

Living with Wildfire in Delta County, Colorado: Cross-Community Comparisons

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Citation

Meldrum, James R.; Barth, Christopher, M.; Colter Falk, Lilia; Brenkert-Smith, Hannah; Warziniack, Travis; Champ, Patricia A. 2015. **Living with wildfire in Delta County, Colorado: cross-community comparisons**. Res. Note. RMRS-RN-67. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 33 p.

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Introduction

Wildfire risk in the wildland-urban interface (WUI) is a significant problem in Colorado, as in much of the United States. Wildfire risk mitigation refers to activities performed proactively, before a hazard event occurs, that reduce the chances and/or consequences of a wildfire. Actions taken by individual residents toward mitigating their properties' wildfire risks can play an important role in the effort to reduce the catastrophic effects of wildfires both to society as a whole and to the residents themselves. However, the relationships of wildfire risk mitigation actions to attitudes, experiences, and other considerations are complex (Brenkert-Smith and others 2006, 2012), and WUI residents may be defined by subpopulations that differ widely in perspectives about wildfire issues, both within (Raish and others 2007) and across different communities (Carroll and others 2014; Champ and others 2011a,b; Meldrum and others 2013).

This research note summarizes two linked datasets for four WUI communities in Delta County, Colorado. These data include a general population survey of residents in the community and an assessment of the physical characteristics of all residential properties in the community (see appendix A for a copy of the assessment tool and appendix B for a copy of the survey, with descriptive statistics for all survey questions). This report summarizes the study design and focuses on the extent to which collected data vary across the four communities. It also provides information regarding knowledge, concern, and activities related to wildfire and wildfire risk mitigation among residents of each of the four communities, as well as the results of the corresponding assessment performed by a wildfire specialist for those same properties. Data collection was similar to that performed in the Log Hill Mesa community in Ouray County, Colorado, and reported in a previous research note (Meldrum and others 2013).

As detailed below, respondents in the four Delta County communities differ by community on many measured variables, including some demographic factors (e.g., age and part-year residence) but not others (e.g., income and education), some attitudes (e.g., whether wildfires are an important part of the natural forest and whether people can control them) but not others (e.g., reasons for not mitigating and whether people living in the WUI are a problem in terms of wildfire risk), and some sources for receiving wildfire information (e.g., local fire departments and neighborhood groups) but not most others. In other words, many but not all of the social data depend on local community context. Further, the distributions of property risk levels differ across the communities, both in terms of the risk levels assessed by a wildfire specialist and the risk levels perceived by survey respondents. In addition, the data demonstrate a "risk perception gap" between the wildfire specialist's and residents' assessments of property-level wildfire risk consistent with that found in Log Hill Mesa (Meldrum and others 2013, in review). The findings of this report can facilitate long-term monitoring, management, and educational practices related to the mitigation of wildfire risk in WUI communities like those in Delta County. Similarly, they can inform the conduct of related research in the WUI. In particular,

the significant differences found in many variables across communities underscore the importance of understanding community-specific contexts when developing management and educational programs.

Methods

The Bureau of Land Management (BLM) Southwest District Fire Management program and the West Region Wildfire Council (WRWC) seek to encourage residents of western Colorado to mitigate wildfire risk on their properties. As part of this effort, WRWC conducts wildfire risk assessments of private properties and administers household surveys in the communities where the wildfire risk assessments have been completed. This report focuses on the linked data collected for communities in Delta County, Colorado.

Study Area: Delta County

The data described here were collected in four of the five Fire Protection Districts (FPD) in Delta County, corresponding to the towns of Cedaredge, Crawford, Hotchkiss, and Paonia. A “community” can be defined in many ways and at many different hierarchical levels, with implications for the extent to which individuals’ data are aggregated. In this report, we analyze these FPDs as four distinct communities because many of our results offer potential insights for wildfire risk management and education at that level. However, subdividing each FPD based on self-identified communities or homeowners associations, for example, might further highlight some cross-community differences and obscure others.¹

Located in central-western Colorado, Delta County consists of 1,149 mi² ranging in elevation from 4,758 to 11,396 ft above sea level. The Delta County Community Wildfire Protection Plan (CWPP Delta County 2011) describes much of the county as being at high or very high risk from wildfire, noting that the 2001 Federal Register included these four FPDs on its list of “urban wildland interface communities within the vicinity of federal lands that are at high risk from wildfire” (p. 20). The county has a semiarid climate with abundant sunshine, frequent winds, low humidity, and less than 8 inches of rainfall in the average year. Typical vegetation includes pinyon-juniper woodlands, Gambel oak, sagebrush, and invasive cheatgrass, and the county saw 141 reported ignitions between 1999 and 2008 (117 of which were from lightning).

Wildfire Specialist Assessment

In the summer of 2013, WRWC conducted a wildfire risk assessment of every privately owned residential parcel with a home larger than 800 ft² in the four communities. This risk assessment, described in more detail below, is based on the Home Ignition Zone concept (Cohen 2000) and has been developed by BLM

¹ For example, the Grand Mesa Resort community within Cedaredge FPD has a substantially higher proportion of part-year versus full-time residents than the remainder of Cedaredge FPD, and its residents have significantly less direct experience with wildfire on average.

Fire Mitigation Specialist Christopher Barth and collaborators over a series of implementations.² In it, parcels are assessed by a wildfire specialist on 10 attributes related to wildfire risk and given an overall wildfire risk rating that addresses not only structure survivability during a wildfire event but also considerations such as firefighter access and evacuation potential. By design, these ratings reflect a property's risk relative to the overall level of risk within its community rather than reflect an absolute risk rating. A complete copy of the assessment tool is provided in appendix A.

Properties were primarily assessed from public roadways and on site when permission was granted. WRWC sought permission to enter properties for this risk assessment through numerous requests, including direct mailing invitations to public meetings, mailed postcards, a newspaper ad, and posted flyers. For some interested residents, the wildfire specialist not only performed the standard 10-item assessment but also provided in-person, step-by-step analysis of their property's wildfire risk with the opportunity to ask questions or describe the specifics of their property.

When permission to enter was not granted, viewing from public roadways was supplemented with information from the Delta County Assessor's website and publicly accessible aerial imagery. In most cases, this combination of sources overcame any limitations from not being able to enter properties, especially for variables such as defensible space and background fuels. However, the variables for decking materials and the distance to other combustibles are not as easily seen by alternative methods, so when these characteristics could not be directly observed, the specialist had to make assumptions. As a default, when a characteristic was unobservable without access, the assessment defaulted to higher risk categories, such as assuming the presence of a wooden deck and other combustibles within 10 ft of the structure. These assumptions could bias the professional assessments toward higher levels of risk in relevant categories.

Between June 20 and July 18, 2013, WRWC completed these assessments for all 1,921 primary residential structures in the four communities, including structures not identified in county assessor records but discovered only through on-the-ground analysis of the district.³ All assessments pertain to the state of the property at the time of assessment; the rating assigned to a property could change over time,

² The Home Ignition Zone concept was developed by Jack Cohen at the Fire Science Lab in Missoula, Montana, and by research from the Institute for Business and Home Safety. The assessment as implemented here is an amalgam of that concept, Christopher Barth's work with the Colorado Springs Fire Department and other entities, Claire Hays' work on the Wildfire Hazard Information Extraction (WHINFOE) model, and Boulder County's Wildfire Hazard Identification and Mitigation System (WHIMS).

³ Note that county assessor records did not perfectly match the results of on-the-ground assessment, leading to different numbers for household surveys mailed and professional assessments completed. Data collection efforts allowed professional assessments to match actual conditions, and only matched pairs of resident surveys and professional assessments were analyzed for a possible risk perception gap.

reflecting that assessed property characteristics could change over time owing to homeowner behaviors such as maintenance (e.g., grass mowing and needle clearing), moving combustible materials (e.g., porch furniture and propane grills), or retrofitting the home (e.g., installing fire-resistant roofing or decking).

Resident Survey

In a companion effort, the WRWC conducted a household survey of residents of all 1,479 properties in the four communities, as identified by county assessor records. The survey contained seven sections designed to collect information about respondents' housing situation, experience with wildfire, knowledge of wildfire risk, attitudes about wildfire, social interactions, information sources, incentives and barriers toward undertaking mitigation actions, risk attitudes, and demographic characteristics. The survey also asked residents to assess their property based on the same 10 attributes related to wildfire risk that were assessed by the wildfire specialist, as previously described. A copy of the survey instrument can be found in its entirety in appendix B, including descriptive statistics of responses for all questions.

Residents were mailed a letter inviting them to attend a public meeting about the assessment and survey on June 6, 2013; addresses returned as undeliverable were removed from the original mailing list. On July 20, 2013, remaining residents were mailed a letter inviting them to take the survey either online with an individual identification code or by returning the enclosed paper copy in the postage-paid envelope. Those who did not respond were sent another copy of the survey on September 3, 2013, along with a reminder of the option to submit an online version of the identical survey. To further encourage survey participation, a third and final copy of the survey was mailed to non-respondents on January 15, 2014.

Household Survey Results

Of the 1,479 addresses attempted, 138 letters were returned as non-deliverable. Residents in 681 households responded to the survey for an overall response rate of 51 percent ($681/[1,479 - 138]$). Community-specific response rates ranged from 45 percent (Crawford) to 51 percent (Cedaredge). Only 15 percent of responding households (104) used the online option, ranging by community from 12 percent (Crawford) to 16 percent (Cedaredge and Paonia). The results summarized in the rest of this report are based on analysis of both the resident surveys and the wildfire specialist assessments; this section focuses on resident survey results.

Characteristics of the Survey Respondents and Their Residences

Basic respondent characteristics are shown in table 1. Overall, respondents ranged from 27 to 95 years old, with a median age of 65 years. Half (52 percent) reported being retired versus about one-third (31 percent) employed full-time. Fewer females (38 percent) responded than males. Based on Census data (U.S. Census Bureau 2013), respondents' education levels were generally higher than those for the Delta County population as a whole (51 percent of respondents were at least college graduates compared to 19 percent for Delta County overall). About one-fifth (22

percent) of respondents indicated having completed an advanced degree. The median reported household income was between \$50,000 and \$74,999, higher than the Census-reported median income for Delta County households (\$42,786) but consistent with that for households statewide (\$58,244). The vast majority of respondents owned their residence (95 percent), a few lived in a mobile home (6 percent), and about one-quarter indicated living there less than year-round (23 percent). Typical respondents had lived in their current residence for about 13 years (median move-in year is 2000) and expected to stay there for at least 5 more years (16 percent expect to move within 5 years). Move-in dates suggest that many did not build their own homes because the median year in which respondents' homes were built was 1988. Note that the targeted population (i.e., residents of the four communities) is a subset of Delta County overall (1,479 households versus 12,661 households county-wide) and is not intended to be representative of the county as a whole. In addition, the difference in ownership rates between the census (ranging from 54 to 71 percent by community) and the survey results (between 92 and 99 percent by community) paired with the methodology of mailing surveys to the mailing addresses noted in county assessor records, rather than sites' physical addresses, suggests that some survey respondents might be property owners who own, but do not live in, the properties within the communities in question.

As shown by the p-values of the statistical tests shown in the final column of table 1, many demographic variables do not statistically differ across communities. In contrast, age, retirement, residence in a mobile home, part-year resident status, and the year built were all significantly different ($p < 0.05$) across communities. Notable differences include older respondents and more retirees in Cedaredge, no mobile homes in Paonia, roughly twice the proportion of part-year residents in Cedaredge, and a 15-year spread of median build dates (ranging from Paonia as oldest to Crawford and Hotchkiss as newest).

Table 1—Comparison of demographics across communities based on survey results.

	All respondents	Cedaredge	Hotchkiss	Crawford	Paonia	p-value ^a
n (respondents)	681	336	134	65	123	n/a
Response rate (percent)	51	51	49	45	48	0.839 ^b
Age (median)	65	66	63	63	64	0.044 ^c
Female (percent)	38	36	32	43	44	0.178 ^b
College graduate (percent)	51	52	45	51	60	0.117 ^b
Retired (percent)	52	60	46	44	42	0.001 ^b
Income bracket (median)	\$50 to 75k	\$50 to 75k	\$50 to 75k	\$50 to 75k	\$50 to 75k	0.270 ^d
Own (versus rent) (percent)	95	97	93	92	94	0.069 ^e
Mobile home (percent)	6	7	8	6	0	0.003 ^b
Part-year resident (percent)	23	31	15	16	12	<0.001 ^b
Move-in year (median)	2000	2000	1999	2001	2000	0.534 ^d
Year built (median)	1988	1987	1992	1993	1979	0.002 ^d
Plan to move within 5 years (percent)	16	16	12	22	14	0.479 ^e

^a Null hypothesis of no difference across communities; p-values from tests as indicated.

^b chi-squared test; ^cOne-way ANOVA; ^d Kruskal Wallis test; ^e Fisher's exact test.

Relationships with Wildfire

Characteristics of residents' relationships with wildfire, including their levels of awareness and concern, amount of direct or indirect experience with wildfire, and attitudes toward wildfire suppression, all may influence their willingness to address wildfire risk. Similarly, because insurance is intended to protect against financial losses from damage to property, it is possible that homeowners insurance, and the companies that administer it, play a relevant role in residents' perspectives on wildfire risk. This section presents data collected to address these concepts.

Awareness and Concern for Wildfire

Respondents reported a fairly high level of awareness and concern about wildfire risk, and this did not vary statistically by community ($p > 0.05$). Irrespective of community, most were aware of wildfire risk when buying or first renting their residence (34 percent were "somewhat aware" and 50 percent were "very aware") and about half agreed with the statement "your property is at risk of wildfire" (39 percent agree, 10 percent strongly agree). Only 13 percent reported they "don't know" how close a wildfire has come to their property. About two-thirds indicated that they were concerned about wildfire risk affecting their residence (64 percent), and a similar proportion claimed to have an evacuation plan in case of wildfire (63 percent).

Experience with Wildfire

As shown in table 2, many survey respondents reported personal experience with wildfire, with many significant differences across communities. A few respondents reported damage to their current residences from wildfire (1 percent in Cedaredge and Hotchkiss) or smoke (4 percent in Hotchkiss, 3 percent in Paonia,

Table 2—Respondent experience with wildfires.

	All respondents	Cedaredge	Hotchkiss	Crawford	Paonia	p-value ^a
n (respondents)	681	336	134	65	123	
Residence damage from previous wildfires						
No damage	98%	99%	95%	98%	97%	0.009
Smoke damage only	1%	0%	4%	2%	3%	
Fire and smoke damage	1%	1%	1%	0%	0%	
Wildfire on property? (yes)	10%	8%	17%	13%	7%	0.025
Closest distance of wildfire to property						
Wildfire within <2 miles	48%	48%	54%	40%	45%	0.317 ^b
Wildfire within 2-10 miles	38%	36%	35%	45%	42%	
Wildfire within >10 miles	14%	16%	11%	15%	13%	
Reverse 911 call? (yes)	7%	10%	6%	0%	3%	0.003
Evacuated due to wildfire? (yes)	10%	12%	10%	2%	10%	0.064
Lived in other place with risk? (yes)	28%	28%	29%	29%	27%	0.971
Know someone who evacuated? (yes)	54%	51%	59%	42%	63%	0.018
Know someone who had damage? (yes)	32%	26%	35%	37%	42%	0.008

^a Null hypothesis of no difference across communities; p-values from Fisher's exact test except where noted.

^b p-value from Kruskal Wallis test.

and 2 percent in Crawford). Overall, 10 percent reported knowing they have had a wildfire on their property, with community-specific levels ranging from 7 percent (Paonia) to 17 percent (Hotchkiss); between 40 percent (Crawford) and 58 percent (Cedaredge) reported that a wildfire has been within 2 miles of their property. However, only 7 percent had ever received a reverse 911 call to evacuate or prepare for evacuation because of wildfire (ranging from 0 percent in Crawford to 10 percent in Cedaredge) and only 10 percent had ever evacuated because of wildfire (ranging from 2 percent in Crawford to 12 percent in Cedaredge). About one-quarter (28 percent) had previously lived in other areas at risk of wildfire. In addition, many reported second-hand wildfire experience in terms of knowing someone who has been evacuated because of wildfire (54 percent overall, ranging from 42 percent in Crawford to 63 percent in Paonia) or knowing someone whose home was damaged by wildfire (32 percent overall, ranging from 26 percent in Cedaredge to 42 percent in Paonia).

Attitudes Toward Wildfire and Wildfire Suppression

Attitudes about wildfire and wildfire suppression were measured with respondents' level of agreement with numerous statements (1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree, and 5 = strongly disagree). Table 3 depicts the percentage of respondents agreeing (1 or 2) or disagreeing (4 or 5) with each statement, ordered from most to least overall agreement. Overall, more than half of all respondents agreed that wildfires that threaten human life or property should be put out and that saving homes should be a priority over saving forests in a wildfire, while also

Table 3—Respondent attitudes toward wildfire and wildfire suppression

		All respondents	Cedaredge	Hotchkiss	Crawford	Paonia	p-value ^a
		n	681	336	134	65	123
		----- Percent -----					
Wildfires that threaten human life should be put out. STATE3 (n = 649)	Disagree	2	2	4	0	3	0.008
	Agree	90	92	90	89	86	
Wildfires are a natural part of the balance of a healthy forest/ ecosystem. STATE6 (n = 646)	Disagree	5	7	4	3	1	<0.001
	Agree	80	76	89	85	83	
Wildfires that threaten property should be put out. STATE4 (n = 643)	Disagree	4	3	5	3	6	0.001
	Agree	77	83	76	68	67	
During a wildfire, saving homes should be a priority over saving forests. STATE5 (n = 649)	Disagree	13	11	20	8	15	0.679
	Agree	67	68	60	69	70	
Naturally occurring wildfire is not the problem; people who choose to live in fire prone areas are the problem. STATE1 (n = 640)	Disagree	22	23	15	28	18	0.286
	Agree	43	40	45	45	46	
With proper technology, we can control most wildfires after they have started. STATE2 (n = 646)	Disagree	41	36	50	34	50	0.008
	Agree	29	31	28	34	21	

^a Null hypothesis of no difference across communities; p-values from Kruskal Wallis test using all five response levels (1 = strongly agree to 5 = strongly disagree); percentage for middle level (3 = neutral) not shown.

agreeing that wildfires are a natural part of a healthy ecosystem. Two of the statements (STATE5 and STATE1) did not significantly vary across communities, whereas the remaining four (STATE3, STATE6, STATE4, and STATE2) did, as determined by Kruskal Wallis tests on all five response levels. Respondents from Cedaredge were more likely to agree that wildfires threatening homes should be put out and less likely to agree that wildfires are a natural part of the balance of a healthy forest, whereas respondents from Hotchkiss and Paonia were more likely to disagree that wildfires can be controlled after they have started. More respondents disagreed versus agreed with only one of the statements in this section: “with proper technology, we can control most wildfires after they started.”

Homeowners Insurance and Wildfire

Irrespective of their community, only 3 percent of respondents did not have homeowners insurance, yet few reported receiving information about reducing wildfire risk from their homeowners insurance company (9 percent). More than half of respondents (60 percent) did not know if wildfire risk affects their homeowners insurance in any way and another 18 percent said that none of the insurance statements applied to them; overall, 82 percent were not aware of any negative impact on their homeowners insurance as a result of living in a wildfire-prone area. The only insurance-related question that differed statistically across communities (Fisher’s exact test, $p = 0.001$) pertained to whether respondents pay a higher premium because of wildfire risk (13 percent overall, from 5 percent in Paonia to 9 percent in Hotchkiss and Crawford, to 18 percent in Cedaredge). Very few (5 percent) of respondents had policies that require wildfire risk mitigation, and 3 percent have had policies canceled or refused for renewal because of wildfire risk.

Risks

It is often posited that risk perceptions play an important role in residents’ decisions about whether and how to mitigate wildfire risk, but there are many ways to think about risk. Results covered in this section pertain to different aspects of how residents understand and think about risk.

General Attitudes Toward Risk

People vary in the extent to which they find taking risks acceptable. To explore residents’ general orientations toward risk, respondents were asked about their risk attitudes with a simple measure developed by Dohmen and others (2011). Respondents were instructed to report their willingness to take risks in general and in five separate risk domains (driving a car, financial matters, sports or leisure, career decisions, and health choices) on a scale from 0 (not at all willing to take risks) to 10 (very willing to take risks). On average, respondents saw themselves as slightly risk averse (slightly less willing than willing to take risks: mean 4.2), but all possible choices were represented in results. Assuming normally distributed responses, responses pertaining to risk in general differ from those for all specific risk domains (matched t-tests, $p < 0.001$) except for career decisions ($p = 0.195$), with respondents reporting greater risk aversion in each individual domain as compared

to their “general” risk aversion, on average. Further, there is no evidence to suggest that risk ratings differed by community (one-way ANOVA tests, p-values range from 0.357 to 0.868 for each risk domain variable).

Sources of Information About Wildfire Risks

There are many possible sources of information about wildfire risk, which can vary in content, quality, and other potentially relevant characteristics. To understand what sources are informing residents of these communities, the survey asked respondents to select from a list the sources from which they have received information about reducing the risk of wildfire. Respondents reported receiving this information from a variety of sources, although one in five (21 percent) claimed to have not received any information about wildfire. Reported information sources did not differ statistically across communities with the exception of local fire department and neighborhood groups (Fisher’s exact tests, $p < 0.001$). Many respondents reported learning from the local fire department (37 percent), but this varied from 20 percent in Crawford, to 33 percent in Cedaredge and Paonia, to 62 percent in Hotchkiss. Other information sources included the media (34 percent), WRWC (26 percent), and government agencies such as the Colorado State Forest Service (15 percent) or the U.S. Forest Service or BLM (13 percent). One-fifth (20 percent) reported learning about reducing wildfire risk from neighbors, friends, or family members, although half reported having discussed wildfire issues with a neighbor (50 percent). Few had learned about reducing wildfire risk from neighborhood groups such as the HOA or neighborhood watches (8 percent), although Cedaredge stands out at 12 percent versus 2 to 3 percent for other communities.

Perceptions of Wildfire Risks

Wildfire risks perceptions—either pertaining to the potentially negative consequences of a wildfire or the likelihood of one occurring—are often considered a prerequisite for a homeowner to take action to address that risk. To better understand residents’ relevant thoughts, the survey included multiple measures of risk perceptions. Responses to these questions demonstrate that a small proportion of respondents (15 percent) perceived a 50 percent or greater chance that a wildfire would occur on their property in the year of the survey (and only 3 percent reported the chance as greater than 50 percent), whereas half of respondents (51 percent) thought that the chance was 10 percent or less. On average, respondents estimated the chance at 21 percent, with no significant differences across communities (Kruskal Wallis test, $p = 0.972$). In contrast, nearly one in three (31 percent) estimated that there is a 50 percent or greater chance that their home would be damaged or destroyed if a fire did occur on his or her property, including 7 percent who estimated that as 90 percent or greater. Also in contrast, respondent expectations about a fire damaging or destroying their homes varied significantly by community (Kruskal Wallis test, $p < 0.001$), ranging from mean estimates of a 20 percent chance in Hotchkiss to 29 percent in Paonia, 35 percent in Crawford, and 37 percent in Cedaredge.

The joint probability of personally experiencing the negative impacts of a wildfire is a combination of the chance that a wildfire occurs on one's property and the chance that a wildfire on the property would destroy or damage one's home.⁴ Based on this calculation, we find that half of the respondents implicitly estimated the joint probability of experiencing a wildfire that damages their homes in the year of the survey at 3 percent or lower, whereas fewer than 2 percent of respondents estimated that joint probability as 50 percent or greater.

Expected Consequences of Wildfire

For more detail into respondents' expectations about how a wildfire would personally affect them, the survey also asked respondents to rate the likelihood of certain impacts if a wildfire did occur on their property. Impacts were rated on a scale from 1 ("Not likely") to 5 ("Very likely"). Consistent with previous results, most of these responses differed across communities, as detailed in table 4, with respondents in Hotchkiss generally considering most consequences to be less likely than respondents from elsewhere. Half of all respondents (49 percent) thought it was unlikely they personally would put the fire out (ranging from 37 percent in Hotchkiss to 56 percent in Cedaredge), whereas 31 percent thought that was likely (ranging from 26 percent in Cedaredge to 43 percent in Hotchkiss). Further, more than half of respondents (56 percent) expected the fire department to save their home in a wildfire, although only 43 percent in Crawford thought that was likely, whereas up to 68 percent in Hotchkiss thought so. Overall, 58 percent expected that their trees and landscape would burn, but smaller proportions expected smoke damage (51 percent) or physical damage (41 percent) to their home or for their home to be destroyed (25 percent). More than two-thirds (69 percent) thought it unlikely that their community water supply would be threatened.

Mitigation of Property-Level Wildfire Risk

Respondents in all communities demonstrated a high level of willingness to undertake wildfire mitigation on their properties, as shown by the agreement with four related statements (STATE11, STATE13, STATE14, and STATE15). Few (6 percent) agreed that they "live here for the trees and will not remove any of them to reduce wildfire risk." Similarly, most (85 percent) disagreed with the claim that "managing the wildfire danger is a government responsibility, not [theirs]" and that "actions taken by homeowners to reduce the risk of loss due to wildfire are not effective" (82 percent). Responses do not vary statistically across communities (Kruskal Wallis tests, p-values range from 0.201 to 0.666 by question).

When asked about the density of the vegetation on their property on a scale from 1 = "very sparse" to 5 = "very dense," respondents reported a reduction from an average perceived density rating of 3.1 at the time they moved in to a current average rating of 2.5. Asked the same about neighboring properties, respondents reported

⁴ The joint probability (i.e., wildfire risk) is the product of the unconditional probability of wildfire (i.e., probability of wildfire) and the probability of damage, conditional on wildfire (i.e., consequence of wildfire).

Table 4—Respondents’ estimation of the likelihood of wildfire consequences

If there is a wildfire on your property, how likely do you think it is that the following would occur?		All respondents	Cedaredge	Hotchkiss	Crawford	Paonia	p-value ^b
		----- Percent -----					
You would put the fire out LACT1 (n = 636)	Unlikely ^a	49	56	37	47	45	<0.001
	Likely ^a	31	26	43	28	33	
The fire department would save your home. LACT2 (n = 638)	Unlikely ^a	24	29	13	37	18	0.002
	Likely ^a	56	56	68	43	54	
There would be some smoke damage to your home. LACT3 (n = 632)	Unlikely ^a	23	20	35	20	19	0.013
	Likely ^a	51	55	40	52	52	
There would be some physical damage to your home. LACT4 (n = 637)	Unlikely ^a	31	27	48	25	29	<0.001
	Likely ^a	41	46	30	48	36	
Your home would be destroyed. LACT5 (n = 637)	Unlikely ^a	57	52	74	52	57	<0.001
	Likely ^a	25	31	14	31	18	
You would suffer financial losses due to the loss of business/income on your property. LACT6 (n = 632)	Unlikely ^a	63	66	70	59	49	0.014
	Likely ^a	27	25	19	31	35	
Your trees and landscape would burn. LACT7 (n = 646)	Unlikely ^a	21	19	29	17	21	0.007
	Likely ^a	58	61	47	67	54	
Your pets would be harmed (include non-income generating livestock). LACT8 (n = 629)	Unlikely ^a	74	76	75	60	74	0.142
	Likely ^a	14	14	12	13	15	
Your neighbors’ homes would be damaged or destroyed. LACT9 (n = 635)	Unlikely ^a	35	30	49	34	36	0.007
	Likely ^a	41	45	35	36	38	
Your community water supply would be threatened. LACT10 (n = 634)	Unlikely ^a	69	64	77	71	69	0.037
	Likely ^a	21	23	15	24	19	
The fire would spread to nearby public lands. LACT11 (n = 638)	Unlikely ^a	39	42	43	30	33	0.099
	Likely ^a	44	41	39	58	48	

^a Response levels condensed from five categories (1 = “not likely” to 5 = “very likely”) to two (1, 2 = “Unlikely” and 4, 5 = “Likely”).

^b Null hypothesis of no difference across communities; p-values from Kruskal Wallis test using all five response levels (1 = “not likely” to 5 = “very likely”).

a much smaller decrease, from an average of 3.1 to an average of 3.0. Responses to VEG1 and VEG2, which pertain to initial and current vegetation levels on the respondent’s own property, did not statistically differ across communities (Kruskal Wallis tests, $p = 0.052$ and $p = 0.096$, respectively). However, responses to VEG3 and VEG4, which pertain to initial and current vegetation levels perceived on most of one’s neighboring properties, did vary by community (Kruskal Wallis tests, $p = 0.003$ and $p = 0.040$), respectively), with respondents in Cedaredge and Crawford generally rating neighbors’ properties as having denser vegetation than did respondents in Hotchkiss and Paonia.

In addition, close to half (47 percent) reported knowing that at least one of their neighbors has taken actions to reduce the risk of wildfire on his or her property; of those, 37 percent have worked with their neighbors for that purpose on either their or their neighbors’ properties. In contrast, 35 percent reported knowing that at least one neighbor was not taking action to reduce wildfire risk. However, few agreed that

they “don’t take action [on wildfire risk] because adjacent properties are not treated leaving [their] actions ineffective” (1 percent strongly agree, 3 percent agree). None of these neighbor action variables differ across communities.

When respondents were asked about factors that keep them from undertaking actions to reduce the wildfire risk on their property, top responses included the physical difficulty of doing the work (40 percent), financial expenses (33 percent), and time it takes to do the work (27 percent). A smaller proportion of respondents reported barriers of not wanting to change the look of their properties (19 percent), a perceived lack of effectiveness of risk reduction actions (13 percent), or HOA restrictions on cutting trees (7 percent). Although only 11 percent cited a lack of awareness of wildfire risk as a barrier keeping them from undertaking action, higher percentages of respondents reported that other types of information were barriers: 26 percent felt constrained by a “lack of information about, or options for, removal of slash or other materials from thinning trees and other vegetation;” and 27 percent felt constrained by a “lack of specific information on how to reduce wildfire risk on [their] property.” Only one of the measured barriers statistically differed by community (Fisher’s exact test, $p = 0.017$): 10 percent of Cedaredge respondents noted HOA restrictions on cutting trees versus 2 percent in Hotchkiss, 5 percent in Crawford, and 6 percent in Paonia.

Similar to the perceived barriers to undertaking wildfire risk mitigation on their property, more than half of respondents (52 percent) reported that they would be encouraged to reduce the wildfire risk on their property by help with thinning vegetation or removal of debris or financial assistance (45 percent). About two-thirds (64 percent) reported a willingness to participate in a cost-sharing grant program that would help cover costs up to the estimated total cost of approximately \$1,000 per acre to remove vegetation in an effort to reduce wildfire risk, with an average willingness to contribute around \$360 per acre for that work (with the grant therefore paying the remaining average of \$640 per acre). Although the percentage who would participate did not vary across communities (chi-squared test, $p = 0.252$), the average amount respondents were willing to pay ranged from about \$300 in Crawford and Hotchkiss to \$360 in Cedaredge and \$430 in Paonia (Kruskal Wallis test, $p = 0.019$). Again reflecting the importance of information to respondents, 57 percent of respondents also reported that “specific information about what needs to be done” would encourage them to reduce the wildfire risk on their properties, and 22 percent reported that “a list of recommended contractors...to do the work” would encourage them.

Results: Resident and Professional Wildfire Risk Ratings

To assess the level of agreement between the way residents and an external observer view the wildfire risk of properties, residents were asked their perception of the same set of 10 wildfire risk factors in the survey as the wildfire specialist assessed. This section reports descriptive statistics for the two sets of measures (shown in table 5), referring to these as resident (from respondents; answers to the household surveys)

and professional (from the wildfire specialist's assessments) risk ratings. The "points" column of table 5 depicts the relative weighting of each item in contributing to the property's overall risk score; points reflect the relative importance of each factor in contributing to a property's overall risk. A maximum risk rating for all 10 categories corresponds to a total of 595 points. The "resident survey" column presents the percentage of respondents selecting each response and the "professional assessment" column presents the percentage of parcels (for which a survey was returned) placed in each response category by the wildfire specialist.

Resident survey responses varied significantly across communities (Kruskal Wallis tests, $p < 0.05$) for 5 out of 10 attributes (ROADS, TOPOGRAPHY, FUELTYPE, DSPACE, and OTHER), whereas all assessed measures except ROOF varied significantly across communities (Kruskal Wallis tests, $p < 0.05$) (details not shown). In addition, the final column of table 5 reports the p-value of a statistical test that the two distributions differ (Wilcoxon signed rank sum, which non-parametrically tests the null hypothesis of the two variables coming from the same distribution), as well as which dataset reported higher average risk levels when they differed. Consistent with previous research in other communities (Meldrum and others 2013, 2014), results demonstrate the presence of a complex risk perception gap between respondents and the wildfire specialist. Specifically, respondents on average reported higher risk levels for all access risk factors and the balcony, deck, or porch material, whereas the specialist reported higher risk levels for the building exterior material and for distances to dangerous topography, to defensible space, and to woodpiles and other combustibles.

Each property's overall wildfire risk was assessed by adding the points for all 10 evaluated risk factors. Adding the resident and professional results creates "weighted sum" resident and professional overall risk scores, respectively, on which some characteristics (e.g., ROOF) have a larger influence than others (e.g., ROADS). These sums were grouped into predetermined risk categories: low (25–150 points), moderate (151–175), high (176–270), very high (271–330), and extreme risk (331–595). In addition, the household survey asked respondents to rate their property's wildfire risk among the same five categories. The question was asked twice: once before asking about the individual property attributes, and again after asking about them, noting the second time that this rating might be based on the 10 factors previously discussed. Respondent were not informed of the point assignments for each attribute. These "direct questions" offer additional measures of the resident's perceived assessment of overall risk, and comparison of before and after shows the extent to which the individual attribute questions influenced responses.

As table 6 shows, the most common professionally assessed category was "high risk," whereas the most common resident-assessed category was "moderate risk." Statistical testing demonstrates that the weighted sum scores did not vary between respondents and the specialist (Wilcoxon signed rank sum, $p = 0.772$), nor did responses to the direct question change significantly before and after asking about individual attributes (Wilcoxon signed rank sum, $p = 0.116$). In contrast, both direct question

Table 5—Resident and professional risk ratings for 10 individual property attributes.

Category	Criteria	Values	Points	Resident	Professional	p-value ^a
				survey	assessment	
				<i>Percent</i>		
Access risk factors	Structure address posted at driveway entrance? (ADDRESS)	Posted and reflective	0	79	97	<0.001 Survey
		Posted, NOT reflective	5	12	2	
		Not visible from road	15	9	2	
	How many roads could be used to get out of community? (ROADS)	Two or more roads in/out	0	52	60	0.002 Survey
		One road in/out	10	48	40	
	Width of driveway (DRIVEWAY)	Greater than 24 ft wide	0	6	52	<0.001 Survey
		Between 20 and 24 ft wide	5	30	27	
		Less than 20 ft wide	10	64	21	
Background risk factors	Distance to dangerous topography (ridge, steep drainage, or narrow canyon) (TOPOGRAPHY)	More than 150 ft	0	70	70	0.072 Assessment
		50 to 150 ft	30	18	11	
		Less than 50 ft	75	12	19	
	Predominant background fuel type in neighborhood (FUELTYPE)	Light (grasses)	25	22	26	0.117
		Moderate (light brush and/or isolated, small trees)	50	53	41	
		Heavy (dense brush or timber, down and dead fuel)	75	25	34	
Structural risk factors	Roofing material (ROOF)	Tile, metal, asphalt	0	97	98	1.000
		Wood (shake shingle)	200	3	2	
	Building exterior (EXTERIOR)	Non-combustible siding (e.g., stucco, cement, brick)	0	33	20	<0.001 Assessment
		Log, heavy timbers	20	13	14	
		Wood, vinyl, or wood shake	60	54	66	
	Balcony, deck, or porch (DECK)	None/non-combustible	0	22	45	<0.001 Survey
		Combustible material	20	78	55	
Defensible space risk factors	Defensible Space (CSFS 6.302 Standards; “closest distance from your house to overgrown, dense, or unmaintained vegetation”) (DSPACE)	More than 150 ft	0	24	20	<0.001 Assessment
		30 to 150 ft	50	41	39	
		10 to 30 ft	75	27	27	
		Less than 10 ft	100	8	15	
	Location of woodpiles and combustibles (e.g., light flashy vegetation, propane tanks, trees, firewood, trash) (OTHER)	None or >30 ft from structure	0	51	21	<0.001 Assessment
		10-30 ft from structure	10	38	36	
		<10 ft from structure	30	11	43	

^a Null hypothesis of no difference across communities; p-values from the Wilcoxon signed rank sum test. If the null hypothesis is rejected, dataset with higher average risk rating is noted.

Table 6—Comparison of risk categorizations across different elicitations.

	Points	Assessment weighted sum	Survey weighted sum	Survey direct question (after)	Survey direct question (before)
----- Percent -----					
Low risk	25–150	29	27	26	25
Moderate risk	151–175	10	10	49	49
High risk	176–270	39	39	19	20
Very high risk	271–330	15	6	4	5
Extreme risk	331–595	7	18	2	2

responses significantly differed from both weighted sum ratings (Wilcoxon signed rank sum, $p < 0.001$ for all four combinations). In other words, even though respondents consistently rated some individual attributes as higher risk and others as lower risk versus the professional assessment (as shown in table 5) these differences tend to average out when aggregated with the pre-assigned weights. However, when asked directly about overall wildfire risk, respondents tended to rate their properties with lower risk than the specialist.

Finally, table 7 compares overall risk ratings across communities. It reports community-average ratings for the three overall measures, each of which varies significantly across communities as shown by the p-values in the final column. As shown by the “Assessment weighted sum,” the professional assessed the wildfire risk of properties in Paonia substantially higher than in other communities, with Cedaredge earning the lowest average overall risk rating. In contrast, respondents in Cedaredge rated their properties risks higher, on average, than respondents in other communities for both the “Survey direct question (after)” and the “Survey weighted sum” (which is constructed from the points system that respondents did not observe). Crawford is unique in that its average “Survey direct question (after)” response was as high as for Cedaredge, yet its “Survey weighted sum” is the lowest of all communities.

Table 7—Average overall risk ratings by community.

	All respondents	Cedaredge	Hotchkiss	Crawford	Paonia	p-value ^a
Assessment weighted sum	206	195	200	208	242	>0.001
Survey weighted sum	189	195	182	169	189	0.048
Survey direct question (after) ^b	1.1	1.2	0.8	1.2	1.0	>0.001 ^c

^a Null hypothesis of no difference across communities; p-values from one-way ANOVA tests except where noted.

^b Categorized from 0 (low risk) to 4 (extreme risk).

^c Kruskal Wallis test.

Discussion and Conclusions

Understanding and encouraging residents in the WUI to play a role in mitigating wildfire risk on their properties requires understanding residents' knowledge, concern, and activities related to that risk, as well as recognizing that these factors might vary from one community to the next. The main finding from this study is that, despite the four communities being in close proximity of each other and all belonging to the same county in western Colorado, many measured variables vary significantly across communities. Risk ratings as assessed either by the professional or by the respondents vary significantly from place to place, as do past experiences with wildfires and expected consequences in the event of a wildfire. In contrast, barriers and incentives pertaining to wildfire risk mitigation do not tend to vary at the community level, nor does the lack of much interaction with insurance companies about wildfire risks. Local fire departments are more common information sources in some communities than others, as are neighborhood organizations such as HOAs. In general, what variables did or did not vary across communities is complex and does not follow easy generalizations, suggesting the importance of specific, community-level context when researching or trying to influence perspectives on wildfire risk and wildfire risk mitigation actions.

The information provided here may be useful to practitioners tasked with understanding and influencing the relationship of WUI residents with wildfire risk and to policymakers who must make decisions about wildfire suppression and risk mitigation. In addition, this study provides a baseline for further analysis of the perspectives of these communities and of differences in risk understandings and related variables across different communities within the WUI.

References

- Brenkert-Smith, H.; Champ, P.A.; Flores, N. 2006. Insights into wildfire mitigation decisions among wildland-urban interface residents. *Society and Natural Resources*. 19(8): 759–768.
- Brenkert-Smith, H.; Champ, P.A.; Flores, N. 2012. Trying not to get burned: Understanding homeowners' wildfire risk-mitigation behaviors. *Environmental Management*. 50: 1139–1151.
- Carroll, M.S.; Pavaglio, T.; Ellison, A.; Abrams, J.; Moseley, C. 2014. Community diversity and wildfire risk: An archetype approach to understanding local capacity to plan for, respond to, and recover from wildfires. Ecosystem Workforce Program Working Paper Number 50. Eugene, OR: University of Oregon. 20 p.
- Champ, P.A.; Brenkert-Smith, H.; Flores, N. 2011a. Living with wildfire in Boulder County, Colorado, 2007. Res. Note RMRS-RN-47WWW. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 26 p.

- Champ, P.A.; Brenkert-Smith, H.; Flores, N. 2011b. Living with wildfire in Larimer County, Colorado, 2007. Res. Note RMRS-RN-48WWW. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 27 p.
- Cohen, J.D. 2000. Preventing disaster: home ignitability in the wildland-urban interface. *Journal of Forestry*. 98(3): 15–21.
- Delta County. 2011. Delta County, Colorado: Community Wildfire Protection Plan. 164 p.
- Dohmen, T.; Falk, A.; Huffman, D.; Sunde, U.; Schupp, J.; Wagner, G.G. 2011. Individual risk attitudes: measurement, determinants, and behavioral consequences. *Journal of the European Economic Association*. 9(3): 522–550.
- Meldrum, J.R.; Barth, C.M.; Falk, L.C.; Brenkert-Smith, H.; Warziniack, T.; Champ, P. 2013. Living with wildfire in Log Hill Mesa, Colorado. Res. Note RMRS-RN-66. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 34 p.
- Meldrum, J.R.; Champ, P.A.; Brenkert-Smith, H.; Warziniack, T.; Barth, C.; Falk, L. [in press]. Understanding gaps between the risk perceptions of WUI residents and wildfire professionals. *Risk Analysis*.
- Raish, C.; Gonzalez-Caban, A.; Martin, W.; Martin, I.M.; Bender, H. 2007. Cultural variation in public perception concerning fire use and management. In: Daniel, T.C.; Carroll, M.; Moseley, C.; Raish, C.; eds. *People, fire, and forests: a synthesis of wildfire social science*. Corvallis, OR: Oregon State University Press: 70–88.
- U.S. Census Bureau. 2013. 2008–2012 American community survey 5-year estimates. <http://www.census.gov/acs/www/>. (April 3, 2015).

Appendix A: Professional Assessment Tool

WRWC's Wildfire Hazard Structure Survey

ACCESS

Structure address posted at driveway entrance?

	Posted and reflective	0
	Posted, NOT reflective	5
	Not Visible from road	15

Ingress and Egress

	Two or more roads in/out	0
	One road in/out	10

Width of driveway

	Greater than 24 feet wide	0
	Between 20-24 feet wide	5
	Less than 20 feet wide	10

VEGETATION & TOPOGRAPHY

Distance to dangerous topography

	More than 150 feet	0
	50-150 feet	30
	Less than 50 feet	75

Predominant background fuel type in neighborhood

	Light (grasses, forbs, tundra)	25
	Moderate (light brush, small trees)	50
	Heavy (dense brush or timber, down and dead fuel)	75

Defensible Space (CSFS 6.302 Standards)

	more than 150 feet	0
	30-150 feet	50
	10-30 feet	75
	less than 10 feet	100

25-150	LOW
151-175	MODERATE
176-270	HIGH
271-330	V. HIGH
331-595	EXTREME

STRUCTURE

Roofing Material

	Tile, metal, asphalt	0
	Wood (shake shingle)	200

Building Exterior

	Non-combustible siding (stucco,	0
	Log, heavy timbers	20
	Wood, vinyl, or wood shake	60

Location of woodpiles and combustibles (light flashy vegetation, shrubs, trees, trash)

	None or > 30 ft from structure	0
	10-30 feet from structure	10
	< 10 feet from structure	30

Balcony, deck, or porch

	Non/non combustible	0
	combustible material	20

Appendix B: Resident Survey Instrument

Living with Wildfire in Delta County



www.COwildfire.org

(n=681)

Key: **Red ALL CAPS** are variable names

n = number of observations

Blue numbers are percent responses (might not total 100% due to rounding)

Based on all data collected by May 20, 2014

What is the West Region Wildfire Council?

The West Region Wildfire Council (WRWC) was established in 2007 as a collaborative effort to support interagency efforts to develop and implement plans to better mitigate the threat of catastrophic wildland fire to the communities and natural resources in the Colorado counties of Delta, Gunnison, Hinsdale, Montrose, Ouray, and San Miguel. WRWC members represent private citizens, local, county, state, and federal agencies with an interest in, and a commitment to addressing wildfire risk across the region. Members have worked with homeowners, fire districts, and counties to develop Community Wildfire Protection Plans in the region. The WRWC provides communities with education about wildfire risk and assistance with implementing steps to reduce wildfire risk through fuels reduction projects and the creation of defensible space.

Project Description and Disclosures

This research study explores how residents and owners of property in Delta County respond to wildfire risk. Participation in this study is entirely your choice. There is no cost for participation in this study. You will not be paid for participation in this study. We will maintain the privacy of your data.

Section 1: In this first section of the survey, we ask about your residence in the [Paonia] community in Delta County, CO. If you own multiple homes, please answer the following questions with respect to your [Paonia] residence. We refer to this home as your **current residence**.

OWNRENT (n=675)

1.1 Do you own or rent your current residence? (*Circle one number*)

95% 0 Own
5% 1 Rent

HOMETYPE (n=673)

1.2 How would you describe your current residence? (*Circle one number*)

6% 0 Mobile home or trailer
94% 1 Single-family home
1% 2 Multi-family dwelling (e.g., townhouse, condo, apartment)

MONTHS (n=662)

1.3 How many months per year do you live at your current residence? (*Fill in the blank*)

MEAN = 10 months; MEDIAN = 12 months

FULLTIME (n=654)

1.4 In what year did you move to your current residence? (*Fill in the blank*)

MEAN = 1996; MEDIAN = 2000

YRBUILD (n=633)

1.5 In what year was your current residence originally built? (*Fill in the blank*)

MEAN = 1980; MEDIAN = 1988

MOVE1 (n=661)

1.6 Do you expect to move away and/or sell your current residence in the next five years? (*Circle one number*)

84% 0 No
16% 1 Yes

RISKAWAR (n=674)

1.7 How aware of wildfire risk were you when you bought or decided to rent your current residence? (*Circle one number*)

13% 0 Not aware
34% 1 Somewhat aware
50% 2 Very aware
2% 3 Don't remember

RISKRATE2 (n=667)

1.8	How would you rate your current residence's wildfire risk? (<i>Circle one number</i>)	
25%	0	Low Risk
49%	1	Moderate Risk
20%	2	High Risk
5%	3	Very High Risk
2%	4	Extreme Risk

CONCERNED (n=657)

1.9	Are you concerned about wildfire affecting your current residence? (<i>Circle one number</i>)	
36%	0	No
64%	1	Yes

Section 2: In this section, we ask about your experience, if any, with wildfire.

FIRE (n=669)

2.1	What is the closest distance (as a crow flies) a wildfire has come your current residence? (<i>Circle one number</i>)	
9%	0	There has been a wildfire on your property
32%	1	Less than 2 miles away but not on your property
32%	2	2 to 10 miles away
13%	3	More than 10 miles away
13%	4	Not sure

DAMAGE (n=671)

2.2	Has your current residence ever been damaged by a wildfire or smoke from a wildfire? (<i>Circle one number</i>)	
98%	0	No
1%	1	Yes, your current residence suffered only smoke damage
1%	2	Yes, your current residence suffered fire and smoke damage

EVACPLAN (n=669)

2.3	Do you currently have an evacuation plan for your household in the event a wildfire threatens your current residence? (<i>Circle one number</i>)	
37%	0	No
63%	1	Yes

REVERSECALL (n=670)

2.4	Have you ever received a reverse 911 call to evacuate or prepare to evacuate your current residence due to wildfire? (<i>Circle one number</i>)	
93%	0	No
7%	1	Yes

EVACUATED (n=669)

- 2.5 Have you ever evacuated from your current residence due to a wildfire or threat of a wildfire? *(Circle one number)*
- | | | |
|-----|---|-----|
| 90% | 0 | No |
| 10% | 1 | Yes |

PREVRISK (n=670)

- 2.6 Have you ever owned a home (in Colorado or elsewhere), other than your current residence, that was located in an area at risk of wildfire? *(Circle one number)*
- | | | |
|-----|---|-----|
| 72% | 0 | No |
| 28% | 1 | Yes |

KNOWEVAC (n=670)

- 2.7 Do you know anyone (in Colorado or elsewhere) who has been evacuated from his or her home due to a wildfire? *(Circle one number)*
- | | | |
|-----|---|-----|
| 46% | 0 | No |
| 54% | 1 | Yes |

KNOWDAM (n=670)

- 2.8 Do you know anyone whose home has been damaged or lost due to a wildfire? *(Circle one number)*
- | | | |
|-----|---|-----|
| 68% | 0 | No |
| 32% | 1 | Yes |

- 2.9 Which of the following statements are true regarding homeowners insurance for your current residence? *(Circle all that apply)*

(n=672) 1 = circled; 0 = not circled; % reported is % circled

- | | | |
|-----|---|---|
| 3% | 0 | An insurance company has canceled or refused to renew your policy because of wildfire risk. INSURE3 |
| 13% | 1 | You pay a higher premium for your homeowners insurance because of wildfire risk. INSURE4 |
| 5% | 2 | Your homeowners insurance company requires wildfire risk mitigation as a condition of your policy. INSURE5 |
| 5% | 3 | You do not have homeowners insurance. INSURE6 |
| 60% | 4 | You have homeowners insurance but do not know if wildfire risk impacts it in any way. INSURE7 |
| 18% | 5 | None of the above apply to you. INSURE8 |

Section 3: In this section, we ask about the characteristics of your *current residence* and the area near your *current residence*. These characteristics are related to the risk of wildfire to your property.

ROOFTYPE (n=660)

- 3.1 What type of roof does your current residence have? (*Circle one number*)
- | | | |
|-----|---|----------------------------------|
| 3% | 0 | Wood (shake shingles) |
| 97% | 1 | Tile, metal, or asphalt shingles |

SIDETYPE (n=659)

- 3.2 What type of exterior siding covers the **majority** of your current residence? (*Circle one number*)
- | | | |
|-----|---|--|
| 33% | 0 | Stucco, cement, brick, stone, or other noncombustible siding |
| 13% | 1 | Log or heavy timbers |
| 54% | 2 | Wood or vinyl siding |

BALCONY (n=667)

- 3.3 Does your current residence have a balcony, deck, or porch? (*Circle one number*)
- | | | |
|-----|---|--|
| 11% | 0 | No |
| 89% | 1 | Yes → Is any part of the balcony, deck, or porch made of wood? (<i>Circle one number</i>) BALCONY2 (n=586) |
| 13% | 0 | No |
| 87% | 1 | Yes |

DRIVEWAY (n=660)

- 3.4 How wide is your driveway at the **narrowest** point? (*Circle one number*)
- | | | |
|-----|---|---|
| 64% | 0 | Less than 20 feet (one car wide) |
| 30% | 1 | 20 – 24 feet (two cars wide) |
| 6% | 2 | More than 24 feet (more than two cars wide) |

DRIVEWAY2 (n=659)

- 3.5 How long is your driveway? (*Circle one number*)
- | | | |
|-----|---|---------------------------|
| 83% | 0 | Less than 0.25 miles long |
| 17% | 1 | 0.25 miles or longer |

HOMENUM (n=666)

- 3.6 Is your house number posted at the end of your driveway? (*Circle one number*)
- | | | |
|-----|---|--|
| 8% | 0 | No |
| 92% | 1 | Yes → Is the posted number reflective? (<i>Circle one number</i>) REFLECT (n=571) |
| 13% | 0 | No |
| 87% | 1 | Yes |

CLOSEVEG (n=667)

3.7 What is the **closest** distance from your home to overgrown, dense, or unmaintained vegetation? (*Circle one number*)

- 8% 0 Less than 10 feet
- 27% 1 10 – 30 feet
- 41% 2 31 – 150 feet
- 24% 3 More than 150 feet

COMBUST (n=669)

3.8 What is the **closest** distance from your home to combustible items other than vegetation such as lumber, firewood, a propane tank, hay bales, or other materials that could easily ignite? (*Circle one number*)

- 11% 0 Less than 10 feet
- 38% 1 10 – 30 feet
- 51% 2 More than 30 feet

RIDGE (n=666)

3.9 What is the **closest** distance from your home to a ridge, steep drainage, or narrow canyon? (*Circle one number*)

- 12% 0 Less than 50 feet
- 18% 1 50 – 150 feet
- 70% 2 More than 150 feet

ROADS (n=665)

3.10 If the road you use to access your current residence was blocked due to a wildfire, is there another road you could use to get out of your community? (*Circle one number*)

- 48% 0 No
- 52% 1 Yes

DOMVEG (n=662)

3.11 Which of the following best describes the **dominant** vegetation on your property and those properties immediately surrounding you? (*Circle one number*)

- 22% 0 Grasses
- 53% 1 Light brush and/or isolated trees (e.g., grass/sage mix with some pinion-juniper and/or isolated oak and ponderosa pine)
- 25% 2 Dense brush and/or dense trees (e.g., continuous pinion-juniper and/or dense oak with ponderosa pine)

RISKRATE (n=670)

3.12 Homes are assessed for overall wildfire risk based on the items asked about in questions 3.1 – 3.11 above. Now that you have considered these items, how would you rate your current residence’s wildfire risk? *(Circle one number)*

- 26% 0 Low Risk
- 49% 1 Moderate Risk
- 19% 2 High Risk
- 4% 3 Very High Risk
- 2% 4 Extreme Risk

CHANCES1 (n=651)

3.13 What do you think is the chance that a wildfire will start on or spread to your property this year? *(Circle one number)*

	0	10	20	30	40	50	60	70	80	90	100
No Chance	13%	38%	19%	11%	4%	12%	1%	1%	1%	0.5%	0%
For Sure											

CHANCES2 (n=655)

3.14 If a wildfire starts on or spreads to your property this year, what do you think is the chance that your home will be destroyed or severely damaged? *(Circle one number)*

	0	10	20	30	40	50	60	70	80	90	100
No Chance	11%	28%	15%	9%	5%	11%	3%	3%	6%	3%	4%
For Sure											

Section 4: Please think about the properties across the street, next to, or bordering your property (may include vacant lots or publicly owned land). Even if you live on a large property and your neighbors are far away, the following questions refer to the owners/managers of these adjacent properties as your **neighbors**. The properties themselves are referred to as **neighboring properties**.

TALKFIRE (n=669)

4.1 Have you ever talked about wildfire issues with a neighbor? *(Circle one number)*

- 50% 0 No
- 50% 1 Yes

NACTION (n=667)

4.2 Have any of your neighbors done anything to reduce the risk of wildfire on their property? *(Circle one number)*

- 27% 0 No →Skip to Question 4.5
- 47% 1 Yes
- 26% 2 Don’t know →Skip to Question 4.5

WHENACT (n=308)

- 4.3 When did your neighbors undertake action(s) to reduce risk of wildfire on their property in relation to any actions you have undertaken? *(Circle one number)*
- 10% 0 You have not taken any action
 - 14% 1 They took action before you did
 - 19% 2 They took action after you did
 - 32% 4 You took action around the same time
 - 26% 5 Don't know

WORKN (n=310)

- 4.4 Have you ever worked with any of your neighbors to reduce the risk of wildfire on your property or that of your neighbors? *(Circle one number)*
- 63% 0 No
 - 11% 1 Yes, on your property
 - 5% 2 Yes, on your neighbors' properties
 - 21% 3 Yes, on both your property and your neighbors' properties

SLACKER (n=661)

- 4.5 Do you have any neighbors who are **not** taking action to address what you would consider sources of wildfire risk in the event of a wildfire (e.g., dense vegetation) on their property? *(Circle one number)*
- 32% 0 No
 - 33% 1 Yes
 - 35% 2 Don't know

4.6 How would you describe the vegetation on your property and the **neighboring properties**? *(Circle one number for each)*

	Very Sparse				Very Dense
When you first moved in, the vegetation on your property was... VEG1 (n=656)	11%	18%	35%	22%	14%
Currently, the vegetation on your property is... VEG2 (n=656)	14%	35%	36%	11%	3%
When you first moved in, the vegetation on most of the neighboring properties was. VEG3 (n=651)	7%	20%	38%	23%	12%
Currently, the vegetation on most of the neighboring properties is... VEG4 (n=656)	7%	25%	39%	22%	6%

Section 5: In this section, we ask about sources of wildfire information and wildfire beliefs.

5.1 From which of the following sources have you received information about reducing the risk of wildfire? (*Circle all that apply*)

(n=665) 1 = circled; 0 = not circled; % reported is % circled

- 37% 1 Local fire department SOURCE1
- 26% 2 West Region Wildfire Council SOURCEw
- 8% 3 Neighborhood group (homeowners group, neighborhood watch, etc.) SOURCE2
- 20% 4 Neighbors, friends, or family members SOURCE3
- 34% 5 Media (newspaper, TV, radio, internet) SOURCE4
- 15% 6 Colorado State Forest Service SOURCE6
- 13% 7 US Forest Service or US Bureau of Land Management SOURCE7
- 6% 8 A wildfire related website SOURCEWEB
- 9% 9 Your homeowners insurance company INSURE2
- 8% 10 Other →Please describe: SOURCE9
- 21% 11 None of the above. You have not received any information about wildfire SOURCE10

5.2 If there is a wildfire on your property, how likely do you think it is that the following would occur? (*Circle one number for each item*)

	Not Likely				Very Likely	Not Applicable
You would put the fire out. LACT1 (n=636)	27%	21%	20%	13%	17%	1%
The fire department would save your home. LACT2 (n=638)	14%	10%	19%	20%	36%	1%
There would be some smoke damage to your home. LACT3 (n=632)	9%	13%	26%	20%	30%	1%
There would be some physical damage to your home. LACT4 (n=637)	15%	16%	28%	18%	22%	1%
Your home would be destroyed. LACT5 (n=634)	32%	24%	17%	11%	14%	1%
You would suffer financial losses due to the loss of business/income on your property. LACT6 (n=632)	41%	13%	9%	7%	16%	14%
Your trees and landscape would burn. LACT7 (n=646)	7%	13%	21%	18%	38%	2%
Your pets would be harmed (include non-income generating livestock). LACT8 (n=629)	44%	19%	10%	7%	5%	15%
Your neighbors' homes would be damaged or destroyed. LACT9 (n=635)	17%	18%	23%	22%	18%	2%
Your community water supply would be threatened. LACT10 (n=634)	45%	18%	10%	9%	10%	8%
The fire would spread to nearby public lands. LACT11 (n=638)	25%	12%	16%	14%	28%	5%

5.3 How much do you agree or disagree with the following statements about wildfire?
(Circle one number for each statement)

	Strongly Agree	Agree	Neutral	Dis-agree	Strongly Disagree
Naturally occurring wildfire is not the problem; people who choose to live in fire prone areas are the problem. STATE1 (n=640)	12%	31%	35%	15%	7%
With proper technology, we can control most wildfires after they have started. STATE2 (n=646)	3%	26%	30%	35%	6%
Wildfires that threaten human life should be put out. STATE3 (n=649)	54%	37%	7%	1%	1%
Wildfires that threaten property should be put out. STATE4 (n=643)	35%	42%	19%	3%	1%
During a wildfire, saving homes should be a priority over saving forests. STATE5 (n=649)	31%	39%	21%	7%	2%
Wildfires are a natural part of the balance of a healthy forest/ecosystem. STATE6 (n=646)	39%	41%	15%	2%	2%
You live here for the trees and will not remove any of them to reduce wildfire risk. STATE11 (n=648)	2%	4%	19%	45%	30%
Managing the wildfire danger is a government responsibility, not yours. STATE13 (n=647)	2%	1%	13%	49%	36%
Actions taken by homeowners to reduce the risk of loss due to wildfire are not effective. STATE14 (n=648)	2%	3%	13%	51%	31%
Your property is at risk of wildfire. STATE15 (n=649)	10%	39%	26%	17%	8%
You don't take action because adjacent properties are not treated leaving your actions ineffective. STATE17 (n=640)	1%	3%	25%	45%	25%

Section 6: In this section, we would like to know about your willingness to reduce the risk of wildfire on your property.

6.1 Please tell us if each item listed below is a factor that keeps you from undertaking actions to reduce the wildfire risk on your property. *(Circle one number for each item)*

	Keeps you from taking action?	
	No	Yes
Financial expense/ cost FACTOR1 (n=621)	67%	33%
Time it takes to do the work FACTOR2 (n=615)	71%	29%
Physical difficulty of doing the work FACTOR3 (n=617)	60%	40%
Lack of specific information on how to reduce wildfire risk on your property FACTOR4 (n=615)	74%	27%
Lack of effectiveness of risk reduction actions FACTOR5 (n=597)	87%	13%
Do not want to change the way your property looks FACTOR6 (n=607)	81%	19%
Lack of information about or options for removal of slash or other materials from thinning trees and other vegetation. FACTOR7 (n=618)	74%	26%
Lack of awareness of wildfire risk FACTOR8 (n=613)	89%	11%
Restrictions by homeowners' association on cutting trees FACTOR9 (n=609)	93%	7%

6.2 Would any of the following items encourage you to reduce the wildfire risk on your property? *(Circle all that apply)*

(n=641) 1 = circled; 0 = not circled; % reported is % circled

- 45% 1 Financial assistance **INCENTV1**
- 57% 2 Specific information about what needs to be done **INCENTV2**
- 52% 3 Help doing the work (thinning trees and vegetation...) **INCENTV3**
- 22% 4 A list of recommended contractors that could be hired to do the work **INCENTV4**
- 13% 5 Other (what? **INCENTV5**)

PARTICIPATE (n=578)

6.3 While costs vary, the average cost to a homeowner of having a contractor remove vegetation to reduce wildfire risk is approximately \$1000 per acre. If your property is less than one acre, the average cost to reduce risk on the entire property is approximately \$1000. If a grant program paid for a share of the cost of this work on your property, would you participate in the program? *(Circle one number)*

36% 0 No

64% 1 Yes → Please circle the **highest** amount that you would be willing to pay per acre to have a contractor remove vegetation. **AMTUPAY (n=356)**

	Amount you pay	/	Amount grant pays per acre
6%	\$1000	/	\$0
3%	\$800	/	\$200
17%	\$600	/	\$400
26%	\$400	/	\$600
33%	\$200	/	\$800
14%	\$0	/	\$1000

Section 7: In this section, we ask about personal and household characteristics. As with all questions in this survey, your responses are completely confidential.

7.1 Do you view yourself as someone who is fully prepared to take risks, or do you try to avoid taking risks? *(Circle one number)*

RISKTAKE1 (n=619)

	0	1	2	3	4	5	6	7	8	9	10	
Not at all willing to take risks												Very willing to take risks
	7%	9%	10%	14%	11%	28%	6%	6%	5%	3%	2%	

7.2 On the same scale, how would you assess your risk tolerance in the following areas? *(Circle one number for each item)*

	0	1	2	3	4	5	6	7	8	9	10	
Not at all willing to take risks												Very willing to take risks
Driving a car	21%	16%	15%	11%	7%	13%	6%	4%	3%	1%	4%	RISKTAKE2 (n=622)
Financial matters	14%	13%	18%	15%	9%	15%	8%	4%	2%	1%	2%	RISKTAKE3 (n=618)
Sports or leisure	12%	11%	12%	13%	9%	16%	8%	9%	6%	2%	2%	RISKTAKE4 (n=609)
Career decisions	14%	9%	11%	9%	9%	18%	8%	7%	6%	3%	4%	RISKTAKE5 (n=590)
Health choices	18%	13%	18%	14%	8%	15%	5%	3%	1%	1%	2%	RISKTAKE6 (n=617)

AGE (n=628)7.3 What is your age? (*Fill in the blank*)

MEAN = 64; MEDIAN = 65

GENDER (n=640)7.4 Are you? (*Circle one number*)

63% 0 Male

38% 1 Female

EDUC (n=636)7.5 What is the highest grade or year of school you completed? (*Circle one number*)

1% 0 Less than high school

16% 1 High school graduate

24% 2 Some college or technical school

8% 3 Technical or trade school

22% 4 College graduate

8% 5 Some graduate work

22% 6 Advanced Degree (M.D., M.A., M.S., Ph.D., etc.)

EMPLOY (n=640)7.6 Which of the following best describes your current employment situation?
(*Circle one number*)

31% 0 Employed full time (including self-employed)

13% 1 Employed part time (including self-employed)

4% 2 Unemployed or do not work outside of the home

52% 3 Retired

INCOME1 (n=540)7.7 Which of the following categories describes your annual household income?
(*Circle one number*)

7% 0 Less than \$15,000

12% 1 \$15,000 – \$24,999

13% 2 \$25,000 – \$34,999

15% 3 \$35,000 – \$49,999

20% 4 \$50,000 – \$74,999

17% 5 \$75,000 – \$99,999

11% 6 \$100,000 – \$149,999

3% 7 \$150,000 – \$199,999

3% 8 More than \$200,000

Thank you for your help! Please use the space below to write any additional comments.

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