Response and Future Readiness: Vegetation Mitigation After Destructive Wildfire

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Over the past several decades, wildfire has become an increasingly costly and destructive natural hazard as a result of a combination of ecological and social factors, including climate change, decades of wildfire suppression on the landscape, and residential expansion into fire-prone vegetation (Fischer et al. 2016, Flannigan et al. 2013, Moritz et al. 2014). From 1999 to 2016, an average 1,449 residences were destroyed annually by wildland fire and billions of dollars spent on fire suppression. In response to the challenges of wildfire management, the National Cohesive Wildland Fire Management Strategy advocates the creation of fire-adapted communities (FAC), communities that can coexist with wildfire because of their investments in education, vegetation thinning (i.e., reducing fuel), planning and management of the built environment, and appropriate suppression and emergency response (Fire Adapted Communities Coalition 2014) (Figure 1). The FAC program envisions a collaborative, iterative approach where residents, communities, and governments work to identify and implement needed wildfire risk reduction actions over time, as resources, threats, and opportunities change. Unlike other natural hazards, wildland vegetation management is a key part of preparing for and responding to wildfire, as vegetation is both a vulnerable resource and a source of risk.

Combined, vegetation management on the landscape, vegetation mitigation around the home, and other human interactions with natural systems (e.g., ignitions, suppression response) play essential roles in determining the frequency and severity of wildfire (Parise and Cannon 2012, Syphard et al. 2013, Fischer et al. 2016).

However, unlike other natural hazards, social scientists are only beginning to examine what happens *after* wildfire events (Mockrin et al. 2016, Paveglio and Edgeley 2017). A large and growing body of social science literature focuses on risk reduction and management *before* wildfires (McCaffrey 2015) but post-wildfire studies[4] have mostly been case studies, focusing on individual locations and often one facet of community recovery or response (e.g., psychological distress, changes in building codes) (Carroll et al. 2005, Eisenman et al. 2015, Mockrin et al. 2015, Mockrin et al. 2016). It is unclear how vegetation mitigation might change after a fire—mitigation alone and in combination with other strategies that communities may pursue to reduce wildfire risk for future occurrences. Studies of hazard impacts and recovery often focus on large events, such as hurricanes, earthquakes, or flooding, which damage thousands of homes, or more, in densely populated urban areas (Highfield et al. 2014, Newman et al. 2014, Pais and Elliott 2008). In these larger metropolitan areas, green spaces may be dominated by urban parks, street trees, and smaller natural land holdings, surrounded by urban infrastructure. In contrast, wildfire is neither limited to urban settings nor, in most settings, a one-time event,

4. Here, we refer to social science studies of human community response and management after destructive wildfire—there are many studies of ecological recovery and response to fire.

Fire Adapted Communities

Communities in wildfire prone areas are working together to be fully prepared for wildfire. A fire adapted community (FAC) incorporates people, buildings, businesses, infrastructure, cultural resources, and natural areas to prepare for the effects of wildfire. There are many components to being a FAC, with a range of roles and actions that can reduce risk. The following components of a FAC are adapted from the "Guide to Fire Adapted Communities" (Fire Adapted Communities Coalition 2014).

Neighbor to Neighbor

Neighbors are linked by wildfire risk. If one home is inadequately prepared, the risk level to the entire neighborhood increases, and everyone's safety is impacted. Neighbors can collaborate to use Firewise principals in their community.

Science and Research

A wildfire is still a threat, even if it's miles away. Traveling embers can ignite roofs, vents, lawn chairs, decks, fences, mulch, pine needles, and other common items around your house and yard. Cleaning debris and maintaining landscaping reduces the likelihood of ignition.

Fuel Management

Land management and wildfire are closely related. Ranching, farming, timber and logging operations, species management, and development can impact wildfire risk. FAC resources include information on forest land management, healthy fire behavior on managed land, and farm/ranch fire guidance.

The CWPP Process

A local Community Wildfire Protection Plan (CWPP) is a collaborative plan created by the fire department, state and local forestry, land managers, community leaders, and the public. The planning process maps values at risk and requires actions to reduce risk, such as prescribed burning, fuel reduction, or other measures that prepare a community to better confront their wildfire threat.

Residents & Home

Residents can increase their home's survival and family's safety during a wildfire by making wise decisions about defensible space and situational awareness. Landscaping and home construction techniques and having an emergency preparedness plan can all help residents. Local fire departments work with residents on emergency evacuation through the Ready, Set, Go! Program.

Whole Community

A fire adapted community acknowledges and takes responsibility for its wildfire risk, and implements appropriate actions at all levels. Actions address resident safety, homes, neighborhoods, businesses and infrastructure, forests, parks, open spaces and other community assets. Whole communities are coming together to confront their common risk.

Codes & Standards

Consensus developed codes and standards can provide criteria for planning development in areas that might be threatened by wildfire. The National Fire Protection Association's main wildland fire standard and the International Code Council's wildland urban interface code are both designed to reduce wildfire risk.

and it tends to destroy smaller numbers of homes (Alexandre 2015), with local authorities leading response and recovery (Mockrin et al. 2016). With wildfire, the vegetation management actions taken in recovery can alter fire's frequency, path, and severity in the future, and determine ultimate well-being of human and ecological systems. Wildfire is therefore a unique hazard which can contribute to our understanding of green stewardship, readiness, and response.

Becoming and maintaining community fire-adaptedness means managing for fire in social, political, economic, and ecological aspects. Managing vegetation is key, including vegetation management at the landscape level and around individual home sites. At the landscape level, managers work to reduce the likelihood that vegetation will support a destructive wildland fire, using fuel treatments and other management strategies to promote fire-resilient landscapes (Stephens et al. 2012). At the individual home site, managing vegetation in the immediate vicinity of homes can also reduce the risk of wildfire damage, in addition to using fire-resistant materials when building homes (Cohen 2000). In many cases, communities may choose to pursue these household mitigation activities collectively at the neighborhood level, through the Firewise program. The Firewise program through the National Fire Protection Agency is a voluntary program that certifies neighborhoods and small communities that have taken key collective actions to reduce the risk of wildfire damaging or destroying homes (obtaining a risk assessment and making an action plan; see more at www.firewise.org/usa-recognition-program.aspx) (National Fire Protection Association 2016).

Our Study—Response and Recovery After Wildfire

We undertook a study of community change following destructive fire, using nine sites across the United States to examine whether wildfire experience led to adaptation on the part of local governments and communities. Our interviews broadly addressed community-level response and rebuilding after a wildfire, with an emphasis on changes in wildfire mitigation through formal policy and informal actions. We selected fires that occurred in 2009 or 2011, and reported 20 or more homes lost on official Incident Command Status (ICS-209) reports that compile daily records of building damage (National Wildfire Coordinating Group 2016). We used purposive sampling to choose study sites in a range of settings, including urban and rural settings, and a diversity of geographic locations, to examine a variety of potential community responses to wildfire.

For each study site, we first reviewed publicly available documents about wildfire history in the region, fire-related building and zoning codes, land use planning, and hazard mitigation. We then conducted semi-structured

interviews with public officials and community leaders to characterize community-level response to wildfires (for example, changes in local regulation, or participation in community outreach and education programs). This approach allowed us to characterize broad changes as reported by informants, not individual resident-level responses to wildfire events. We conducted interviews between December 2013 and October 2015, expanding upon the questionnaire used by Mockrin et al. (2016). We then combined qualitative interviews and publicly available documents to determine community-level changes in wildfire mitigation and preparation after fires.

For this chapter, we focus on three different locations where post-fire vegetation stewardship emerged as notable in informants' discussion of post-fire recovery and response. Below, we relate each location's experience with wildfire and vegetation stewardship.

1. The Highway 31 Fire, Windsor Green Fire, and North Myrtle Beach

Fire Incident and Setting

The Highway 31 fire (2009) primarily burned in unincorporated area of Horry County, SC, in both South Carolina Department of Natural Resources (DNR) land and private land. Seventy-six single-family homes were lost when the fire crossed into the city of North Myrtle Beach into the Barefoot Resort, a large residential and vacation development with golf courses. The fire caused one fatality, a first responder. Homes were mostly full-time residences, although some were used as seasonal homes. Many homeowners were retirees. The second major wildland fire that caused housing damage in this area was the 2013 Windsor Green fire, which impacted a condominium complex in unincorporated Horry County (6 buildings containing 104 condo units were lost). The condominiums were full-time residences and occupants were younger and employed (not retirees).

In recent decades, housing has grown dramatically in Horry County, driven by an influx of retirees and others attracted by the proximity to beaches (city of North Myrtle Beach), recreation opportunities (e.g., golf), open space, and low-cost standard of living. Development is nearly all in planned unit development (PUDs) or entire subdivisions, either single family homes, town homes, or condominium units, all using public utilities. Highly flammable crepe myrtles and pine straw (needles) are popular for landscaping, and are commonly found close to houses. Lots are small and housing is dense, with open space found mostly in development common areas, managed by homeowners' associations (HOAs). HOAs play an important role in overall property management,

particularly in large planned unit developments and unincorporated areas of Horry County. There are no formal regulations requiring defensible space or fire-resistant home materials in either the city or the county although several HOAs had begun to pursue Firewise certification before these fires. The area is served by professional firefighters, with a long-standing, dedicated wildland fire team maintained by Horry County Fire and Rescue.

Housing development has diminished much of the former timber estate, and remaining open space is either preserved by SC DNR (Lewis Ocean Bay Heritage Preserve) or cannot be developed because they are wetlands. The pine vegetation and wetlands are extremely fire prone, and fire suppression is tactically difficult in wetlands and bogs. Wildfire in the forested areas of Horry County has been common over the past 40 years, but in the past, housing densities were lower and homes were not lost. The Highway 31 fire and Windsor Green fire were, in this regard, novel events. Informants thought many residents in Horry County were unfamiliar with wildland fire, especially those who moved to this area from the Northeast where wildfire is not common. This unfamiliarity was exacerbated by the recent growth of Horry County, where development of new residential areas near fire-prone landscapes is relatively recent. Even those who were long-time residents spoke of adjusting their understanding of wildfire to reflect the fact that homes are now at risk from wildland fire.

> "10 years ago, 15 years ago [there] was nothing... it burned, it affected all the animals in the trees, I mean, that were out there but it wasn't necessarily a real impact on me as an individual because people didn't live there. I think the fact that people live there now, obviously it's created the concern, the idea that it is an issue."
>
> —Horry County Emergency Management[5]

Vegetation and Management Post-Fire

These two wildfire incidents, occurring in close proximity geographically and only several years apart, led to increasing community concern about the threat of wildfire to housing.

> "Now, the communities that did have fires near them, they're definitely a lot more aware now. But it took a fire in order for them to be aware that there was such a threat."
>
> —Horry County Planning

Housing recovery was relatively rapid after both fires, as individual homeowners and the condo complex drew upon insurance. Because of the extent and distribution of housing development, much of the wildfire mitigation work has been at the level of PUDs, and pursued

5. Throughout this paper we use a respondent's organization, rather than title, to preserve confidentiality. Statements are not official views of these organizations.

by HOAs. In the aftermath of these wildfires, the South Carolina Forestry Commission created a new position to promote residential mitigation and support neighborhoods that are pursuing Firewise certification (the staff member is based in Horry County and has responsibility for coastal SC.) After the wildfires, an additional 12 communities in Horry County have been formally recognized as Firewise communities and others are continuing to pursue certification. Firewise communities will have to work collaboratively to maintain defensible space around homes as well as mitigate vegetation in common areas and around subdivisions.

However, community leaders expressed concerns that prevailing norms of vegetation landscaping around homes will not be easily changed. For example, after the wildfires, there was a great deal of debate within communities about the use of pine straw for landscaping, but the practice continues in many neighborhoods. In addition, administrative struggles within individual HOAs could hinder progress towards fire-adaptation and not all communities have pursued becoming Firewise. For example, the Windsor Green community became Firewise after rebuilding after the fire, while the Barefoot Resort community has thus far not elected to pursue Firewise certification. Using formal regulations to require defensible space maintenance or fire-resistant home materials lacks broad community support, although local government is interested in promoting wildfire mitigation. Informants thought awareness and concern about wildfire risk diminished with time since the fires.

Challenges also persist due to the scale and type of housing development, and the county's commitment to preserving open space. Many PUDs were built immediately adjacent to undeveloped lands, without a vegetative buffer that could be thinned or managed between the housing and fire-prone vegetation.

> "Conservation and the amount of open space we have in Horry County is actually a threat because these areas are being protected for environmental reasons, but the land has to be managed. If it isn't managed then it becomes a threat."
>
> —Horry County Planning

> "Now, the problem that we run into is that most of those communities back up to basically an unmitigated, unmanaged wildland [] that's extremely flammable...You can be within 10 feet of your home and have a solid wall of wax myrtles and other flammable vegetation. So the growth of [housing] has really thrown in a huge monkey wrench on wildfires and the risk and the danger for this area."
>
> —South Carolina Forestry Commission

HOAs must now work with the open space landowners and the U.S. Army Corps of Engineers to try to establish buffers in land *outside* their

developments. Horry County officials recognize these concerns about management and distribution of open space and are interested in revising land development regulations to facilitate buffer establishment, but much of the land available for housing in this area has already been developed.

2. The Monastery Fire

Fire Incident and Setting

The Monastery Fire (2009) burned in an unincorporated area of Klickitat County, WA, outside the city of Goldendale. Although fire incident records list 100+ structures as destroyed, most of those were outbuildings, and only 12 homes were lost (5 permanent residences, all mobile homes, and 7 second homes). This is a rural community and residents are fiercely independent. Most homes are modest primary residences or simple second homes, with a few upscale second or retirement homes mixed in. All are served by private wells, often with limited capacity, and septic systems. Formal residential landscaping is not common; homes may be surrounded by storage and outbuildings. Lots ranged from 5 to 20 acres with some larger holdings. Roads are privately owned and maintained, and access is challenging, particularly in inclement weather. HOAs are uncommon, although one larger subdivision of 5 acre lots, founded with an interest in promoting self-sufficiency, has an HOA and is a Firewise community (this subdivision was located outside the burn perimeter).

In recent decades, housing here has grown modestly, with some influx of retirees and amenity migrants, often from urban areas in western Oregon and Washington. Land is commonly held undeveloped by absentee owners. The county government is interested in encouraging housing growth and development, seeing it as an economic asset for the community. There is limited public land in the county, but large amounts of forest are still owned by timber companies. Vegetation in the area where the fire occurred is a mix of ponderosa pine (*Pinus ponderosa*), oak (*Quercus* spp.), grasses, and shrubs. Beetle infestations have been problematic in recent years, which have contributed to increased susceptibility for wildfire. However, respondents agreed that increased fire risk was to be expected in these conditions.

> "I mean, we have enough large fires in the county here to where, in fact, I think it was the week before this fire, I had a big fire [of] 13,000 acres in my [fire] district and fortunately, we didn't lose anything except an awful lot of grazing land and fencing and whatnot. It's just a fact of life, you know?"
>
> —Community-managed fire victims fund

The fire-affected area is served by rural fire departments, staffed primarily by volunteers. Residents have a range of experience and knowledge of wildfire and forestry—some long-time residents and ranchers own their own heavy equipment and are familiar with wildland fire, while migrants and second-home owners are described as less familiar with wildland fire. There had previously been wildfires in the area of the Monastery fire, but housing was less extensive, and homes were not lost. Wildfires have continued to occur after the Monastery fire, but without the loss of homes.

Vegetation and Management Post-Fire

This wildfire incident, and the accompanying loss of homes, led to an outpouring of community support for those who had lost their homes, as well as some increased interest in vegetation management on individual properties. A community-managed fire victims fund was able to marshal local support and online donations from outside the region to replace mobile homes for the five full-time residents who had lost homes in the fire. A new State Department of Natural Resources (DNR) position was created not long after the Monastery Fire, supported by federal funds, with a focus on improving forest health on private lands (addressing beetle damage and reducing the risk of wildfire). The DNR employee offers technical advice about vegetation treatments and a cost-share program that helps subsidize the costs of vegetation thinning on private land, although many in the community are wary of participating in a formal government program.

> So there's some paperwork involved, and a lot of the folks don't want to do that kind of stuff. But I help them through the process...I do the bulk of it and then I do compliance. So I'll go out and visit with a landowner usually a couple of times to kind of convince them that it's a good thing... There's a lot of folks that have done stuff on their own with no assistance from me other than they ask me a few questions."
>
> —Washington State Department of Natural Resources

However, interview participants thought that local residents were more willing to speak with state DNR and fire department employees about their properties and minimizing wildfire risk after the Monastery fire.

3. Station Fire

Fire Incident and Setting

The Station Fire (2009) primarily burned land in the Angeles National Forest (NF), and was the largest fire to date in Los Angeles County (LA County),

California. After escaping initial containment efforts, the Station Fire underwent periods of rapid growth and extreme fire behavior, ultimately threatening thousands of homes in nearby communities. In total, the fire destroyed 89 homes and 29 commercial buildings, with approximately two-thirds of homes lost either in or bordering the southern part of the Angeles NF. Approximately 30 homes were lost in Stonyvale-Vogel Flats, an inholding near the southern border of the forest, located along a county-owned and paved road. Residences were a combination of privately owned homes and recreation residences (cabins leased from the Forest Service). Homeowners were informally organized by a shared water system on the private-land portion of the inholding. These were all primary, full-time residences, and residents valued the remote setting and access to the Angeles NF, but also commuted into the city of Los Angeles and nearby urban areas for work and shopping.

Los Angeles County is the most populous county in the United States and contains a complex patchwork of jurisdictions, with 88 separate cities falling within LA County, including the city of Los Angeles. Housing development around the southern edge of the Angeles NF has continued to grow over the past decades, mostly in planned subdivisions or suburban neighborhoods, with hillside locations prized for their proximity to open space and views of the metropolitan area (real estate here is quite expensive). Much of LA County is fire-prone, with a combination of fire-adapted chaparral vegetation and dynamic weather of a Mediterranean climate. Los Angeles County has a long history of wildfires causing damage to homes and threats from many other natural hazards (earthquakes, mudslides and debris flows, flooding).

> "So we've been in this business for a very long time...In 1934 [shows picture of flood damage]...this is where the Flood Control District first got an idea of the fire-mud flow cycle."
>
> —LA County Department of Public Works

The southern San Gabriel foothills where National Forests abut residential development had had extensive wildfires that damaged housing in the years before the Station Fire, including the Sayre and Marek Fires. The Angeles NF has a long history of wildfire management and mitigation, including the use of fuel breaks and prescribed fire, to promote fire-resilient ecosystems and prevent destructive wildfire from affecting adjacent developments.

The Los Angeles County Fire department is responsible for wildland fire fighting, forestry, and structure protection in the unincorporated area of the county, and is active in wildfire mitigation and education. As required by the state of California, LA County has formal regulations for homes that fall within state-mapped Fire Hazard Severity Zones. Homes are required to

maintain defensible space (as much as 200 feet of clearance from the structure, depending on aspect, slope, and other environmental conditions), and must be constructed with fire-resistant home materials when built (re-roofing must also use fire-resistant materials) (County of Los Angeles 2014). Residents living adjacent to and within the Angeles NF were described as aware of wildfire risks, and worked to minimize ignitions, although many of the homes lost in the Stonyvale-Vogel Flats inholding in the Station Fire were older, and had not actively maintained defensible space. The Forest Service completed a fuel treatment around this inholding area in the year before the Station Fire, and residents had considered forming a Fire Safe Council,[5] but had not pursued it.

Vegetation and Management Post-Fire

The Station Fire was extremely controversial, with much of the post-fire public attention focused on evaluating and revising Forest Service suppression strategies (GAO 2011). Housing recovery in the Stonyvale-Vogel Flats inholding has been limited, in large part because those wishing to rebuild must comply with current LA County codes when rebuilding. The challenges of supplying access, siting septic systems, and providing appropriate water supply (in cisterns) for fire suppression have been prohibitively expensive or infeasible for many.

> "[A resident] was going to build this beautiful place. He had the drawings. He was ready to go, and then the fire came and the bridge, as he understood what they [LA County Fire] were requiring, would have cost him like a million dollars or something. So, he left."
>
> — Local Community Leader

If homeowners do rebuild, they will be required to use fire-resistant materials and create defensible space around their homes in order to comply with LA County regulations. Recreation residences on land leased from the Forest Service have not been permitted to rebuild. Broader vegetation recovery on the Angeles NF has been the responsibility of the Forest Service. A lengthy drought slowed vegetation recovery, and prescribed burning in broader LA County and unburned areas of the Angeles NF has also been prevented by the drought. The LA County Department of Public Works was active in forecasting and outreach about post-fire mud and debris flows, although actual damages were limited following the fire due to lack of rainfall. One noticeable change in post-fire vegetation management occurred when the Angeles NF created a new program to allow homeowners to conduct defensible space clearing onto Forest Service land, as recommended by the Governmental Accountability Office's post-fire report (GAO 2011).

If approved by Forest Service personnel, homeowners are now allowed to thin vegetation up to 300 m around their property and on to Forest Service land, in order to comply with defensible space prescriptions required by local authorities (e.g., LA County) (Angeles National Forest 2014). In interviews, Forest Service staff acknowledged some benefits of this program, given the financial and logistical constraints that prevented them from performing fuel treatments for all homes adjacent to or within the forest, but there were also concerns about environmental impacts.

> "...They let them build so close, and so that's something that...when the next boom happens, they [need to] take into account how close they are to the forest and come to an agreement on how that's going to be dealt with because the cost of doing the NEPA analysis is ours."
>
> — Angeles National Forest

However, after two seasons, no homeowners had yet enrolled in the program. Forest Service employees were simplifying enrollment processes, and pursuing group action via Fire Safe Councils.[6]

Lessons Learned—Wildfire Events and Opportunities for Vegetation Mitigation

Because vegetation mitigation surrounding homes and vegetation conditions on forests and open spaces are key determinants of wildfire damage, recommendations for local communities focus on adaptation strategies that consider unique community values, environments, and situations. Our results indeed showed post-fire responses are variable—these selected locations changed vegetation mitigation through a variety of pathways including formal, voluntary programs (i.e., Firewise, cost-share with state DNR), formal regulations enacted by the Forest Service, and/or informal conversations and education. Post-fire responses were based on the communities' prior knowledge of wildfire, local and governmental capacity to recover and rebuild, and homeowner and landowner willingness to participate in vegetation management programs. Many solutions were dependent on changes to policies or programs that existed before the fire, and were deemed in need of expansion or adjustment after the fire.

These differences in post-fire vegetation management reflected the configuration and extent of open space, within private land and public land, as well as residents' background with land stewardship and interest in governmental

6. D. Travis, Angeles NF, pers. comm.

programs and collective action. However, vegetation mitigation is only one piece of environmental stewardship and readiness is only one component of adaptation. Each of these communities also altered other components of wildfire preparation and mitigation (most often, suppression). We choose these three examples because informants were able to speak about the wildfire event leading to some type of change in vegetation management, but we note that we also had sites where vegetation management, around individual residences and in open space (private or public), did not emerge as key changes post-wildfire.

With a variety of settings and fire incidents, there were some similarities and differences across these three study sites. For both the fire in Washington and the fires in South Carolina, additional investment in state agency staff led to increased wildfire education and outreach, including vegetation mitigation. Even in Washington, where government oversight and interventions were generally unpopular with residents, fire chiefs and extension agents were crucial in disseminating information regarding vegetation clearing, fuels management, and land stewardship. Trust and agency-community relationships have also been identified as key in acceptance of public lands management after a fire (Olsen and Shindler 2010, Shindler et al. 2014). In both the California and South Carolina study sites, there was increased interest in vegetation management on open space or public lands to protect homes from future loss to wildfire, but these changes took different forms. Interest in vegetation stewardship in Horry County, SC, increased as residents began to see themselves as part of a fire-prone community and began working to try to implement fuel breaks between their communities and onto open space and public lands, although progress was challenging. In LA County, the public land owner (Angeles NF) changed policy to facilitate private land-owners' defensible space treatments onto public lands. However, it may be challenging for homeowners to pursue this opportunity individually, and forest managers now think Fire Safe Councils might be best positioned to take on such an effort.

Voluntary programs such as Firewise or vegetation mitigation programs were commonly pursued as a first step after wildfire, when communities were spurred to take action on wildfire concerns. Firewise certification can grow out of whole-neighborhood or community desire to change vegetation management. Contacting the Firewise organization (www.firewise.org) for assistance is the first step in the process of becoming certified. The Firewise criteria and checklists, and its assistance and certification processes, support and encourage collective action. Although Firewise programs aren't primarily intended to change broader community policies or attitudes surrounding wildland fire, the presence of a certified Firewise community may serve as

an example to surrounding neighborhoods. For communities ready to make broader governance and management changes regarding wildland fire, FAC program provides a variety of guidance and reference materials. For example, FAC recommends development of a community wildfire protection plan, and this alone can be a crucial first step in a community becoming fire-adapted, as it allows the leaders and stakeholders of the communities themselves to outline how they plan to deal with wildfire risk given their resources, knowledge, economics, politics, and community culture; and to capture these insights in a stand-alone, formal document.

While these initial management changes may help create a more fire-resilient community, continual strategy and policy updates for fire-adapted land stewardship may be needed, even as memory of past fires begins to wane (Quarles et al. 2013). Vegetation will continue to regrow and change, and with it risk for future wildfire, while public awareness and community support for enhanced wildfire mitigation and changes to natural resource management policy will also change with time since disaster (Burby et al. 2000, Carroll et al. 2005, 2011). In the study areas where residents had rebuilt housing after the fire (SC and WA), study participants were already concerned that community awareness about wildfire was fading with time from the event. A diversity of efforts, including formal governmental efforts and ongoing outreach, may keep wildfire damage, recovery, and rebuilding in view, hopefully reducing the likelihood of future loss.

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