



Please send any comments, feedback, or suggestions to
benjamin.hatchett@colostate.edu

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Encouraging Wildfire Mitigation Action Via National Weather Service Fire Weather Products

Benjamin J. Hatchett^{a,b}

*^aCooperative Institute for Research in the Atmosphere, Colorado State University, 3925a
Laporte Ave, Ft. Collins, Colorado, 80521, United States of America*

^bCorrespondence to: benjamin.hatchett@colostate.edu,

Abstract

Wildfire mitigation actions intend to reduce the probability and consequences (risk) of wildfire to critical assets by protecting the life and property of the public and emergency responders during and after a wildfire event. Given mitigation activities span a continuum of timescales from minutes to years and multiple orders-of-magnitude in terms of costs, an opportunity exists to encourage mitigation actions based on the lead-time before a potential wildland fire event. Examination of National Weather Service fire weather products (i.e., fire weather watches and red flag warnings) indicates these focus messaging primarily on fire prevention and response efforts with little-to-no emphasis on mitigation actions. As a highly trusted public partner, we argue the NWS has an extraordinary opportunity to engage with the public to train and remind them about mitigation actions they can take before critical fire weather or before ignition. Here, we propose a simple, cost-effective

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text- and graphics-based approach to incorporating mitigation messaging into NWS fire products, with examples provided to facilitate necessary testing and iterative development before demonstration.

1. Introduction

Wildfire mitigation actions consist of a range of activities that reduce the probability and consequences (hereafter, risk as defined by Thompson et al. 2016) of wildfire on the built environment (National Wildfire Coordinating Group, 2025). Mitigation ultimately aims to protect the life and property of the public and emergency responders during and after a wildfire event. It serves to increase the resilience of a community to fire and other disturbances while improving ecological function and aesthetics (National Wildfire Coordinating Group, 2025). Wildfire mitigation also helps residents maintain insurance coverage and reduce negative health and economic impacts associated with structure damage and loss during and following fire (National Wildfire Coordinating Group, 2025).

Mitigation activities span a continuum of time from minutes to many years. Planning- and legal-focused mitigation activities occur over the timescale of years, such as in the development of community wildfire protection plans and updates to code and ordinances. These types of activities occur at local (i.e., Firewise USA® neighborhoods and requirements in homeowner association "Covenants, Conditions, and Restrictions"), city, and state scales; while there is no federal wildfire mitigation mandate, many federal agencies provide grant funding in support of mitigation efforts. Risk assessments can be done relatively quickly (on the order of hours–days) at the individual home-scale and education can be provided in minutes to hours. Many of the mitigation actions that reduce ignition potential require varied lengths of time and

costs to implement. Some are "one-and-done" structure hardening efforts that last years-to-decades (e.g., the replacement of a roof using Class A material or the installation of mesh screens on vents). Others require multiple efforts over time. These include the first entry and follow-up maintenance of vegetation management and fuels reduction efforts through thinning, chipping, and prescribed burning to reduce fuel loading and continuity around critical assets, improve roadside clearance, and create or improve fuelbreaks. Increasing structure ignition resistance also requires ongoing maintenance of defensible space in terms of ensuring appropriate spacing and fuel continuity between remaining vegetation and clearances of combustible materials around structures and egress routes.

The establishment of does not imply compliance (Wilkin et al., 2025). Community engagement and partnerships are critical to begin and continue the risk reduction actions associated with mitigation efforts (National Wild-fire Coordinating Group, 2025). Successful partnerships are built on trust, which ultimately requires ongoing engagement over time. Face-to-face, two-way, active communication is more likely to drive mitigation actions (Wilson et al., 2017), however, it is more resource intensive than passive communication. Passive communication relies on material such as brochures, social media posts, videos, signs, or websites that can be updated as necessary, but only may be produced once.

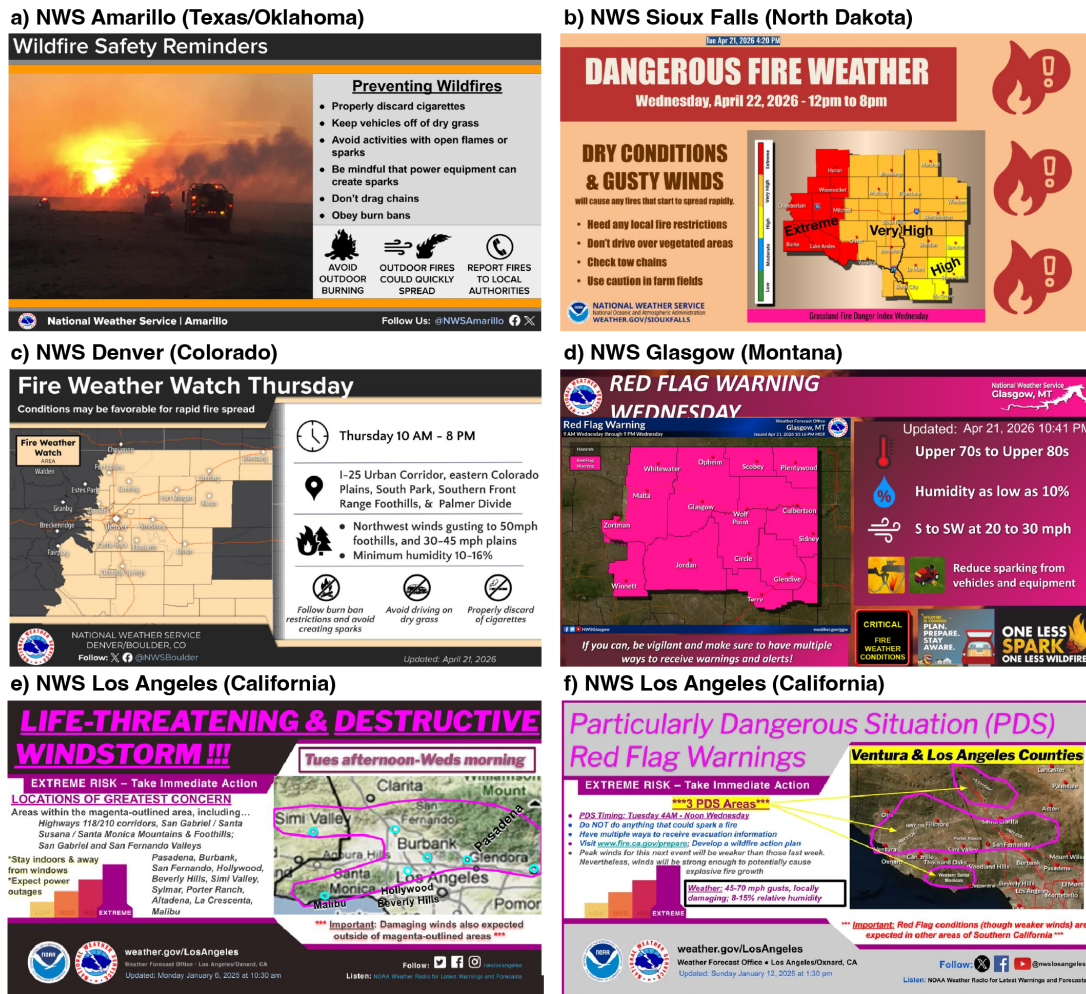


Figure 1: Example graphical NWS Fire Weather-related products from fire-prone regions in the western-central United States. Products are ordered to reflect the least to most severe conditions, including (a) general reminders about wildfire safety, (b) upcoming fire weather, (c) a Fire Weather Watch, (d) a Red Flag Warning, (e) an upcoming high-impact wind event that does not indicate upcoming fire weather, and the most severe warning, (f) a Red Flag Warning with the "Particularly Dangerous Situation" tag.

Publicly-available National Weather Service fire products are examples of passive communication (Figure 1). These include the text- and graphically-based Fire Weather Watches and Red Flag Warnings (RFWs), which are

issued 12–72 hours before critical fire weather is forecast to begin (National Weather Service, 2025) and disseminated online via social media and through traditional broadcast and print media. Red Flag Warnings support fire operations through increasing situational awareness and lending credibility to public messaging (?) while also inducing behavioral changes leading to reduced human-caused ignitions (Abatzoglou et al., 2024). Since 2002, records from the Iowa Environmental Mesonet <https://mesonet.agron.iastate.edu/> indicates every NWS County Warning Area (CWA) across the United States has issued at least 10 RFWs (Figure 2). Many CWAs across the U.S. have issued over 2,000 RFWs. Messaging associated with graphical NWS fire products, which are shared widely via NWS websites, social media, and on television, focuses almost solely on *fire prevention*, and in some cases only recommend "taking immediate action" without explicitly stating what actions to take (Figure 1).

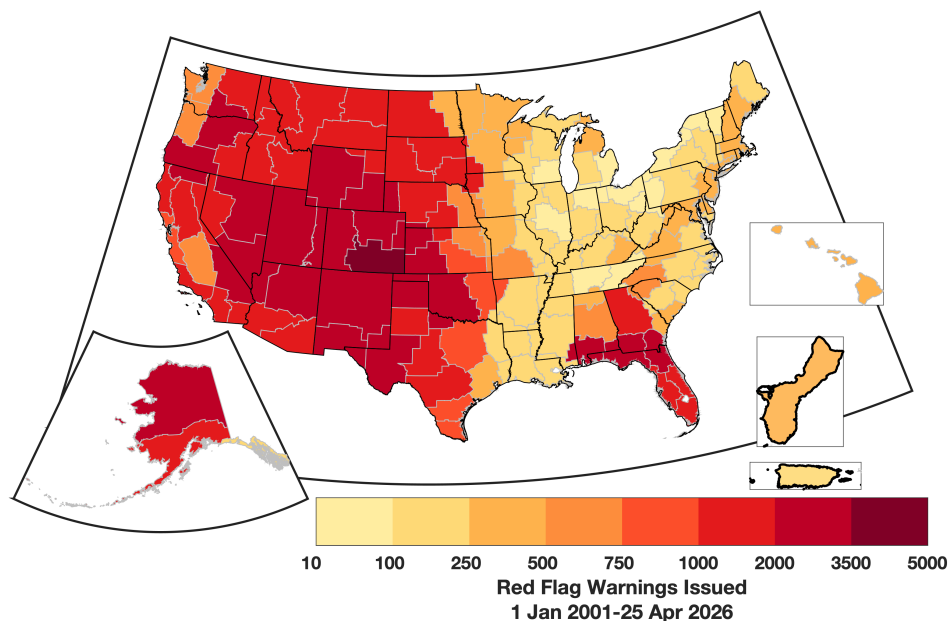


Figure 2: Total issuances by County Warning Area (CWA) of National Weather Service (NWS) Red Flag Warnings (RFW) between 1 January 2002 and 21 April 2026. Because RFWs are issued by Fire Weather Zone, multiple warnings may be issued for the same day within the same NWS CWA.

Wildfire loss prevention (especially in cases when a wildfire transitions into an urban conflagration) centers on both wildfire prevention and mitigation, with expansion of mitigation representing a critical need due to the inevitability of wildfire ignition in many landscapes and continued human development in and adjacent to fire-prone areas. Recognizing that ignition prevention is critical, I argue the passive messaging of NWS fire products currently miss, or at least under-utilize, an opportunity to increase wildfire risk reduction through encouraging mitigation. This is because these products

rarely communicate specifically *what can be done by the public to mitigate their exposure and vulnerability* to new or existing wildfires that approach the built environment. As a highly trusted public partner, the NWS has an extraordinary opportunity to engage with the public to train and remind them about the steps they can take to mitigate the risk of wildfire involving their home or property. Here, a simple, cost-effective text- and graphics-based approach to incorporating mitigation messaging into NWS fire products is proposed, with examples provided to facilitate necessary testing and iterative development before demonstration.

2. Incorporate mitigation into NWS messaging via simple icons and text

Simple "What to do" protective action statements in NWS infographics can take the form of 1) icons, 2) icons with brief text, and/or 3) longer format text. In text-based products available online, longer format, albeit abbreviated text is used. Following the guidance of the National Wildfire Coordinating Group (2025) and CAL FIRE (2026), 12 low-to-no cost mitigation activities are provided (Figure 3). These span timescales for taking action from months ahead of expected fire activity to the immediate hours before critical fire weather begins. They also address aspects of the three main structure ignition zones. Ahead of peak wildfire season or during ongoing/worsening drought conditions, low-cost actions to create ignition-resistant structures may include covering vents with mesh, caulking gaps, painting exposed sur-

faces, and checking weather stripping around doors. Defensible space around structures in Zone 2 (5–30 ft) and Zone 3 (30–100 ft) can be achieved and maintained by more time- and resource-intensive actions that ensure spacing between vegetation, mowing or weed whipping grasses, and limbing trees.

Once fire weather is within the medium-short term forecast and NWS messaging has begun in general or using specific products, recommended mitigation actions can be recommended for Zone 0 (0–5 ft) and Zone 1 (0–30 ft). This includes ensuring combustible objects like garbage bins, firewood, lumber, and flammable liquids are moved out of the 0–5 ft area and that any debris is also removed from around structures including homes and sheds, as well as propane tanks. Gutters and roofs can be cleared of debris in the time leading up to fire weather (and especially if winds are transporting additional material, though ladder and roof safety should be emphasized if possible), and boats and vehicles can be moved away from structures into Zones 2–3. New human-caused ignitions is especially unhelpful during ongoing wildfires. Thus, recommendations for ensuring trailer chains do not drag (by crossing and twisting them) is always warranted ahead of and during elevated fire danger. A horse trailer was drawn to cue readers to consider this if they are beginning to stage for, or start preemptive, animal evacuations.

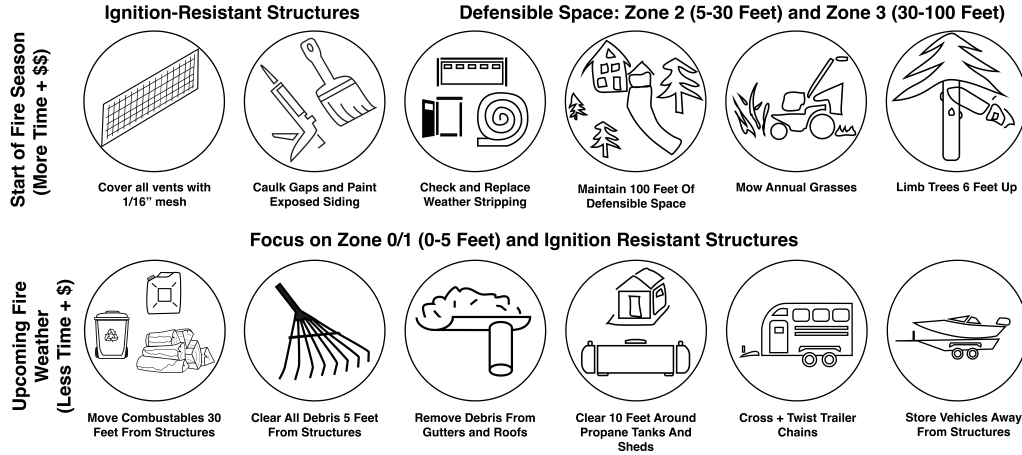


Figure 3: Newly-developed icons to cue readers on mitigation actions to take at different timescales before expected wildfire ignitions. Note these are a work-in-progress as I did not finish all sketches and will continue to refine these.

Using the templates developed by Heggli et al. (2023a,b) and simple line-art graphics developed using Adobe Illustrator, I provide an example of how these new images could be incorporated graphically and textually into a hypothetical NWS Fire Weather Watch (Figure 4). Table 1 outlines the suggested timeline for messaging of mitigation actions. Some mitigation actions, such as maintaining a debris-free and combustible object-free structure ignition zone, can be messaged more frequently than other actions that may require additional time and cost to perform (e.g., scheduling and performing vegetation management or installing new siding or vent covers) or may not be appropriate given existing fire danger (e.g., mowing or prescribed burning).

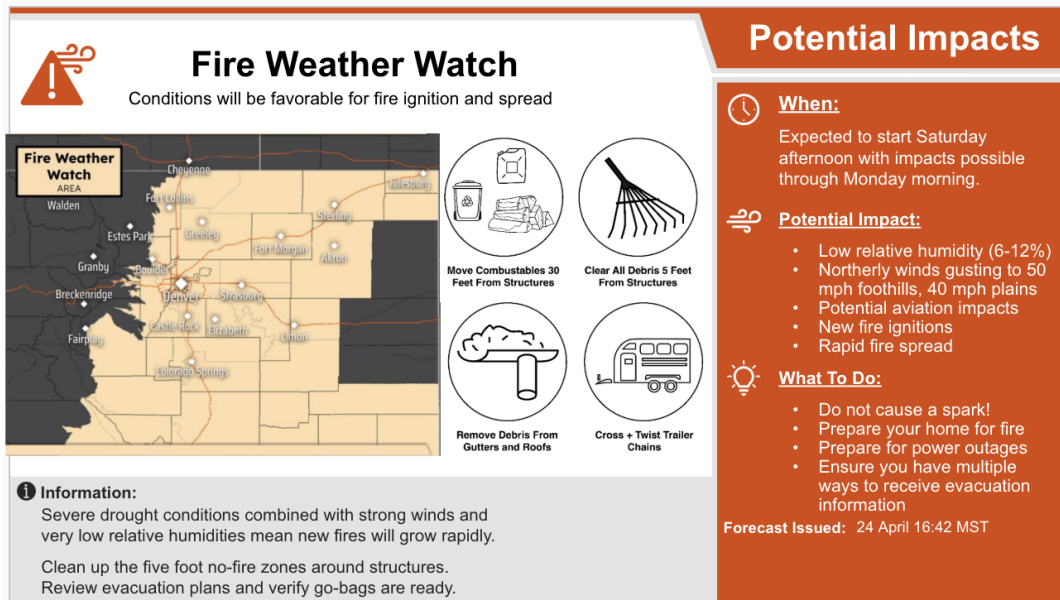


Figure 4: Proposed adaptation of an NWS infographic (using the templates developed by (Heggli et al., 2023a,b) for a Fire Weather Watch that includes mitigation actions that can be taken within 12 hours of the onset forecast critical fire weather. Simple line art graphics were developed to accompany the watch areas to cue readers to consider taking actions.

A Communication Timeline for Mitigation Actions using NWS Products			
Start of Fire Season (Month-Weeks; broad briefings)	Elevated Awareness (5-10 Days; Forecast Discussion)	Watch & Warning Issuance (12-72 hr; FWW & RFW)	Particularly Dangerous Situation (PDS-RFW)
5 ft (Zone 0) 30-100 ft clearance Review evacuation plan Review Go-Bag Neighborhood clean-up Defensible space	5 ft (Zone 0) 30-100 ft clearance Review evacuation plan Review Go-Bag Defensible space	5 ft (Zone 0) 30 ft clearance Review evacuation plan Prepare Go-Bag Trailer chains prep'd for egress Secure loose items Prepare for power outages Ready to receive evacuation information	5 ft (Zone 0) 30 ft clearance review evacuation plan Prepare Go-Bag Trailer chains prep'd for egress Secure loose items Prepare for power outages Ready to receive evacuation information

Table 1: Suggested timeline for communicating various mitigation actions leveraging National Weather Service (NWS) products. It is strongly recommended to collaborate with local, state, and regional agencies and community organizations to ensure consistent messaging of mitigation and preparatory actions.

3. Engagement Plan(ning)

Unification of messaging and consistency in the delivery of uniform messages that support protective actions in terms of both mitigation is an important component of 'partner-level' (e.g., NWS, fire departments, community-based organizations) engagement that should increase the likelihood of adoption and successful broader community engagement. To minimize costs and burdens on NWS forecasters and other partners, a grassroots (bottom-up)

engagement approach is suggested. To begin this process, I have provided some basic icons and example text (Figures 3-4) to consider implementing into graphical products. The next step will be to further revise the icons and make them available to forecast offices, fire departments, and mitigation specialists for initial feedback and iteration. One example of a successful application of this step was incorporating prescribed burn extinguishment and securement messaging into NWS graphical forecasts products ahead of a known critical fire weather pattern in the southern Great Plains that follows favorable burning conditions and often escaped escaped prescribed burns (cf. Figure 15 in Lindley et al. 2025). A wider engagement process can follow by leveraging networks such as regional Fire Science Consortia and community-based organizations like Collaboratives and Coalitions, to solicit additional feedback and gain community buy-in. Using the provided examples as ice-breakers for further discussion, fire and emergency managers (especially public information officers and wildfire mitigation specialists), other community-based organizations, and other local, state, regional, and federal partners can discuss how to coordinate and collaborate consistent mitigation messaging with their local NWS office. This could be done at a mitigation workshop (broader community reach), at a table during a mitigation fair, or as part of regular formal or in-formal meetings that occur between fire, land, and emergency management partners such as when state Annual Operation Procedures are discussed. Throughout, consistent messaging should take the form of using the same terminology and language, similar graphi-

cal tools as proposed (icons, but also photos), and coordinating the sharing of information through time and ahead of events using multiple platforms of media. These varied engagement situations will provide opportunities to discuss these aspects.

In parallel, one additional method to identify community-centric information (such as commonplaces that develop further engagement and build trust) can occur through the use of a rhetorical CRIB (Collect, Review, Identify, Build) sheet (Lambrecht et al., 2025) to further identify and ensure alignment of messaging with shared community values, helping to build additional trust between the community and messengers. At the local and regional scale, community leaders—perhaps selected as wildfire mitigation ambassadors—can help amplify the message in a more active manner by encouraging neighbors to take part in organized neighborhood clean-ups (e.g., chipper days, mow days, etc) and by re-sharing NWS messaging at appropriate times. More passively, using social media or via other communications (e.g., email or flyers), they can recognize ongoing mitigation work happening among the community.

This engagement plan implies asymmetric and asynchronous actions that can occur at various points in time, but centers on a need for continuous re-engagement between partners and the public. A more specific plan is likely not appropriate to give here as each community will be different as I cannot assume to know the best approach. To that end, the ideas here are merely suggestions, and I welcome feedback on specific approaches that have succeeded.

4. Discussion

Home ignitions during a wildfire are a local combustion process determined by conditions in the home ignition zone (Cohen, 2000). Reducing the probability of structure involvement implies a greater likelihood of structure survival and successful fire suppression and control. By stopping these ignitions by taking the correct mitigative steps, i.e., creating non-combustible zones around structures and maintaining defensible space, we are more likely to succeed in protecting life and property, increase firefighter safety, and live with wildfire in a more resilient landscape (Barrett et al., 2024).

The intent of these suggestions is not for the NWS to message alone, rather, it is to leverage the public trust held by the community of diverse and expert partners. Coordination and collaboration across partners in the community, from fire agencies, emergency and land managers to community ambassadors, can ensure unified, consistent messaging that supports multiple missions of life and property safety, economic vitality, and public health. In doing so, partnerships can be strengthened to facilitate ensuring mitigation support is accessible to all and to prioritize high risk areas.

The map shown in Figure 2 does not include other products, such as Fire Weather Watches, that are often communicated graphically to both public audiences and to responsible decision makers (i.e., fire and emergency managers). Thus, it represents a minimum of potential engagement opportunities, especially when other NWS messaging is considered. Ideally, communities would be reminded at least annually to perform the highest priority stan-

dard community wildfire mitigation actions around the structure ignition zone, such as maintaining Zone 0's 5 ft non-combustible zone and keeping combustible objects at least 30 ft from the structure. In addition, an annual reminder to check on the status of go-bags and review evacuation plans is recommended. During severe drought conditions, additional reminders about wildfire preparedness can be paired with other beneficial actions to mitigate drought impacts, such as water conservation. This situation represents an additional opportunity to produce collaborative messaging from other community partners such as water agencies or resource conservation districts. However, reduced watering of landscapes during drought may make ornamental fuels more receptive, emphasizing the importance to maintain defensible space, trim and remove dead material, and mow grasses. Smoke readiness could also be included to cover reductions in air quality resulting from both prescribed fire and wildfire. These all represent low-cost suggestions to increase the potential for additional preparedness before fire weather begins.

5. Conclusion

The National Weather Service (NWS) is a trusted source of information for communities and fire and emergency managers regarding upcoming fire weather. Current graphical and text-based products, such as Fire Weather Watches and Red Flag Warnings, often include preventative actions to reduce the chances of wildfire ignition, which is an important component of ensuring

public safety. However, after identifying a potential gap in the messaging of mitigation-focused activities that can be done ahead of fire weather, I produced example graphics focusing on demonstrating low-cost, and general quick mitigation actions that can be taken across various timescales. This information can be readily implemented in NWS and other partner messaging efforts. By recommending mitigation actions, the public can be encouraged to reduce the risks posed by wildfire on their property, especially in their structure ignition zone. Any increase in mitigation actions should lower the burden on first responders and increase the chances of structure survival during a wildfire, leading to reduced costs and more rapid recovery.

An engagement plan was proposed to facilitate the implementation of this new messaging. Targeting broad applicability across varied scales of communities (neighborhood to federal), the plan recommends coordination and collaboration across partners in the community to craft and tailor messages to be the most locally-relevant and actionable. The next steps could include collaboration with a graphic designer to improve and build additional icons, iteration on the draft approach with other mitigation and communication experts, and teaming up with NWS forecasters to test implementation.

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