community members on matters relating to fire risk. They described concern about “outsiders” moving into their community who engage in activities that put other community members at risk. Examples provided by participants include burning brush piles and not being able to contain the fire to their property, or as one participant put it, “There are a lot of residences that are not safe.” A common theme expressed during the focus groups included participants concern that their neighbors would not cooperate in strategies to reduce risk. As one LG participant said, “Stay and defend doesn’t work if my neighbors don’t participate.”

Other LG participants reiterated that they were concerned about not being listened to by select government organizations. A participant said:

Well, I think the reason that the agencies and locals co-leading is that we would have some voice. I think the federal agencies ..., we’d have no voice. They wouldn’t care.

Political distrust of the federal government did not extend, however, to the Forest Service or state government agencies. The majority of focus group attendees described higher levels of political trust for the Forest Service, state workers, and state institutions. One LG participant said, “We have a lot of state agencies here in town. We think they’re competent or that we feel confidence in them.” Participants in LG also displayed higher levels of political distrust of their local government. They spoke of the “city” government pejoratively and indicated they felt “hassled” by local government.

BR participants described themselves as self-sufficient and capable of helping themselves: “I’m just saying it has to do with, we’re responsible for ourselves, not the government is responsible for us.” To that end, BR participants indicated that many of the people living in the community possess the skills, knowledge, and equipment necessary to protect their own property. This also extended to a local ability to reduce wildfire fuels and corresponded with their quantitative rankings indicating a lack of support for mandatory regulation of such mitigation in the community. As one participant explained:

People clear their places, so they’ve got views and stuff automatically. The timber is so thick. When you first build and stuff like that, and every 10 years you need to clear it again. I’ve cleared my place now twice, in 10 years.

In some cases, respondents indicated that age and lack of financial resources affect the ability of BR residents to complete mitigation work, but that neighbors or nearby family members assist those who cannot complete work on their own.

BR participants expressed opposition to interference from outside entities and collectively shared the sentiment that “the government needs to butt out and leave things alone.” They expressed fear over relinquishing any power or control over their property and were afraid that accepting assistance from a government agency came with “strings attached.” As another participant put it: “Any time the government gets involved, they own you.” Participants’ viewpoints on this issue were influenced by what they saw as mismanagement of broader government resources. As one BR participant explained: “I’ve found too many of them taxes intended for one thing but end up doing [something] completely different.” BR participants also spoke of activities such as prescribed burning and delayed response to wildfires in their area as affecting their trust of government agencies.

BR participants expressed a relatively high level of social trust in their neighbors. Participants who had lived in the area for more than a few years indicated that they knew many of the other homeowners in the drainage and that they communicate with each other regularly on issues relating to common life (e.g., road conditions, recreation habits, and property management challenges). They also said that if there were a need to work with one another, they could do so effectively. As one participant described:

I imagine there’s some real enemies up here, but basically, people pay attention. “Are you going to put livestock here, or what are you doing here?” We kind of talk about stuff.

Participants also stated that they felt confident in their neighbors’ ability to manage their individual parcels in such a way that they could adequately reduce fire risk.

Participants in the study areas expressed divergent views pertaining to the actions that should be taken to maintain forest health, while sharing relatively similar perspectives about forest aesthetics. Both communities described ties to the timber industry, but those ties took different forms in each community. Many BR participants described having current or past direct ties to the timber industry. They also described a direct link between the presence of people working in the forest and a reduction in fire risk through associated early detection and immediate response. A participant recalled, “I was a logger for 30 years and ... one thing about is that when you have timber harvesting going on, you have people that are in the woods.” Study participants in BR also framed wildfire management arguments around wastefulness of a resource. The majority of LG participants described favoring a more “hands-off” approach to forest management and were more interested in maintaining forest aesthetics. Participants expressed interest in aspects of forest health and aesthetics related to wildlife and recreation activities above other uses.

Discussion

In-line with previous research on human community adaptation to fire in the WUI (Paveglio et al. 2018), we set out to explore two communities that would appear to be different from each other in their ACCs and determine how the expression of those characteristics might influence potential “pathway” components in

each community. Our results suggest that there are viable opportunities to increase fire adaptiveness in both the LG and BR communities but that slightly different strategies might be necessary in each location because of their diverging elements of local context. LG participants expressed willingness to accept mandatory fuel mitigation rules and regulations but would still prefer to be involved in the enactment of those changes. They want to partner with government organizations that they believe possess the most expertise as it pertains to their area and the risks that they face. In LG, this might mean select pathway components featuring reduction of fuels on residential property through the use of formal rules or regulations and the iterative building of relationships among residents and government organizations through comanaged programs.

BR participants appear to recognize the need for increased fuel mitigation measures on their private property, and although their detailed knowledge of what could be done is arguably higher than in LG, their distrust of government agencies renders them far less likely to seek or accept direct government advice and assistance. Many BR participants stated that they feared that there would be “strings attached” to any assistance provided from an external entity. As such, elements of a potential pathway in BR could come in the form of shifting the leadership model for future wildfire adaptation efforts in the community. Rather than leading from the “agency” level, a more productive approach might be to recruit a member(s) of the community to liaise between community members and outside agencies that provide assistance relating to wildfire management. That assistance could come in the form of promoting place-based adaptation processes that are tailored to the community or matching the community with grants that would facilitate adaptation. Each of the adaptation strategies described above are just select examples of a larger, interlinked set of actions that would comprise a full “adaptation pathway” for each location. Those pathways would also be built from a more comprehensive narrative of community context in each location that reflects the full suite of ACCs. However, our effort here demonstrates that such differences can meaningfully be observed across emblematic characteristics implicated by the interactional approach and demonstrates how their differences might lead to specific strategies in each location.

Determining differences in the social characteristics that influence community functioning is only the first step toward identifying potential pathways to fire adaptiveness. In that respect, the quantitative analysis of this study is useful in confirming that there are

significant (i.e., nonrandom) differences in social characteristics across locations studied for this research. However, a lack of qualitative description might also oversimplify the “messy” and often overlapping characteristics that stakeholders can use as a narrative to plan tailored approaches to their shared local circumstances (Brandenburg and Carroll 1995, Paveglio et al. 2018, 2019b). Put another way, confirming difference in context across communities is not the same as explaining why that difference matters and what can be done to work with that context in the planning of next steps toward adaptation. To that end, we turn our discussion to how specific interactions between emblematic ACCs reveal the need for a complex view of adaptation, given local context.

Results from the two communities studied indicate that differential expressions of trust and independence are two factors in particular that are likely to influence response to wildfire risk. Our results also indicate that the concepts of trust and independence, when applied to fire adaptation, are interconnected through their interaction with the ACCs that were a prominent focus of our study. At a cursory level, and based on the analysis of the data, it is evident that participants in both communities are distrustful of higher-level government agencies (i.e., state and federal). However, LG participants showed a willingness to work with either federal or state agencies to achieve outcomes that would reduce risk. This result appears contradictory, and it is not until engaging the details of trust and independence, including their unique expression in the two communities and their linkages to other ACCs, that a clearer understanding of this apparent contradiction be reached.

Residents of both BR and LG place value on a sense of independence, particularly with respect to the federal government’s role in local life, but our results suggest independence means somewhat different things in the two places. This is an important point when tailoring wildfire adaptation to each location and exemplifies the benefit of the interactional approach. BR participants’ sense of independence incorporates elements of both self-sufficiency and a rejection of outside interference. BR participants indicated that they have the ability to mitigate risk themselves. Moreover, their perceptions of federal and state agencies being inept reinforce their opinions regarding the acceptance of assistance from any outside entity. In LG, participants’ desire to avoid interference in the form of additional rules and regulations (i.e., outside interference) appears to be mitigated by a perceived lack of self-sufficiency

as it concerns actual performance of fire risk reduction tasks. LG residents acknowledge that federal and state agencies have an important role to play in reducing wildfire risk and that formal government agencies possess what participants perceive they themselves lack (i.e., the knowledge and resources necessary to do so). At the same time, residents in LG are not content to allow government agencies to extinguish their “voice” in decisionmaking processes. One LG resident summed up the complexity of community member sentiment as such:

Agencies are fine. We all love them but, they have certain bureaucratic mentalities from Salem or D.C. sometimes that may not fit our conditions. So, I'd like to have them because they have the resources, but I want my brothers and sisters from my own town out there, too.

The differences between the two communities relating to trust in outside government entities seem linked to, and a mirror image of, their trust in fellow community residents concerning the knowledge and willingness to mitigate wildfire risk. LG participants indicated that they have little faith in their neighbors' ability or willingness to perform actions that would mitigate wildfire risk. There are a few potential explanations for this finding. First, the participants themselves cited a general lack of knowledge or education about actions that could reduce wildfire risk. Thus, they may be less capable of judging whether their neighbors have performed necessary mitigation measures or may assume that their neighbors share similar deficiencies in knowledge. Second, participants indicated that connections with other community members happen most frequently at small scales (i.e., next-door neighbors) rather than across the community. The resulting collective identity that develops at small scales appears to affect other forms of community-wide social interactions, which in turn has an effect on community members' levels of social trust in one another as it pertains to wildfire mitigation.

In contrast, social trust and ties in BR tended to extend across the more diffuse community, reinforcing the notion that the locals did not need outside “interference” or the associated “strings attached” to achieve risk reduction. BR residents expressed high levels of social trust in their neighbors and are confident that they will act not only in their own self-interest but also in the interest of the community at large on issues related to fire risk. Meanwhile, LG participants reported that they do not always trust their neighbors to perform

mitigation work without some form of oversight by official means.

The above results demonstrate how trust and independence are linked within the context of the BR and LG communities. In that respect, they provide one good example of the ways that ACCs forming the interactive approach might combine to structure the form of wildfire adaptation. For instance, BR participants trust (social) their fellow community members over government agencies because they see their neighbors as being equally capable in addressing issues related to reducing wildfire risk. This makes them more likely to favor incentives or aid that allows individual freedom to implement wildfire mitigation measures and a preference for local oversight in ensuring that those programs do not impose on those freedoms. LG participants, on the other hand, do not always trust that their neighbors are capable or willing to act in ways that would reduce risk and therefore are reliant on some level of assistance from government agencies. Although LG residents were not necessarily trusting of government-only management, they did trust federal and state agencies to ensure mitigation measures *more than they trusted their neighbors*. As a result, LG residents are more supportive of formal programs or regulations that dictate more defined rules about what those mitigation measures should be across relatively uniform residential properties.

Stepping back from the specific results concerning ACCs, it may be useful to comment briefly about how these two study communities fit into the broader framework of community archetypes. This should be done with the caveat in mind that archetypes are meant to act as a heuristic device and are not meant to pigeonhole communities into predefined mutually exclusive community classifications (Carroll and Paveglio 2016). The archetypes are, however, useful as general guideposts in identifying similarities and differences in social characteristics between the wide spectrum of WUI communities. Examples include generally greater acceptance of formal land use planning in formal subdivision communities, a greater focus on ecosystem services as potentially affected by fire and mitigation in rural lifestyle communities, and a greater acceptance of lived experience rather than formal scientifically based approaches as a basis for adaptation in working landscape communities. All this being said, and based on the data collected in LG and BR, it is relatively clear that the BR participants share some ACC expressions that are

similar to rural lifestyle communities (Paveglio et al. 2015c). Those similarities include being highly independent and distrustful of higher-level government agencies (e.g., federal and state). BR participants associate forest health with appropriate forest resource use and are more likely to favor timber harvest as a means of reducing wildfire risk. LG is more complicated (Paveglio et al. 2019b). LG shares similarities with communities that fall along several points in the archetype continuum but may represent a departure from the primary archetypes that have been identified thus far. LG may help provide evidence of additional community archetypes that help reflect the increasing diversity of residential populations at risk from wildland fire, especially those in more developed residential areas (Paveglio et al. 2019b).

The value of case study research such as that presented here is not simply to engage in the luxury of fine details that would be missed by more broadscale analysis. To be maximally useful, case studies should also go beyond that by “shining a light” on dynamics that are likely to be found in other locales and that add to a growing understanding of the contours of more widespread patterns (e.g., community archetypes). The authors believe that the two case studies presented here achieve elements of those goals by articulating ways that social dynamics influence differential views about community adaptation to wildfire risk across segments of the WUI.

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