CHAPTER TWENTY-SEVEN

# Social Dynamics of Wildland Fire in California

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## Introduction

A useful question for managers to ask is: why do we care about understanding fire's ecological processes? At a theoretical level, knowledge itself may be the goal. However, at a more practical level, funding and research interest tends to reflect a desire to understand how to manipulate ecological processes to favor one or several *preferred* management outcomes. Although nature is indifferent about whether fire leads to regrowth of existing species or to wholesale change to a different vegetation type, humans usually favor one outcome over another. Which outcomes are viewed as more or less desirable will depend on trade-offs between diverse human beliefs and values. Many disputes over land management practices, including fire, are due to fundamental differences in what various individuals, organizations, and cultures value and different views on how an ecological process might affect those values. A process that may be perceived as destructive by one person or group may be seen as constructive by others depending on the scale and timeframe each is considering and which value each cares most about—whether it is commodity production, recreation, ceremonial purposes, or habitat for a particular animal species. Although scientific knowledge of an ecological process can help inform management decisions, ultimately it is only one of numerous considerations.

Fire is thus not just an ecological process, but also a social process. Just as rainstorms are normal events but become a concern when they cause flooding, fire is a natural biophysical event that merits more human attention when it begins to have a significant impact on something that people value. This dynamic is what, by definition, makes wildfire a natural hazard. Wildfires have received growing attention in recent years because they have had increasing effects on an array of human values. These increased effects have led to growing debate and discussion about how to minimize fire's negative impacts while fostering the positive effects. Whether an effect is deemed positive or negative is obvious in some situations (e.g., loss of human lives and structures) and less obvious in others.

Decades of research on various natural hazards have provided many useful insights for understanding human responses to wildfire (McCaffrey 2004). Fire is different from most other natural hazards (such as tornadoes and earthquakes) in that it plays an integral ecological function in many ecosystems and, to some degree, can be managed by humans. Allowing fire to play its beneficial ecological role while mitigating negative impacts on things people value will involve some level of fire management but it will also require changes in human behavior. Identifying the best way to do this within the context of the current natural and human environment in California is a highly complex endeavor that necessitates understanding the range of values at risk, how people perceive wildfire management, and actions that might be taken to foster more desirable outcomes. Better-informed management decisions thus will require scientific understanding of social processes as well as ecological processes.

In California, a key reason why concern about wildfires has increased in recent years is due to its growing impact on lives and property. Between 2000 and 2014, 31 civilians (CAL FIRE 2015a) and 25 firefighters died in California due to wildfires (USFA 2014), and from 2000 to 2013 a total of approximately 9,500 homes were lost in the state (NIFC 2014). Across the country, an average of about 1,400 homes and 1,300 outbuildings were lost to wildfire each year between 2000 and 2013 (NIFC 2014). Although geographic distribution of these losses varies each year, California often sustains some of the higher losses. In 2013, for example, 1,093 residences, 945 outbuildings, and 97 commercial buildings were lost to wildfire nationally: although Colorado lost the largest number (520) of residences, California had the highest overall state level losses (184 residences, 521 outbuildings, and 10 commercial buildings) (NICC 2013). Although these numbers demonstrate the more obvious negative outcomes, wildfires also can affect a wide range of things people care about including air quality, cultural resources, a valued animal's habitat, or recreational amenities.

This chapter provides a basic overview of several important social considerations related to wildfire. After a brief cultural

history of fire management, the chapter will discuss research findings about the range of variables that do or do not shape the beliefs and attitudes of people who live in fire prone areas. It will then provide a brief description of some of the national and state programs that work to foster public mitigation efforts and an overview of the institutional structure of fire management in California.

## Brief Cultural History of Fire Management

Fire has always been part of the human landscape. Humans have tended to live where fire could be used to improve living conditions—by hunters to flush out game, by herders to create grasslands, and by farmers to clear fields (Pyne 1997). Fire has shaped human development and, in turn, has been used by humans to shape the surrounding landscape. As such, it is as much a cultural as a natural phenomenon. "Fire and mankind enjoy a symbiosis: most fires are set, directly or indirectly, by man, and even natural fires are tolerated according to human criteria" (Pyne 1997, p.166). Because definitions of proper use and management of fire can vary distinctly between different cultural groups, management decisions often have more to do with cultural than ecological criteria.

Fire suppression in the United States is a relatively recent phenomenon. As is described in chapter 19, Native Americans were active resource managers who had a sophisticated knowledge of fire use. Early Euro-American settlers also used fire for reasons similar to Native Americans, often learning specific practices from local tribes, as well as to convert forest into agricultural land. Occasionally the burning was done in a haphazard manner, but more often than not a strong set of rules and social mores regulated the methods and season for implementing a controlled burn (Pyne 1997). As permanent settlements were established, settlers organized to suppress any fires that threatened private or community resources: activities included creation of firebreaks, fire brigades, and use of prescribed burning to reduce fuel loads (Pyne 1997, p.219).

The official shift toward a policy of suppressing all wildfires began in the late 1800s in step with the development of the Progressive Conservation movement which developed in part out of growing public concern about mismanaged public domain lands and resource scarcity. To address these concerns, it was argued that resource management decisions needed to be taken out of the hands of legislators and local individuals who were thought to be interested more in immediate profit than in long-term resource use. Science and active government involvement was seen as the means of achieving these goals: science provided an objective means by which trained personnel could make rational decisions, and the federal government was, at the time, the only entity able to engage in such a large-scale comprehensive venture. This ultimately led to the withdrawal of large areas of public domain lands from settlement to be placed in forestry reserves that would be managed by the government to maximize their use for present and future generations. In 1905, the United States Forest Service was established to manage these lands.

Professional forestry was seen as the best means to manage the newly reserved lands. The overall approach was imported from Germany where forests had been actively managed for centuries; fire suppression was an integral part of the approach. The emphasis on full control of fire may have been an appropriate professional management method for the German ecological and cultural environment but not necessarily for the American environment. Ecologically, German forestry was developed in less fire-dependent ecosystems, making its emphasis on suppression perhaps less appropriate for US landscapes that are fire dependent. Culturally, professional forestry was formed in a country with a limited land base and a highly structured society where stability and certainty were valued more than innovation. The basic assumptions—scarcity, stability, and certainty—did not apply in the United States, a rather volatile country where resources were abundant and innovation was valued over certainty (Behan 1975). Thus, despite the emphasis on using science, by adopting management practices from a country with such different ecological and socio-political conditions, the Forest Service was importing a cultural approach to forest and fire management as much as than a scientific or an ecological one.

However, the dominant ecological thinking of the time also supported the focus on fire suppression. In 1910, Frederick Clements published arguably the first fire ecology study, *Life History of Lodgepole Pine Forests* and "a milestone in the theoretical scientific justification for fire protection" (Pyne 1997, p.237). Clements' model of succession became the accepted ecological model of vegetation change. In his model, a plant community would move in a linear fashion over time, from an initial pioneer species through intermediary plant communities to culminate in a final climax stage. As an equilibrial state, persistent over time, climax was seen as the best stage and therefore the one to manage for. Any disturbance that drove the system backward in succession was seen as undesirable and fire was such a disturbance. Suppression was thus a means of helping move the succession process toward the climax state and was therefore a scientifically supported practice (Pyne 1997).

The shift to complete suppression did not happen overnight or without controversy. Effective fire control methods and resources needed to be developed and various members of the public brought on board with the policy. Notably, a social tension initially existed between the professional foresters' belief in the need for suppression and early settler beliefs that fire was a useful management tool. A fair amount of agency effort therefore went into educational campaigns against traditional or light burning practices. The ability to suppress fires was given an important boost during the depression with the availability of a large labor pool to fight fires (Nelson 1979, Pyne 1997). During this period, evidence also began to develop that, in certain ecosystems, fire had an important ecological function. Ecologists working in the southeastern longleaf pine forests repeatedly found evidence of the positive benefits of burning only to not publish the information, sometimes due to fear of "administrative reproof" and at other times due to loyalty to the agency that employed many of them, the Forest Service (Schiff 1962).

Full fire suppression was finally approached with the arrival of World War II due to the added impetus created by the increasing value of forest products and fear of Japanese incendiary bombs setting fire to the West Coast (Pyne 1997). Fire was no longer just the enemy of professional foresters but the enemy of the entire nation and advertising agencies (in conjunction with the Wartime Advertising Council) were enlisted to develop fire prevention ad campaigns. Wartime fire prevention posters had slogans such as "Our Carelessness, Their Secret Weapon," "Forest Fires Aid the Enemy," and "Forests are Vital to National Defense." This effort ultimately led to the creation of Smokey Bear in 1945 and the slogan

"Remember Only You Can Prevent Forest Fires" in 1947 (Forest Service 1984).

In the late 1960s, the emphasis of federal policy on fire control began to shift as it became increasingly evident that a technological threshold had been reached and full fire control was not possible, and due to growing evidence that fire was an integral part of many ecosystems (Biswell 1989). By this time ecological thought had begun to shift from Clements' linear model to a more complex, nonlinear view where fire was not inherently a negative process but one that merely led to different, and potentially desirable, ecological states. As fire became seen as an integral part of many ecosystems, agencies began to change their policies from fire control to fire management. The National Park Service incorporated fire management into its policy in 1968 and the Forest Service in 1974, although the 10 AM policy, which said that any reported fire should be suppressed by 10 AM on the following day, remained in place until 1978. The guiding principle was now one of balancing the cost of suppression with the value of the resources protected (Nelson 1979). However, shifting to a more pluralistic fire management approach has not been a straightforward process, as evidenced by the continuing emphasis on suppression. Changing policy alone is not sufficient: cultural perceptions, for both fire managers and the public, of appropriate fire management also need to shift. Ironically, there was now a need to shift the thinking of both practitioners and the public *back* to earlier beliefs that fire is a useful management tool.

In addition, the landscape in which fire use was being proposed had changed dramatically. For much of the twentieth century, as wildfires occurred mostly away from more settled areas and posed little threat to private resources, wildland firefighting and structural firefighting were separate and distinct activities. However, in the six decades after World War II, the US population doubled and the number of housing units tripled: much of this housing growth occurred in what has become known as the wildland urban interface (WUI). Although often used in relation to wildland fires in the western United States, the WUI has no explicit fire component but simply identifies areas where housing meets or intermixes with natural vegetation regardless of how fire prone or fire dependent that vegetation may be. Today roughly one-third of the US population resides in the WUI. In 2010, over 77 million ha (190 million ac) of land in the United States was classified as WUI (about 9.5% of the total US area), encompassing a population of almost 99 million (32.2% of the total population) and almost 44 million homes (33.5% of total homes) (Martinuzzi et al. 2015). Surprising to some is the fact that the majority of WUI land is in the eastern United States, which tends to be more densely developed and have less public land. In 2010, a relatively small amount of California land was classified as WUI (2.73 million ha or 6.6% of the state's area (compared to North Carolina's 5.42 million ha or 39.8% of the state) and a smaller portion of California's houses (32.6%) and population (30.2%) were in the WUI than a number of western and northeastern states such as Montana (64.1% and 62.4%, respectively) and New Hampshire (82.6% and 81.7%). However, in terms of sheer numbers in 2010 California was the state with the largest number of people (11.24 million) and housing units (4.46 million) located in the WUI (Martinuzzi et al. 2015).

More houses in the WUI increases the values at risk and also has created additional challenges for long-term fire and land management in terms of fighting fires, habitat fragmentation, and fire mitigation planning on private property. Over time, the increased number of people living in fire prone WUI areas erased the "buffer" that previously existed between wildland fire and structural fire considerations. This has led to increased tensions between private resources and government wildfire management in a number of areas, particularly in relation to roles and responsibilities for mitigation of the fire risk and fire protection during an event. Increasingly fragmented property ownership also raises challenges around how to have consistent fire management across diverse owners. Reintroducing fire into this more complex landscape is therefore not just a case of reducing the fuels that have built up due to suppression. An effective management strategy will require transcending numerous boundaries, not solely in relation to land ownership but also in terms of differing organizational mandates, management objectives, and values.

## Public Perceptions

Engaging in effective fire and land management in this more complex landscape requires an accurate understanding of the attitudes and beliefs about fire management of those who live in fire prone areas, including their support for different fuel management practices on public lands and reasons they do or do not choose to mitigate fire risk on their land. One of the challenges with understanding public perceptions is that without systematically gathered data it is easy to assume that the perspectives one hears most frequently are representative of the population. However, such assumptions may actually reflect a small proportion of the population and result in sampling bias, as individuals tend to be more vocal when they have a strong opinion about something. As social science research on wildfire management was limited prior to 1998, understanding of what the public thought about wildfires was primarily based on such anecdotal evidence. This contributed to a general narrative that the public demands fire suppression and sees all fire as bad. However, increased research funding (with the establishment of the Joint Fire Science Program in 1998 and the National Fire Plan in 2000) has led to development of a substantial body of fire social science research that provides empirical insights into public perceptions and beliefs and calls into question many of the common assumptions and narratives about public response to wildfire.

One common assumption is that there is a need to make individuals more aware of the fire risk: that lack of proactive response amongst private landowners is due to lack of recognition of the fire risk. However, evidence from multiple studies is quite clear that the vast majority of those living in fire prone areas understand the fire risk (McCaffrey and Olsen 2012). For example, when asked in 2004 to rate their risk on a 10-point scale (with 10 = fire is certain), residents around San Bernardino, California, gave an average rating of 9.3. One problem with the belief that the main issue is low risk perception is the underlying assumption that recognition of a risk will automatically lead to action. However, decades of research on risk perception in relation to other natural and technical hazards have shown that risk perception is a complex and subjective concept. Risk is determined by the probability of an event (for a specific timeframe and spatial extent) times the specific consequence being considered. Differences in risk perception thus may simply reflect a difference in the spatial area or the

consequence each individual or organization is considering. For example, although the average rating for general fire risk in San Bernardino was 9.3, the rating for risk to the individual's house was 4.3 (McCaffrey 2008). Although the lower rating may suggest that the individuals do not understand the wildfire risk to their home, it is actually a logical reflection of the smaller temporal area and specific consequence under consideration. It may also reflect actions individuals have taken on their property to mitigate their risk. Even if two individuals have similar risk perception assessments, they may still respond differently due to a number of considerations that have been found to influence mitigation decisions (including efficacy of the action in reducing risk, social norms, and resource constraints (e.g., time, money, physical ability) (Toman et al. 2013). Ultimately, barriers to proactive public responses in relation to wildfire management are less often an issue of information deficit (not understanding the risk) than of resource deficits.

An assumption related to the information deficit belief is that a key problem is the new people moving to fire prone areas who do not understand the fire risk because they have had no exposure to fire issues and that this lack of understanding is the major barrier to their being proactive. However, as indicated above, lack of information about the fire risk is rarely the primary barrier to individuals being proactive, including newer residents. Research finds little evidence that those who have lived in their home for less time are less likely to understand the fire risk or undertake mitigation activities; most studies find no significant difference for length of residence, and when a difference has been found it is often the newer residents who are more proactive. Two dynamics may explain why an intuitively reasonable assumption does not hold empirically. First, census data indicate that around 60% of moves in the United States take place within the same county and less than 20% are interstate moves (US Census Bureau 2014). This means that, although a "new" resident may be new to that street or neighborhood, they likely have still had significant exposure to the area's fire issues. Confirmation bias may also be at play. This is a psychological process where individuals who have formed an opinion about a topic (e.g., longer term residents who have had time to develop an opinion about the fire risk in the area) tend to discount any new information that contradicts that view. Thus, residents who are truly new to an area may actually be more receptive to new wildfire information than longer term residents.

Another common narrative is that most of the public thinks all fire is bad. Again, there is little evidence that this is the case. Studies have consistently found that the vast majority of individuals living in fire prone areas have a good, often quite sophisticated, understanding of the beneficial ecological role fire plays in many ecosystems. In focus groups and interviews, individuals also often discussed the need to reintroduce fire, generally with a preference for use of fire in less populated areas. In addition, one of the most consistent findings across studies is that under the right conditions roughly 80% of the public thinks prescribed fire is an acceptable management tool. There is also a clear preference for active forest management—whether via thinning or use of prescribed fire (McCaffrey and Olsen 2012). For example, in a survey of individuals who had taken a field tour of different fuels treatments sites in the Sierra Nevada, the vast majority of respondents felt prescribed fire (89%), use of prescribed fire in conjunction with mechanical treatments (83%), and mechanical treatment (69%), were acceptable practices, whereas barely half (52%) felt taking no action was an acceptable management approach (McCaffrey et al. 2008). Such high levels of support for prescribed burning and recognition of the need to reintroduce fire clearly shows that most individuals have a more nuanced view of fire than simply "all fire is bad."

A key tension point created by the increased intermingling of public and private land affected by fire is the issue of responsibility. A common assumption is that private landowners do not feel responsible for addressing their fire risk—given that government land management agencies have historically had primary responsibility for handling wildland fire. However, there is little evidence this is the case. Comments in focus groups and interviews indicate that, rather than displacing the responsibility onto fire and/or land management organizations, residents see the responsibility as a shared one, where each landowner is responsible for mitigating the risk on their land (McCaffrey and Olsen 2012). Both quantitative and qualitative studies show that a large majority of individuals living in fire prone areas believe that it is their responsibility to mitigate the fire risk on their property. A consistent finding across studies is that at least 2/3 of homeowners surveyed have undertaken some level of vegetation management on their property (McCaffrey and Olsen 2012). For example, in a survey of homeowners in Ventura County, California; Alachua County, Florida; and around Helena, Montana, 58% of respondents indicated that to prepare for wildfire they had done a great deal of vegetation management and 31% indicated they had done some work (McCaffrey and Winter 2011).

Overall, studies have found that key dynamics that influence public response are fairly consistent across the country; key processes in California are similarly important in Florida. Syntheses of fire social science research have found limited evidence that region of the country or socio-demographic variables, such as education or type of residence, consistently account for differences in how individuals respond to various wildfire issues. Instead, studies suggest that more intangible factors such as group membership, worldview, or specific elements related to local context (ecological, historical events, etc.) are more influential in explaining differences in individual attitudes, beliefs, and actions in relation to fire management (McCaffrey and Olsen 2012).

## What Does Influence Acceptance of a Practice?

The two variables most consistently associated with a more proactive response are familiarity with a fire management practice and trust in those implementing it. Numerous studies have found, particularly in relation to fuels management treatments on public lands (i.e., prescribed fire and thinning), that higher levels of knowledge or experience with a practice are associated with higher acceptance levels for the practice, and lower levels of concern about potential negative outcomes such as smoke from prescribed fire. Studies have also found a clear relationship between acceptance of practices and trust in those implementing them (Toman et al. 2013). For example, one study found the only factor predictive of acceptance of a fuel treatment was confidence (a form of trust) in those who were implementing the treatment and that the effect could be quite substantial: a one-unit increase in confidence predicted a 6.2 unit increase in acceptance of thinning and 4.6 unit increase in acceptance of prescribed fire in neighborhoods (Toman et al. 2011).

The fact that familiarity and trust are key variables associated with higher acceptance highlights the importance of relationships in facilitating more proactive views. Interactive communication methods (e.g., conversations, field tours) tend to be seen as the most useful and trustworthy information sources. Studies have also found a preference for one-on-one interactions and that personal relationships with agency personnel can have a positive effect on assessments of mitigation activities, whether the activity being assessed is of agency personnel doing a prescribed burn or the decision to implement defensible space measures (McCaffrey and Olsen 2012). Interactive communication also has been shown to be the most effective means of communication for changing behavior as it enhances the ability to ask questions, address specific concerns, clarify misperceptions, and build trust. This conclusion is consistent with findings in the natural hazards and adult learning fields that have found that adults tend to learn better through interactive exchange and that interactive communication is more influential than unidirectional measures in influencing behavior change (Monroe et al. 2006). Research has also shown how various social interactions can help build individual and community capacity to be prepared for wildfire. Social interactions between residents and fire personnel can facilitate not only information exchange but resource sharing. Social interactions amongst residents can help build social networks and a sense of community that, for many individuals, can increase motivation to be more prepared for wildfires. While studies have shown that outreach programs can help increase such social interactions, they have also shown that, as consideration of local context is critical, no single program will be appropriate everywhere (McCaffrey 2015).

## Key Policies and Programs Supporting Public Mitigation Efforts

### National Level

Two recent Congressional Acts have had a significant influence in fostering a more interactive model of fire management. The Healthy Forest Restoration Act of 2003 (HFRA) provided incentives to implement fuels treatments on federal lands as well as in the WUI. It also placed an emphasis on community planning by prioritizing availability of federal grants for hazardous fuels reduction projects to locations that had established a Community Wildfire Protection Plan (CWPP). The CWPP must be developed collaboratively between fire agencies, local government and area residents. As of 2010 an estimated 317 communities in California had a CWPP in place, in addition to some areas with a countywide CWPP (FRAP 2010).

The second notable federal action stems from the 2009 Federal Land Assistance, Management, and Enhancement Act (FLAME Act), which along with other actions required federal fire agencies to develop a national cohesive wildland fire management strategy in collaboration with state, local, and tribal stakeholders. The resultant National Cohesive Wildland Fire Strategy addresses three key areas: restoration and maintenance of landscapes, wildfire response, and fire-adapted communities. Fire-adapted communities are human communities that understand their fire risk and are taking the full range of actions to mitigate their risk: the more actions taken the more fire adapted the community becomes. The inclusion of fire-adapted communities as a key goal of the Cohesive Strategy has increased the focus of both agency personnel and various local stakeholders in identifying how communities can most effectively learn to live with fire. Developed in three phases the final Cohesive Strategy and accompanying National Action Plan was published in 2014 to help decision-makers weigh the consequences of different management options relative to the three Cohesive Strategy goals.

There are three national level outreach programs, funded in large part by the Forest Service, that support different aspects of a fire-adapted community. Firewise USA is a program administered by the National Fire Protection Association that focuses on providing resources directly to homeowners and their neighbors to help create communities that can live with and limit losses from wildfire. Communities that have met a basic set of standards can apply for designation as an official Firewise Community (NFPA 2014). A second national program (Ready, Set, Go!), administered by the International Association of Fire Chiefs, is designed to improve dialog and interaction between local fire departments and residents in their community (IAFC 2015). Finally, the Fire-Adapted Community Learning Network (administered by The Nature Conservancy and The Watershed Research and Training Center in Northern California) was established in 2013 to connect and support people and communities who are working to live more safely with wildfire. The network helps facilitate the sharing of innovations and best practices in resiliency and fire adaptation—including actions that can be taken before, during, and after wildfires—by exchanging information and supporting communities and groups working together at multiple scales (FACLN 2016).

### State Level Efforts

In addition, a number of state level initiatives facilitate development of fire-adapted communities and are relatively unique to California. As of 2016, California is the only state with statewide wildfire related building codes and vegetation management requirements. In 1991, California Public Resources Code 4290 created minimum defensible space related fire safety standards, including access and vegetation management considerations, for all buildings in State Responsibility Areas (see next section). In 2005, California Public Resources Code 4291 established requirements for vegetation management within 100 feet (inside the property line) of all structures and fire-resistant building codes for new structures built on fire prone lands (California State Legislature 2015).

In terms of outreach programs, Fire Safe Councils (FSC) are an important and long-standing initiative within California. FSC began forming in California in the early 1990s in response to an increasing number of wildfires threatening people and property. Essentially, a FSC is an organized group of community members and agency representatives that work to minimize the wildfire risk of their local area. They can be structured very differently depending on the needs of the group and their project location. Some Fire Safe Councils are very small, consisting of a homeowner's association or subdivision, whereas others can cover an entire city, county, or region. FSC help develop and implement communities' priority projects, such as engaging with locals as part of fire-adapted community education campaigns, creating defensible space and implementing Firewise guidelines, and planning

**SIDEBAR 27.1** TRADITIONAL USE–CASE STUDY

Northern California is home to a number of tribes including the Hoopa, Yurok, and Karuk. Although these tribal groups have a tradition of using fire as a land management tool they have not been allowed to openly practice this tradition for over a century even though many of the tanoak (*Notholithocarpus densiflorus*) woodlands in Northern California are adapted to frequent, low and mixed severity fires. As part of local efforts to reintroduce fire the Orleans/Somes Bar Fire Safe Council formed in 2001 with the mission of increasing community protection and restoring historic fire regimes on National Forest Service land, lands held by the Karuk tribe, and private lands on the middle section of the Klamath River. Karuk knowledge and experience with using fire as a land management tool influenced the work of the council from the very start.

This work led to the creation of a 2012 memorandum of understanding between the Karuk tribe and the Six Rivers National Forest to allow the reestablishment of the world renewal ceremony on Offield Mountain. Part of the ceremony involves rolling burning logs down the mountain to ignite fires, an activity that is both symbolic of renewal and functional as the fire helps grow fresh medicines, food, and weaving fibers. For the past few years, the tribe, in collaboration with the Forest Service and the Orleans/Somes Bar Fire Safe Council, has been doing smaller prescribed burns and fuel treatments to prepare the area for the ceremony. Bill Tripp, the Eco-Cultural Restoration Specialist for the Karuk Tribe, believes that the project can serve as a demonstration site that can show how communities can gain the skills and knowledge to both use fire to restore fire resilient landscapes and suppress fires when necessary to protect communities and resources—all in an area that links current fire management practices with traditional Native American fire use.

fuels treatments and fire breaks on area landscapes. Although FSC can vary in their individual missions, most serve as important links between communities and the local fire agencies, filling a role in which more structured governmental bodies have historically struggled. On a statewide level, the California Fire Safe Council is an incorporated entity that acts as a grant clearinghouse to distribute nearly $3 million (in 2015), to local FSC for Community Wildfire Protection Plans, fuels mitigation, and wildfire education campaigns. In early 2015, there were approximately 145 recognized Fire Safe Councils in California (CFSC 2015).

Besides federal and state programs that support activities to learn to live with fire, there are numerous similar local and regional efforts throughout the country, such as Nevada's Living with Fire program (See sidebar case studies for additional examples, sidebars 27.1–27.3). It is a complex endeavor for a community to become fire adapted, and no single program is likely to be effective for all activities or for all locations (McCaffrey 2015). Instead, a range and variety of programs facilitates development of activities and messaging that is tailored to the conditions and needs of the local context.

## Institutional Structure of Fire Management in California

Finally, an important, albeit often overlooked, consideration in understanding social dynamics is the institutional structure that exists around fire management. In California there are a multiplicity of agencies which have a stake in shaping fire outcomes, each with different missions and goals. This includes state and federal air quality agencies, which can determine the ability to implement a prescribed fire; city and county governments, which generally determine where and how land can be developed; and law enforcement, which is responsible for evacuations during fires. Although too complicated to enumerate the full range of institutional stakeholders in detail, it is illustrative to simply look at organizations with responsibilities for fire response. A number of federal land management agencies have significant fire management responsibilities, including the Forest Service, four agencies within the US Department of Interior (Bureau of Land Management, Fish and Wildlife Service, Bureau of Indian Affairs, and National Park Service), and the Department of Defense. As land management agencies, these entities must work to balance fire safety with ecological fire needs. Of the approximately 42 million ha (104 million ac) in California roughly half is federal land.

In addition to the federal agencies, most states have a fire or forestry agency with state level fire management responsibilities. Although in some states these organizations can be quite small and act primarily in an advisory manner, in California the Department of Forestry and Fire Protection, more commonly referred to as CAL FIRE, plays a significant role in fire management. The agency was established in 1905 as the State Board of Forestry by the California legislature in response to

**SIDEBAR 27.2** NORTHERN CALIFORNIA PRESCRIBED FIRE COUNCIL–CASE STUDY

The Northern California Prescribed Fire Council (NCPFC) was formed in 2009 as a forum for land managers, tribes, researchers, and other stakeholders to work together to protect and expand the use of prescribed fire. Since its inception, the council has focused on community building and shared learning, connecting fire practitioners, scientists, and others around their shared interest in increasing use of prescribed fire. The council has also worked to build burning capacity and support for policy changes that would facilitate the use of fire as a fuel reduction and biodiversity conservation tool. Over the last five years, there has been a gradual but perceptible shift in fire management culture in California, which has been attributed, in part, to the increasingly resonant voices of the council (Quinn-Davidson 2016).

The NCPFC is part of a national network of state and regional councils, collectively called the Coalition of Prescribed Fire Councils. Councils were first established in the southeastern United States. Built on the notion that humans and fire both have a place on the landscape, prescribed fire councils have two defining features: 1) They are grassroot organizations that work to promote a culture of positive, solution-oriented fire management that empowers change from the ground up; 2) Their member base is a diverse group of committed practitioners from a wide range of backgrounds, including state and federal agencies, tribes, research institutions, municipal fire departments, environmental groups, ranchers (Quinn-Davidson 2016).

growing public concern over forest health and available timber supply following several large, destructive forest fires and somewhat uninhibited timber harvesting and land clearing practices by homesteaders. The position of State Forester was also created at this time (Thornton 2012). The State Forester and a few office employees based in Sacramento made up the new forestry "department." To assist in fire patrols and emergencies across California, the State Forester was later granted the right to appoint local fire wardens who were initially funded by the counties in which they were located. In 1919, the state began hiring rangers and since then the agency has increased in size and responsibility. In 2014, CAL FIRE employed roughly 4,300 full-time and 2,400 seasonal employees with an annual budget of $1.4 billion (CAL FIRE 2014). With a formal mission to serve and safeguard the people and protect the property and resources of California the organization mainly focuses on fire response, but also manages programs in resource management, environmental restoration, communications, and fire and resource assessment. Through the Office of the State Fire Marshal, they also work on fire prevention and engineering, education, and code enforcement (CAL FIRE 2015b). Through these various programs the agency works with landowners and communities to foster fuels and fire management, environmental restoration, and community preparedness.

In California, primary fire responsibility is divided into three general classifications: Federal Responsibility Areas (FRA), State Responsibility Areas (SRA) and Local Responsibility Areas (LRA). Each federal land management agency has administrative and fire response responsibilities for land under its management. Although all five of the federal land management agencies have fire response obligations, in California the Forest Service and BLM are responsible for the majority of wildland fire protection on FRA lands, an area of around 15 million ha (Artley 2009). Specific local authorities have responsibility for LRA lands which are generally incorporated areas (or lands not classified as either SRA or FRA) (USDA, USDOI, and State of California 2007). Finally, CAL FIRE is primarily responsible for providing fire protection for the SRA. These lands are defined by population density, land use, and land ownership and do not include densely populated areas, incorporated cities, federal government, and agricultural lands. SRA designation is reviewed by the State Board of Forestry every five years and in 2012 consisted of over 12.6 million hectares (FRAP 2012). CAL FIRE provides direct protection and emergency services on nearly 9.6 million hectares of that total and shares the responsibility with other local, state, and federal government agencies on the remainder (FRAP 2012). Additionally, county fire departments provide fire protection on 1.4 million hectares of State Responsibility Area in six "Contract Counties:" Kern, Los Angeles, Marin, Orange, Santa Barbara, and Ventura (CAL FIRE 2012). Conversely, CAL FIRE has agreements to provide some type of emergency services on LRA lands for 150 cities, counties, and districts (CAL FIRE 2014).

Finally, at the local level there are roughly 835 individual county, municipal, and volunteer fire departments in California (USFA 2015). Of these, approximately 29% are volunteer fire departments, 25% are composed entirely of career firefighters, and the remaining departments have a mix of

**SIDEBAR 27.3** MOUNTAIN AREA SAFETY TASKFORCE–CASE STUDY

In the aftermath of a nearby wildland fire, the Mountain Area Safety Taskforce (MAST) of San Bernardino and Riverside Counties was formed in 2002 to address potential public safety issues exacerbated by a multiyear drought and a bark beetle infestation that heightened wildfire risk. As the mountain communities above San Bernardino have only three main egress routes, there were significant concerns over the ability to evacuate tens of thousands of residents and visitors during a wildfire while still allowing access by firefighting crews (Newcombe Sr. 2015). San Bernardino County Fire worked with local residents, Firesafe Councils, volunteer organizations, and representatives of a diverse group of agencies and organizations (including the Forest Service, the Natural Resources Conservation Service, CALFIRE, Caltrans, and Southern California Edison) to identify ways to create a safer environment in the San Bernardino Mountains and surrounding communities (Martinez 2015).

MAST developed an extensive outreach campaign that initially focused on raising awareness of the drought-related bark beetle infestation and facilitating the removal of diseased, dying, and dead trees from private and public lands (MAST 2013). Other activities included developing:

- Emergency response and evacuation plans for residents and area visitors.
- A comprehensive local hazard guide and map book for incoming wildland fire resources and management teams.
- Defensible space guidance for homeowners.
- Educational materials describing contributions of fire to healthy forests.
- Disposal methods for removed trees.

Due in part to its massive outreach campaign, MAST was successful in relaying its message to both area residents and visitors. They were directly credited for the effectiveness in evacuating 20,000 to 30,000 people during the 2003 Old Fire (Wilson-Goure et al. 2006). During the 2007 Grass Valley Fire, law enforcement personnel relied heavily on the evacuation and access plans developed as a result of MAST's efforts. They were prepared to utilize area school buses to evacuate attendees of summer camps and mobilize local resources from a prepared list for livestock transport (Newcombe Sr. 2015). Fuels treatments and tree removal along evacuation routes facilitated safe evacuation for thousands of residents. By 2008, over 1.5 million dead or diseased trees were removed from the project scope, over half of which came from private lands (MAST 2013).

The San Bernardino and Riverside County MAST coalition has provided an example of effective collaboration for a number of emergency planning groups including the Forest Area Safety Taskforce (FAST) which was created in 2003 in San Diego County (Martinez 2015). MAST continues to operate, albeit with less funding and to some degree coordination. However, their original work is still supported by many of the local Fire Safe Councils and other involved individuals, agencies and organizations in and along the San Bernardino Mountains.

volunteer and career staff. In general, municipal fire departments are responsible for specific incorporated areas and are staffed with paid full-time firefighters. Volunteer fire departments tend to operate in rural areas and can be supported by a range of resources including local tax assessment, grants, and donations.

Each of the organizations listed above is an independent entity. While, over time, a generally efficient and effective coordinated response for fighting wildfires has developed between the organizations, such coordination before and after fires is more limited, in part because organizations often have different institutional mandates. For example, although agencies with a land management focus may want to use fire on occasion to meet ecological goals, emergency response agencies that focus on human and property safety may see little value or have no authority to engage in such activities. Ultimately, this large number of independent organizations creates a number of challenges for changing fire management outcomes including: developing and implementing any policy change, mitigating risk across land ownership, developing a consistent message, and potential displacement of risk or responsibility. In response to these challenges, a few interagency efforts—for example, the California Wildfire Coordinating Group, the Southern California Association of Forestry and Fire Wardens, and the California-Nevada-Hawaii Forest Fire Council—have developed to try to coordinate the fire

management effort. Even so, a disparity still remains in fire management between traditional fire suppression organizations and resource managers.

## Conclusion

As wildfires have increasing social impacts, understanding social processes that affect management choices will be as important as understanding the ecological processes associated with fire. The significant loss of life and homes in the 2017 northern and southern California fires further reinforces the importance of better understanding the full range of social dynamics around wildfires in California. A first step is recognizing that a range of human values underlie any land or fire management decision. Nature is quite comfortable with change (e.g., evolution); it is humans that keep trying to restore or maintain ecosystems in a specific state. This chapter provides an initial step in understanding the complexity of social dynamics and range of issues that may need to be considered to restore fire dependent ecosystems and improve future fire management outcomes. Although at one point land management agencies could act as the dominant players in wildland fire management with little conflict, this is no longer the case. Wildfire management is no longer an activity that can be handled solely by land management agencies. The values and needs of all effected stakeholders will need to be taken into account in order to develop ways where we can live with fire in a manner that allows beneficial ecological processes to occur while minimizing undesired outcomes. Traditional narratives that reflect an essentially dichotomous "management versus public" view may no longer be an appropriate one for wildfire management as few of the narratives about the public that underlie the dichotomy hold up when examined empirically. Instead, thinking about fire management from a partnership and collaborative perspective may be more productive. And, in fact, research findings suggest that this is often the way many stakeholders already approach wildfire management. Taking the plurality of views and values into account in fire and land management will be critical for moving forward and developing new and durable approaches and solutions to current and future fire challenges.

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