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Sometimes Simple Works: The value of rapid parcel-level wildfire risk assessments

On October 14, 2020, while heading north on Route 40 in Colorado to their cabin on Columbine Lake, Mike and Pam Eastop saw a plume of smoke in the distance. It was the beginning of the East Troublesome Fire on the Medicine Bow-Routt National Forest. Three days later, the couple left their home, unable to breathe because of the smoke. They drove through dense smoke almost all the way to Granby, a community 17 miles from Columbine Lake.

"Our neighbors left the next day, and they said they wished they left when we did," Mike says. "It was just awful."

Prior to the East Troublesome Fire, the Eastops spent several years raking the needles dropped by the lodgepole pine in their backyard. This proactive measure saved their home. Photo courtesy of Mike Eastop.

On October 21, the East Troublesome Fire blew up and ran 120,000 acres north straight at the Columbine Lake community. Mike constantly refreshed the fire maps shared by officials, zooming in and zooming in again to the couple's half-acre parcel to see if their home still stood. Unbeknownst to Mike, his daughter and son-in-law, who lived in Alberta, Canada, heard the updates on the scanner they were monitoring.

"The firefighters were talking to each other about different roads in Columbine Lake," says Mike. "When they started referencing the roads my daughter knew were around us, and then our particular street, she really got scared."

When the East Troublesome Fire was finally declared out, it had burned 193,812 acres, destroying 366 residences and another 189 commercial structures and outbuildings. In the Columbine Lake community alone, 28 homes were destroyed. Mike and Pam returned to find their home smoke-damaged but standing and the garage intact. Fist-sized, extinguished embers littered the area all around their property and inside the gutters. In their cul-de-sac, three homes were lost. One belonged to a neighbor whose property line was less than 50 feet from their home.

Behind the garage, Mike found scorched lodgepole pine and a heaped-up dirt pile. “I could see where firefighters had been behind our garage shoveling dirt on the tree fort we had built for the kids,” he says. “Nothing was left of that but ash, but you see the marks. It was just very humbling to see that.”

Later that year, Mike felled some of the scorched trees and invited his neighbors, one of whom was a local firefighter, to haul away the wood. Mike and Pam led them to the wood pile and were unprepared for the conversation that followed.

“One of the guys told me, ‘Oh, I remember this place. I was here,’” Mike recalls. “I said, ‘What?’”

“‘The firefighter said, ‘Let me tell you, the crowns of most of your trees were on fire. You raked your needles, didn’t you?’”

“Yeah, I did,” said Mike.

“‘When the tree boughs fell, they fell on dirt,’ the firefighter explained. ‘We were able to take care of them. Had you not done that, we couldn’t have stayed because we could have gotten surrounded so quickly. You guys saved your own home.’”

Stunned, Mike remembers finding it difficult to stand there. Pam had to walk away. Retelling the conversation is still overwhelming, and he finds himself repeating the comment, “He told us we saved our own home.”

SUMMARY

Many tools that identify wildfire risks and hazards across the landscape assume that all houses and properties within a community have the same level of risk. However, there are often substantial differences across properties, such as building materials and distance to overgrown vegetation. Tools that don’t account for parcel-level risk cannot provide the details necessary for informing action on private property, such as maintaining defensible space, posting a visible address sign, or hardening a structure.

To provide practitioners with a practical method for assessing how wildfire risk varies between homes and within an entire community, the Wildfire Research (WiRē) team developed a rapid assessment (RA) that can be conducted by a visual inspection from the road. In the summer of 2019, Colorado’s Grand County Wildfire Council (GCWC) conducted a WiRē RA of the Columbine Lake community, with each house receiving a score, the sum of multiple risk factors. A year later, the East Troublesome Fire burned 23 of the 352 fully assessed homes. At the request of the GCWC, the WiRē team analyzed how the WiRē RA scores related to the fire’s impact on the home.

This retrospective analysis found that a home’s overall WiRē RA score did relate to whether it was destroyed. Additionally, many of the individual risk factors measured by the RA related to whether a home was destroyed, despite being measured at only a coarse scale (e.g., roofing materials were evaluated for flammability, but their gutters were not). Risk factors crossed from properties to their neighbors, demonstrating that mitigation actions taken or not taken by a homeowner can affect neighboring homes. These findings support the use of the WiRē RA as an actionable complement to risk assessments conducted at broader scales. The WiRē RA provides useful information needed by practitioners to offer more targeted recommendations and support programs for homeowners to reduce their risk (e.g., maintaining defensible space and hardening structures to wildfire).

Firefighters credit the Eastop’s mitigation efforts, like removing pine needles from around their house, with helping to save their house from the East Troublesome Fire. Photo from Adobe Stock.

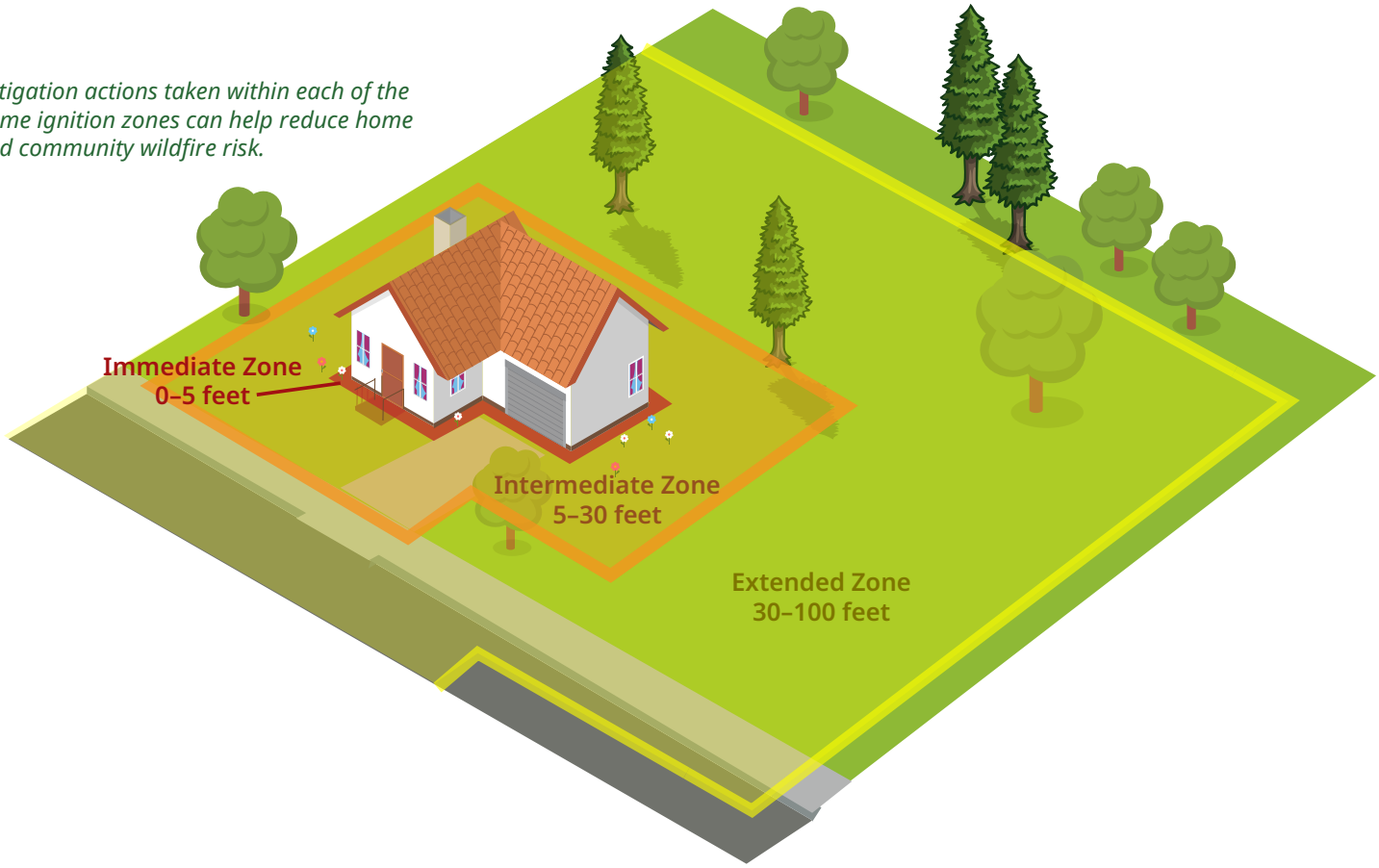
Personalizing Wildfire Risk

The wildfire mitigation work that Mike and Pam Eastop undertook to protect their home is based upon decades of investment by the USDA Forest Service in wildfire research. In the 1990s, Jack Cohen, a retired research physical scientist with the Rocky Mountain Research Station's (RMRS) Fire, Fuel and Smoke Science Program, developed the concept of 'home-ignition zones' for homes within the wildland-urban interface (WUI). This research is the foundation of the National Fire Protection Association's Firewise USA program, which is cosponsored by the Forest Service, the National Association of State Foresters, and the Department of the Interior. The Firewise program provides homeowners with resources to protect their homes and communities from wildfire and connects them with local wildfire practitioners.

While Cohen's research focused on the practical actions that homeowners could take to mitigate their wildfire risk, other researchers focused on the economic and social underpinnings of wildfire mitigation. One such researcher is Patty Champ, an economist with the RMRS. She, along with Chris Barth, a fire mitigation and education specialist with the Bureau of Land Management (BLM), saw a need for research on questions such as whether wildfire mitigation increased property values; why some homeowners mitigated wildfire risk while others didn't; how homeowners thought about risk; and what were the barriers for undertaking wildfire mitigation activities. Such insights are useful for wildfire practitioners when developing educational materials for homeowners or providing justification for why grant funding is needed to fund wildfire mitigation activities that target homeowners.

Champ and Barth, along with other colleagues, created the Wildfire Research Team, which later led to the nonprofit WiRē Center. Champ succinctly describes their work as "research that can empower the voice of practitioners."

Mitigation actions taken within each of the home ignition zones can help reduce home and community wildfire risk.



Meet the Wildfire Research (WiRē) Center

The WiRē Center is a nonprofit organization that works with wildfire practitioners to develop locally tailored methods to create fire-adapted communities. These methods are based upon more than 15 years of research, and ongoing research is underway to refine or develop new approaches. A board of directors, all of whom have experience in wildfire, outreach, and social sciences, oversees the WiRē Center's operations.

"WiRē exists in large part because the Rocky Mountain Research Station and Forest Service has funded so much of it," explains James Meldrum, a research economist with the U.S. Geological Survey and a member of the WiRē Advisory Committee. "Even though we're a big network and a lot of people from a lot of different organizations, it really does rely crucially on the Forest Service funding."

The WiRē Center partners with wildfire practitioners throughout the western United States. Team members are currently working with many partners in the western U.S, including Alaska.

"We want to expand our capacity to work with new partners because in the end our partners find it useful and it moves them ahead," says Patty Champ, a research economist with the USDA Forest Service, Rocky Mountain Research Station (RMRS).

Of her experience working with the WiRē team, Schelly Olson says, "The collaboration has been so wonderful, and it really does motivate homeowners to find out more and to actually do the work on the ground. It's been a great relationship. "

To learn more, visit https://wildfireresearchcenter.org/.

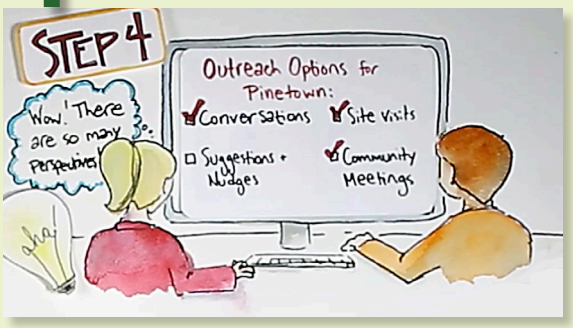
The WiRē Process

WiRē has created a unique approach to collecting data about individual property wildfire risk and resident attitudes and values.

Step 1: Letter Announcing Process

Step 2: Rapid Parcel Assessment

Step 3: Household Survey



Step 4: Review Results

Adapt Approach and Programs

One empowered wildfire practitioner is Schelly Olson. In 2011, she was hired by Grand Fire Protection District No. 1. Grand Fire, along with Grand Lake Fire and the Grand County Wildfire Council (GCWC), provided wildfire risk mitigation support to the Eastops and other homeowners in the Columbine Lake community and Grand County. While working for the District, Olson founded the Grand County Wildfire Council, a nonprofit dedicated to educating homeowners about wildfire preparedness and mitigation. "I focused a lot of attention on the International Association of Fire Chief's Ready, Set, Go! Program, and the National Fire Protection Association's Firewise, as I was very passionate about helping our community prevent, prepare for, mitigate, and survive the wildfire threat," she says.

Olson met Barth and learned about WiRē through her involvement as a founding member of Fire Adapted Colorado, a nonprofit that brings together wildfire practitioners, communities, and officials in Colorado to collaborate on creating wildfire-resilient communities.

Olson learned that WiRē works with wildfire practitioners like herself to help community members adapt to life with fire, so she invited the nonprofit to come to Grand County. And she had a project in mind for GCWC and WiRē to collaborate on: assessing the wildfire risk of as much of the county as possible.

KEY FINDINGS

- WiRē Rapid Assessment (WiRē RA) scores for 352 structures were highly correlated with whether the structure was destroyed by the East Troublesome Fire. This was true for both the overall risk score and many of the individual risk factors underlying that overall score, demonstrating that risk factors were separately useful for understanding whether a structure was destroyed.
- Risk crosses property boundaries. When homeowners do not properly mitigate their properties, they put their neighbors at risk.
- WiRē RA data show variation in wildfire risk within communities. Practitioners may use this information for deciding what type of mitigation work, and where, will have the greatest impact.

Research has demonstrated — and practitioner experience confirms — that home attributes such as type of roofing material, location of firewood piles, and how the yard is landscaped, can influence the wildfire risk to a home. However, most tools for wildfire risk assessments work at broader scales and do not capture the details that vary from one home to the next across a community. To address this need, the WiRē Center developed the WiRē rapid assessment (RA). Based upon 15 years of on-the-ground wildfire practitioner experience, this tool is a quick, simple visual assessment that can be performed by wildfire practitioners from within a vehicle at the end of a driveway.

"At its core, it is just a checklist, and any fire department or forestry person could do it or be quickly trained to do it," says James Meldrum, a research economist with the U.S. Geological Survey and a founding member of WiRē. "What homes look like matters and knowing that for every home in the community matters."

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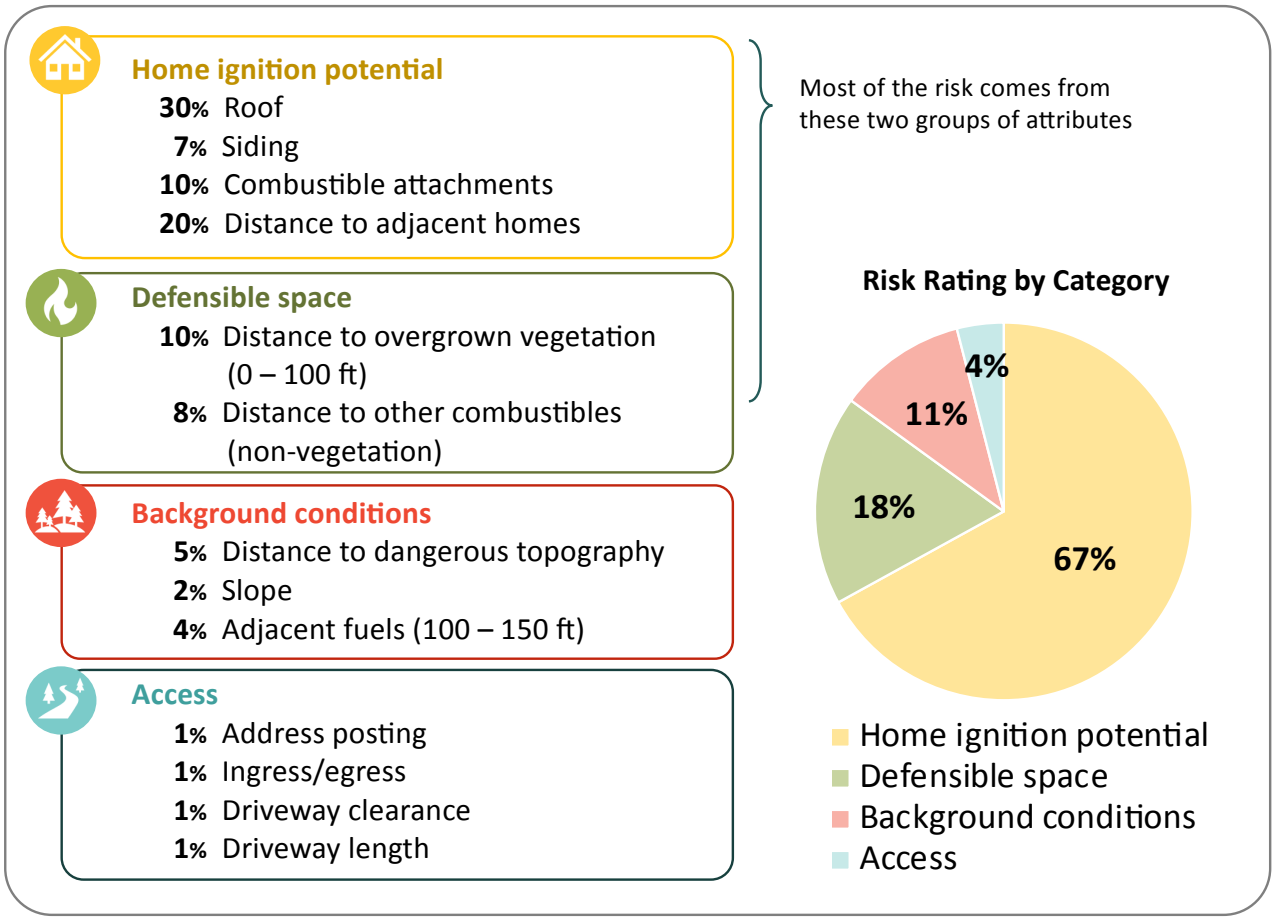


The WiRē RA has evolved over time and includes 13 attributes, such as address posting, adjacent fuels, and combustible attachments (deck, porch, balcony, fence). Not all attributes contribute equally to overall parcel-level risk, but they all play an important role in estimating localized likely fire behavior or factors that impact evacuation and access by emergency responders.

An important aspect of the WiRē RA is the identification and discussion of each of these attributes separately, because each one represents a potential point of concern or potential intervention with wildfire risk to a home. The attributes can also be combined to estimate a measure of overall parcel-level risk (the higher the score, the higher the risk), with each attribute assigned a percentage of the overall score based on expert judgment of that attributes' relative contribution to overall risk.

Because of practical simplicity of the RA, "there is skepticism," admits Champ, "but there is value in a quick approach and understanding how risk is distributed within a community."

Champ, Barth, Meldrum, and others on the WiRē team, worked with Olson to identify the Grand County communities in which to conduct WiRē RAs. Within each of the county's five fire districts, the team selected a study area, which included Columbine Lake. In summer 2019, Olson and two other fire district staff conducted the WiRē RAs. "We were in fire department vehicles, two people per vehicle, and we basically just drove up and down all the roads," she says. "One person drove and the other person entered the attributes into the iPad with both people agreeing on them."

Shortly following the WiRē RAs, a survey was sent to each household, asking them to assess the wildfire risk of their property.

A year later was the East Troublesome Fire. Olson saw a research opportunity: comparing the WiRē RA scores from before the

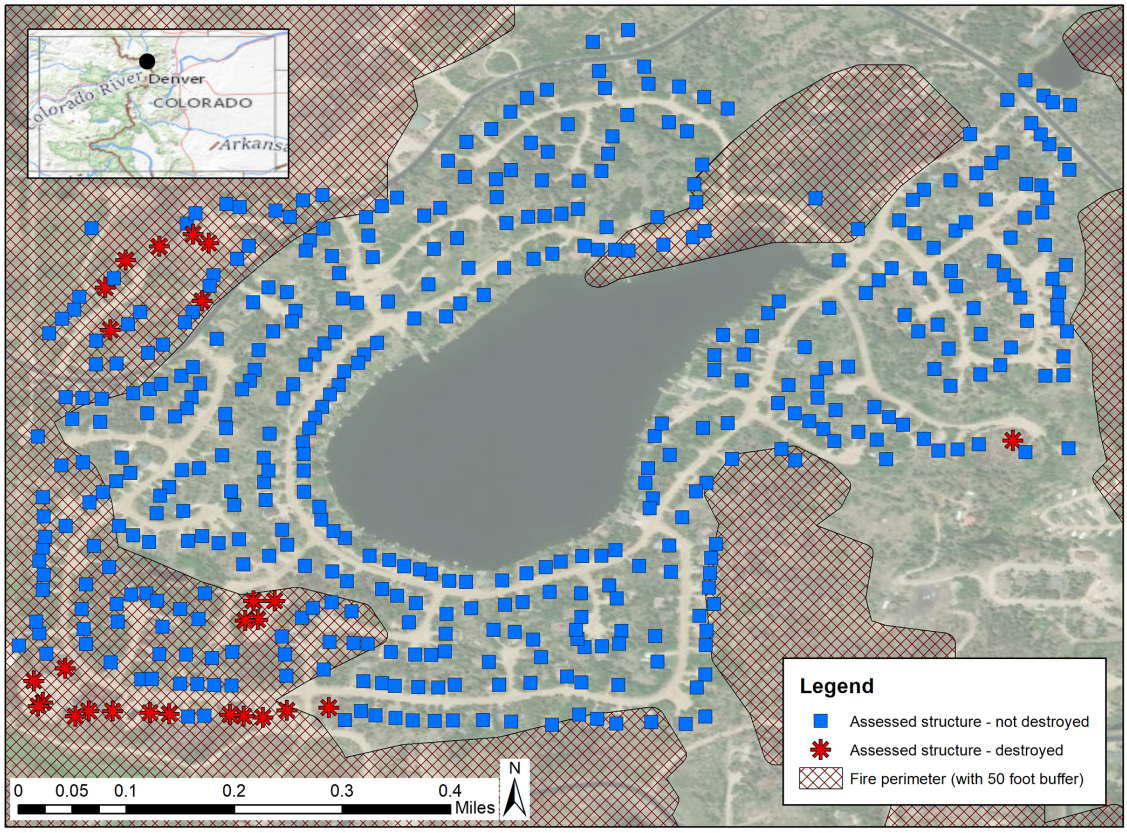
fire to determine how they related to whether or not a home was destroyed.

The WiRē team agreed. "Most of the work we do is about representing and understanding the decisions homeowners make," explains Meldrum. "Whereas this research opportunity was much more focused on the outcomes of that decision. What did the property look like at the time or shortly before that fire occurred?"

Quantifying the Value of Wildfire Mitigation

Meldrum led the analyses of the WiRē RA data for the 352 fully assessed homes, of which 23 were destroyed. The fire perimeter map created by the Incident Management Team was overlaid on a parcel map of Columbine Lake to determine the proximity of the homes to the fire perimeter. All the structures were within a quarter mile or less of the fire perimeter and exposed to wind-driven ember showers.

Based on this scenario, Meldrum designed a model accounting for the entire community being exposed to fire. The model wasn't designed to determine which WiRē RA attributes were the most important in determining whether a structure was destroyed, but rather which of the attributes were significantly correlated with destroyed versus undestroyed homes. The model also accounted for whether risks transferred from one property to its neighbors.



Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information, U.S. Coastal Relief Model. Data refreshed June, 2020.

Founded in 1970, the Columbine Lake community consists of 453 homes around the 45-acre Columbine Lake. While some homeowners such as the Eastops live there year-round, many of the homes are vacation homes or rentals. In 2020, the East Troublesome Fire burned into parts of the community and destroyed 23 of the homes that were assessed by Grand County Wildfire Council in 2019. Basemap image is the intellectual property of Esri and is used herein under license. Copyright © 2022 Esri and its licensors.

How to Best to Assess Wildfire Risk? At All Scales

For over 20 years, RMRS researchers have developed tools to aid wildfire practitioners in assessing wildfire risk and where mitigations efforts can be focused. A crucial reason why multiple tools are needed is because each tool focuses on the wildfire risk at a certain scale. Together, these tools paint a picture of the wildfire risk of entire communities.

Wildfire Risk Assessment Framework – This tool allows wildfire practitioners to assess the potential risk of specific highly valued resources and assets at the landscape-level.

USFS Community Wildfire Transmission – This model shows how wildfire transmission occurs between ownerships. Although houses are included in the map, there are no home-level data to indicate if the homeowner had performed wildfire mitigation activities to reduce the risk.

WiRē Rapid Assessment – This tool is a quick, simple way to create a snapshot of the wildfire risk for a single residential property, and when aggregated, for an entire community. It can be used to prioritize wildfire risk mitigation efforts within a community and facilitate detailed conversations with residents about how they can reduce risk on their properties.

Although Meldrum had a small dataset to work with, there were enough data to pick up a meaningful signal. “The overall risk score was fairly predictive, and it explained a fair amount of whether a home was destroyed or not,” he says.

Specific attributes such as adjacent fuels and distance to nearest home were significantly correlated with home destruction, along with driveway clearance and home accessibility. Like many other risk assessment tools, the WiRē RA is intended to help practitioners and homeowners identify areas of risk that can be mitigated before a wildfire happens. Many of the attributes included in the assessment focus on characteristics that a homeowner has some control over. This supports and encourages residents to take mitigation actions into their own hands.

Although the WiRē RA is not about wildfire suppression feasibility, some of the attributes measured also relate to whether firefighters can protect a home or are forced to move on. During the fire, Grand Fire Chief Brad White observed fist-sized embers landing throughout the Columbine Lake community. These embers caused spot fires, and firefighters were forced to decide if they could safely put them out or not.

“We want to treat every home as equal as possible, and we want to protect every home we can,” he says. “But sometimes you get out there and you’re just limited on time and on firefighters. We found ourselves making some of those decisions.”

An example where firefighters were forced to make such a decision: to save one home, they only needed to remove deck furniture and clear some vegetation in the yard; at another home, they would have had to fell and limb a dozen trees to create defensible space. “We’ll spend 10 minutes cleaning up brush around the house but then we need to move on,” says Chief White.

There is one important caveat to this research, Champ explained: "These results are important, but we need to be careful about making inference to other communities and other wildfires. Future research might address that issue."

One example of this was found in the roof materials attribute. Other wildfire studies have found that the type of roof material, such as composite shingles, metal, or clay tiles, can reduce wildfire risk; however, this wasn't observed in Columbine Lake, which Meldrum attributes to a limitation of the data.

A meaningful signal that stood out to Meldrum and Champ was the importance of distance between homes. They found that risk factors on a given property were related to whether its neighboring homes were destroyed, which they refer to as spillover risk. "It's something that we intuitively understand," Meldrum explains. "It's reflected in other work people have done but that really came out as a pretty strong signal in our analysis."

Adds Champ: "We often talk about homeowners needing to mitigate their property, so they don't lose it in a wildfire. They also need to act because their house is fuel and can burn down their neighbor's house. That is the nature of living in proximity to other people in a fire-prone area."

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U.S. Forest Service
research economist

Firefighters defend a home during Colorado's Black Forest Fire in 2013. 1) The crew piles patio furniture away from the house. 2) Although flames are reaching up the tree trunks, the homeowner had previously limbed the trees, so the flames don't reach the canopy. 3) The fire has moved past without burning the house. Crews use water resources to douse any remaining fire that encroaches on the mulch surrounding the home. Stills taken from a video courtesy of the Colorado Springs Fire Department.

Wildfire Mitigation Requires a Holistic Approach

The WiRē RA draws upon on-the-ground wildfire practitioner experience for assessing the wildfire risk to a house. The visual assessment can be done from the driveway, which enables communities to be assessed quickly. To ensure that a community is assessed through a consistent lens of wildfire risk, it's advised to have experienced fire professionals or mitigation specialists conduct the RA.

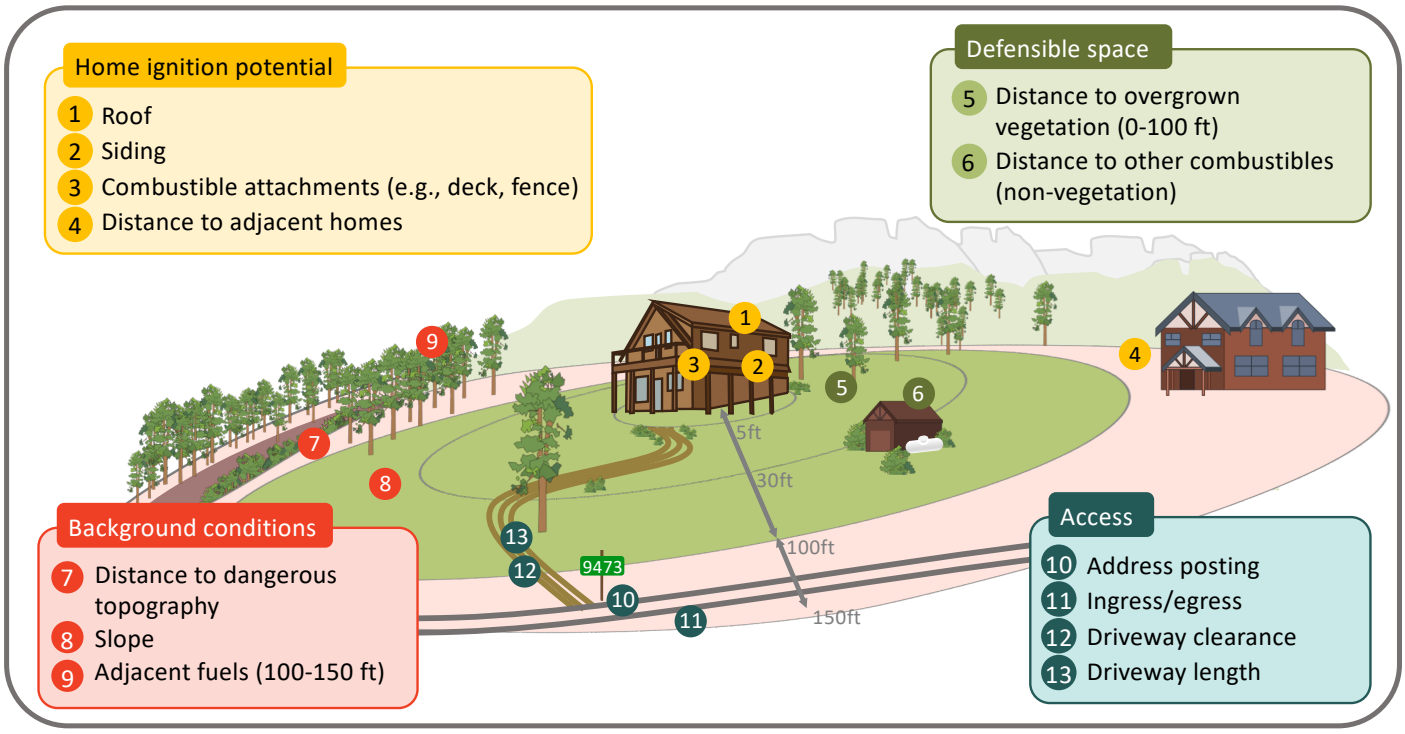
One caveat to the RA is that it can't account for wildfire mitigation work that isn't visible. For example, the Eastops had a high WiRē RA score, in part due to factors out of their control, such as the length of their driveway, only one road into their cul-de-sac, and the proximity of their neighbor's home. The drive-by RA also didn't pick up the mitigation work that Mike had done behind the house. The combination of the RA and a site visit would have demonstrated to Olson and Chief White that the Eastops were reducing the spillover risk to their neighbors.

The wildfire risk that the WiRē RA identifies draws upon Jack Cohen's home-ignition model. The model describes each home as having three zones: the Immediate Zone 0 to 5 feet around the house, the Intermediate Zone 5 to 30 feet around the house, and the Extended Zone 30 to 100 feet around house. Within each zone, homeowners are advised to implement different wildfire mitigation strategies.

As Cohen explained in the Thompson Memorial Lecture "What is the Wildland Fire Threat to Homes?" that he delivered on April 10, 2000, at Northern Arizona University:

> Because home ignitions depend on home ignitability [and the zones within 100 feet of the house as described above], the behavior of wildland fires beyond the home or community site does not necessarily correspond to the potential for WUI fire losses. Highly ignitable homes can be destroyed during lower-intensity wildfires, whereas homes with low home ignitability can survive high-intensity wildfires.

WiRē Rapid Wildfire Risk Assessment: A Visual Guide



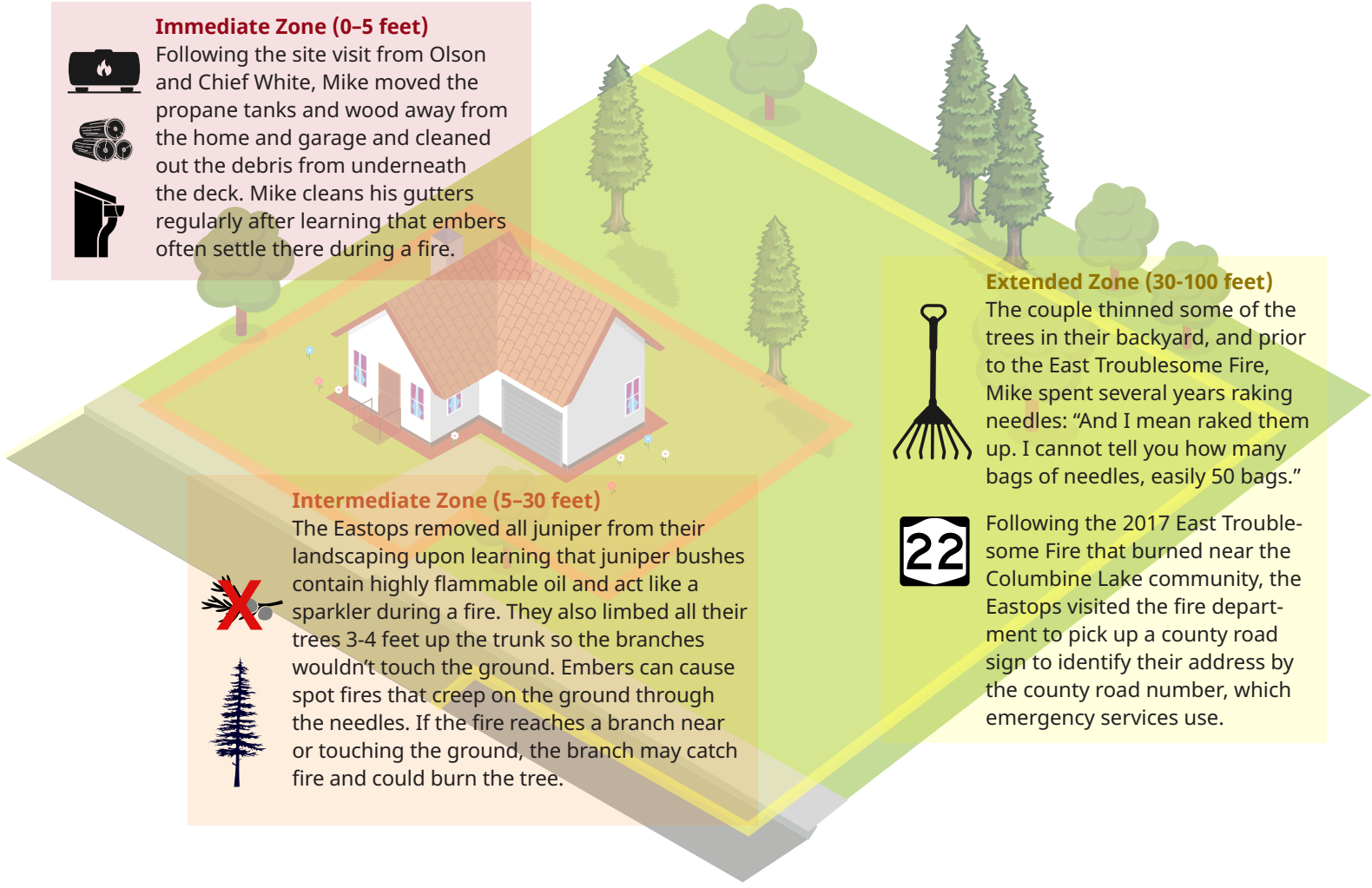
What work did the Eastops do to reduce wildfire risk on their property?

Wildfire mitigation actions can make a difference in protecting your home and your neighbor's. Every time a homeowner tells Olson that her work helped them save their home, she gets goosebumps. "I can't believe that neighborhood is still standing," Olson says. "The homes are so close to each other and are only 0.25 acres each. They should have all been gone and they were not. Actions on the ground by the firefighters, and actions by the homeowners prior to the fire, made a difference."

"We went from being pretty naïve and this can't happen to us kind of attitude to this happened to us," Mike Eastop says. "We were lucky, and we're committed to doing the things we can do."

However, there is the devastating reality that homes may still be destroyed even if all wildfire mitigation efforts are done. Chief White says during the fire, firefighters expressed frustration that homes they thought were well prepared ended up catching fire. Olson lost her home in the East Troublesome Fire. Her neighborhood, Winding River Villas, which was behind Columbine Lake, had 22 out of 30 homes destroyed.

And the reality is that wildfire mitigation is ongoing work. Complacency or fire-fatigue can lead to even more lost homes. "That fire burned almost 200,000 acres," Olson explains. "We have another 800,000 acres in Grand County that could burn."



Immediate Zone (0–5 feet)
Following the site visit from Olson and Chief White, Mike moved the propane tanks and wood away from the home and garage and cleaned out the debris from underneath the deck. Mike cleans his gutters regularly after learning that embers often settle there during a fire.

Intermediate Zone (5–30 feet)
The Eastops removed all juniper from their landscaping upon learning that juniper bushes contain highly flammable oil and act like a sparkler during a fire. They also limbed all their trees 3-4 feet up the trunk so the branches wouldn't touch the ground. Embers can cause spot fires that creep on the ground through the needles. If the fire reaches a branch near or touching the ground, the branch may catch fire and could burn the tree.

Extended Zone (30-100 feet)
The couple thinned some of the trees in their backyard, and prior to the East Troublesome Fire, Mike spent several years raking needles: "And I mean raked them up. I cannot tell you how many bags of needles, easily 50 bags."

Following the 2017 East Troublesome Fire that burned near the Columbine Lake community, the Eastops visited the fire department to pick up a county road sign to identify their address by the county road number, which emergency services use.

What's Next?

Mitigation work occurs at the landscape, community, and parcel scale, which means wildfire practitioners need tools to assess risk at each. The WiRē team believes the Wire RA could be useful at each of these scales. At the landscape-scale, the WiRē RA data can inform where strategic fuel breaks adjacent to communities might be most beneficial to community protection (e.g., near the highest-risk neighborhoods). At the community scale, conducting RAs helps practitioner partners to understand and prioritize where mitigation and educational resources are needed.

There is interest in conducting a follow-up WiRē RA for Columbine Lake in 2023.

Meldrum also sees the potential utility of the WiRē RA in understanding wildfire risk more broadly. Usually, when WiRē works with a community, the tools developed are applicable to that specific community. What if these tools could be adapted to provide more nuance for risk assessments developed at broader scales, such as across a landscape? "I do think that is another direction we can start thinking about," he says. "From attributes that we can measure from more of a distance, we can develop an understanding of different levels of susceptibility and of how the risk varies across homes that are similarly exposed."

At the parcel scale, the results of the RA can be used as an educational tool for the homeowner. The WiRē RA provides a low-barrier touchpoint with homeowners. "It's an appropriate tool for communicating risk to homeowners across the whole community," Champ says.

Following the WiRē RA in Grand County, Olson sent the results of the assessment to each fire district so local fire professionals could work directly with their residents to address areas of higher risk. For residents who followed up, this provided an opportunity for one-on-one, in-depth evaluation of their property with fire professionals to identify specific actions that they could take to reduce their risk. Such in-depth evaluations help homeowners understand what they can do and how to do it.

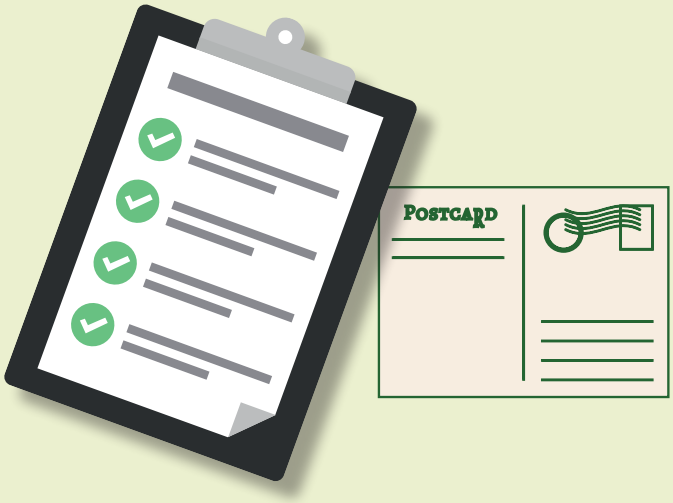
A site visit can be eye-opening if the RA reveals a home is at high or extreme risk, explains Chief White. "We had residents with perfectly groomed landscaping around the house, but they had a very long, steep, narrow driveway. There is no way we can get an engine up there in the middle of a fire."

Chief White also sees the information as useful for mitigation efforts. "Operationally, we need to do a lot more work in the county and do more [in-depth] parcel-level assessments and get that work

Second Homes

A number of the homes in the Columbine Lake community are second homes. This is a reality for many communities in the WUI, which can hamper community-wide wildfire mitigation efforts since homeowners aren't onsite year-round, and they might not be proactive in reducing the wildfire risk around their home.

A WiRē RA paired with a postcard sent to these second-home homeowners can provide a touchpoint and an opportunity for a follow-up when they return.



completed before a fire," he says. "[The WiRē RA] helps us to know where to put resources."

And it is this outreach value that Olson sees as crucial for education efforts. The results of the household survey conducted with WiRē RA showed that homeowners had a different perception of risk than wildfire practitioners. "One of the things we've found with the survey is we need to keep telling people that mitigation is important," she says. "Although people could throw up their hands and say, 'If East Troublesome Fire happens again, there's nothing I can do,' I don't want people to have that mindset. I want them to say, 'I'm going to do everything in my power to protect my home and my family in the event of the wildfire.' If we have our community members think this way, we will become more fire adapted and more resilient. We need to do it if we choose to live in the woods."

MANAGEMENT IMPLICATIONS

- Although it is widely recognized that wildfire risk varies from one home to the next, many risk assessments treat all homes the same. This research finds that even coarse measurements of parcel-level conditions can help predict the risk of home loss in the event of a wildfire.
- WiRē RAs conducted for an entire community provide information about the distribution of parcel-level wildfire risk and the individual attributes, such as a wood roof or combustibles near the home, that constitute overall wildfire risk on a property.
- WiRē RAs complement broader-scale wildfire risk assessments. They are a low-investment approach to understanding the distribution of risk within a community, helping programs prioritize and tailor efforts to encourage and support homeowners' mitigation actions.

FURTHER READING

Meldrum, James R.; Barth, Christopher M.; Goolsby, Julia B.; Olson, Schelly K.; Gosey, Adam C.; White, James (Brad); Brenkert-Smith, Hannah; Champ, Patricia A.; Gomez, Jamie. 2022. Parcel-level risk affects wildfire outcomes: Insights from pre-fire rapid assessment data for homes destroyed in 2020 East Troublesome Fire. Fire. 5: 24.

SCIENTIST AND COLLABORATOR PROFILES

The following individuals were instrumental in the creation of this Bulletin.

PATRICIA (PATTY) CHAMP is a research economist with the USDA Forest Service, Rocky Mountain Research Station, in Fort Collins, CO. She earned an M.S. and Ph.D. from the University of Wisconsin. Patty's research focuses on economic valuation methods, economic and social analysis of natural hazards (wildfire, invasive species, and climate change), and measurement of public preferences, attitudes, and behaviors.

JAMES MELDRUM is a research economist in the Social and Economic Analysis Branch at the U.S. Geological Survey, Fort Collins Science Center. He earned an M.S. and Ph.D. from the University of Colorado-Boulder. James' primary research focus is measuring, modeling, and understanding human relationships with natural resources.

SCHELLY OLSON recently retired as the assistant chief of Grand Fire and the executive director of the Grand County Wildfire Council. In 2022, she was a Wildfire Mitigation Awardee, an award given by the USDA Forest Service, National Fire Protection Agency, International Association of Fire Chiefs, and the National Association of State Foresters. Schelly can be reached at schellyko@gmail.com.

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