Chapter 4.2—Fire and Tribal Cultural Resources

Frank K. Lake[1] and Jonathan W. Long[2]

Summary

Native American tribes regard plants that have evolved with frequent fire and other natural resources as living cultural resources that provide, water, food, medicines, and other material goods while also sustaining tribal cultural traditions. Collaborations between management agencies and tribes and other Native American groups can incorporate traditional ecological knowledge to facilitate placed-based understanding of how fire and various management practices affect tribal cultural resources and values. Collaboration approaches reviewed in this chapter and in chapter 9.6, "Collaboration in National Forest Management," can foster restoration opportunities that would benefit tribal communities and broader values. A strategy to promote socioecological resilience may include efforts to reestablish frequent fire regimes by emulating traditional burning practices, and to learn how larger high-severity fires may affect cultural resources and associated values.

Introduction

This chapter reflects several of the broader themes featured in this synthesis. First, it reinforces the perspective that humans are and have long been integral parts of ecosystems in the synthesis area (Stevens 2005). Therefore, to the extent restoration depends on reestablishing, at an appropriate scale, the disturbance regimes that have shaped ecosystems, it is important to consider opportunities to reestablish or emulate Native American forest practices, such as harvesting and burning (fig. 1). Second, this chapter emphasizes the importance of considering system dynamics at a range of scales, from individual organisms to large landscapes. Research has focused on small-scale effects of tribal land management and traditional burning practices, such as how individual plants, patches, or sites respond, but the effects of tribal practices on larger vegetation communities and landscapes constitutes an important subject for further research (Anderson 2006b). Lastly, this chapter recognizes that efforts to promote socioecological resilience would be incomplete if they did not consider how the widespread lack of fire in the synthesis area impacts contemporary uses of forest resources by Native Americans.

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[1] Research ecologist, U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, 3644 Avtech Parkway, Redding, CA 96002.

[2] Research ecologist, U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, 1731 Research Park Dr., Davis, CA 95618.

Belinda Aldern

Figure 1—Ron Goode of the North Fork Mono Tribe directs a burning treatment for a patch of sourberry plants (*Rhus trilobata*).

Many Native Americans[3] have a broad conception of cultural resources, which includes artifacts, structures, heritage sites, biophysical resources, and intangible resources (Welch 2012). Both wildfire and prescribed fire can affect cultural resources directly and indirectly (see fig. 2), with frequency, seasonality, extent, and severity of fires influencing those effects. Efforts to manage wildfires can also have lasting and detrimental effects on cultural resources through line construction, firing operations, and other suppression, mop-up, or postfire rehabilitation activities (Ryan et al. 2012). Emphasizing the idea that critical resources have natural, economic, and cultural dimensions (see section 9 preface, "Social/Economic/Cultural Components"), this chapter focuses on relationships between fire and tribal cultural resources, especially for living resources such as plants, fungi, and animals, which have been actively managed to sustain them in their desired quantity and quality. Plants have been a particularly important focus of research on fire effects on cultural resources.

[3] Where this chapter focuses on cultural resources within the synthesis area, it refers to Native Americans. The term tribe is emphasized when discussing management strategies that are likely to be implemented through consultations, collaborations, or other interactions on a government-to-government basis. Those relationships, along with approaches to working with tribal traditional ecological knowledge, are considered in chapter 9.6, "Collaboration in National Forest Management."

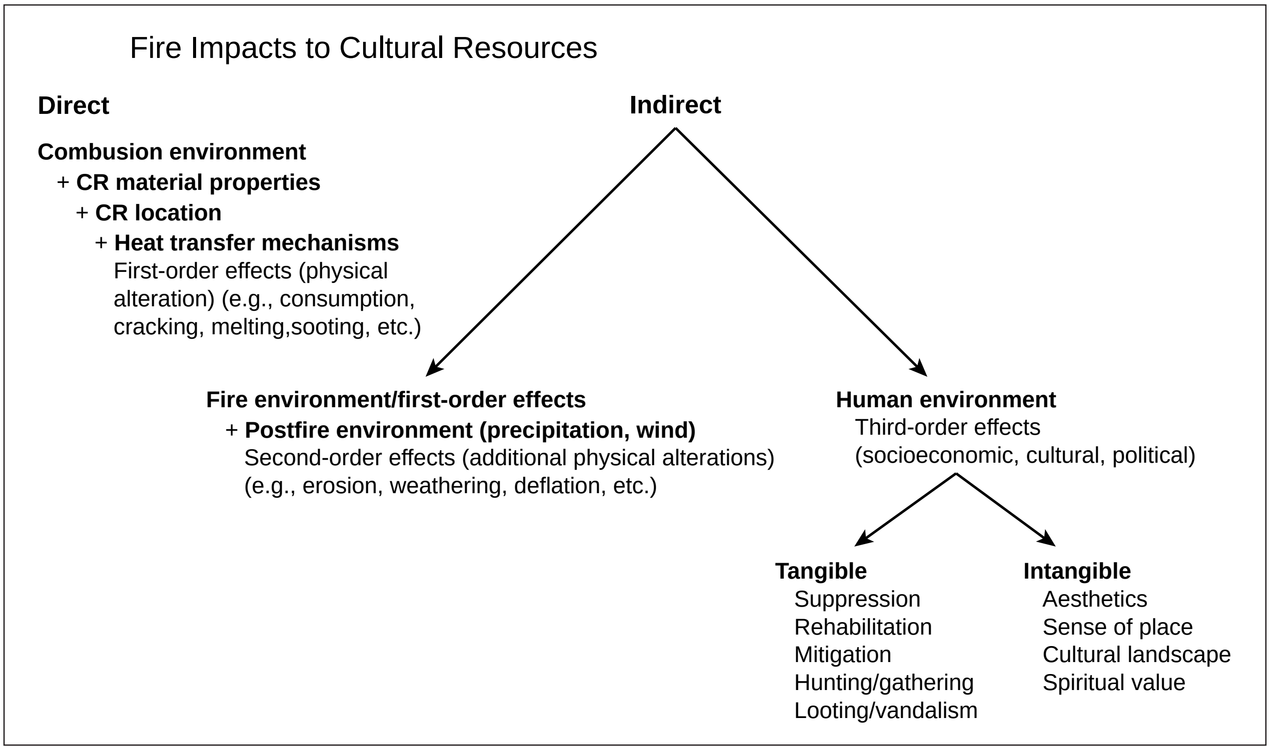

Figure 2—Direct and indirect fire effects on environment, cultural resources, and tribal values (Ryan et al. 2012: 12).

Burning to Promote Tribal Cultural Values and Ecological Restoration

Reestablishing traditional burning practices aligns well with ecological restoration goals, given that many culturally valued fungi and plants produce berries, nuts, roots, and stems that support wildlife and provide other ecological services (Anderson 2006a, Anderson and Barbour 2003). Restoration efforts that support traditional tribal practices and subsistence activities can also promote other social and cultural values, such as native language, place names and maps, ceremonies, and other elements of cultural capital that perpetuate and maintain Native American traditions and associated ecosystems (Jordan and Shennan 2003, Long et al. 2003).

Understanding how Native American harvesting activities relate to ecological conditions at different scales may help forest managers promote valued cultural resources and broader restoration objectives. Native American practitioners today, as in the past, adapt and respond to areas of the landscape affected by fires to acquire resources of value (Anderson and Moratto 1996). Practitioners such as basketweavers harvest individual plants or patches at a variety of locations in a landscape (Anderson 1996, 2006a). Securing enough resources for a tribal family requires access to different populations of target organisms distributed across diverse ecological communities. Consequently, narrow-scale treatments that enhance a few patches may only serve a small number of basketweavers (Anderson 1996, 1999). Tribal communities rely on access to a variety of ecological communities across a diverse landscape to maintain different cultural traditions, including ceremonies, basket making, hunting, and food gathering (fig. 3). Using fire to promote cultural resources in different ecological communities at a larger landscape scale could enhance resource quality, diversity, and access for multiple tribal groups, given that many Sierra Nevada tribes have similar or related cultural, language, basketry, and subsistence traditions (Anderson 2006a, Jordan and Shennan 2003).

Effects of Fire on Culturally Valued Plant Resources

A lack of fire or undesirable applications of fire (including, but not limited to, uncharacteristically severe wildfire) can pose a threat to the sustainable production of these plants in the quantity and quality desired by Native Americans to sustain traditional lifeways and livelihoods.

Many plant species that are used by Native Americans depend on fire both for persistence and for maintenance of desired growth forms and quality. In the absence of fire, many of these species will decline in abundance or mature to a condition in which the plant material is not suitable for traditional cultural uses. Examples of these fire-associated plants valued highly by Native Americans and tribes are various shrubs, herbs, and graminoids used for basketry and cordage, including willows (*Salix* L. sp.), Indian hemp (*Apocynum* L.), milkweed (*Asclepias* L.), skunkbush sumac (*Rhus trilobata* Nutt.), sedges (*Carex* L.), deergrass (*Muhlenbergia rigens* (Benth.) Hitchc.), California redbud (*Cercis orbiculata* Greene), Pacific dogwood (*Cornus nuttallii* Audubon ex Torr. & A. Gray), and beargrass (*Xerophyllum tenax* (Pursh) Nutt.); nut-producing trees, such as California black oak (*Quercus kelloggii* Newberry) and beaked hazelnut (*Corylus cornuta* Marshall); berry-producing shrubs and herbs, such as elderberry (*Sambucus* L.), woodland strawberry (*Fragaria vesca* L.), and blueberry (*Vaccinium* L.); edible geophytes, including snake lily (*Dichelostemma* Kunth), mariposa lily (*Calochortus* Pursh), and camas (*Camassia* Lindl.); and plants for medicinal or ceremonial uses, such as wild tobacco (*Nicotiana* L.), among many others (Anderson 1994, 1999, 2006a). A lack of fire or undesirable applications of fire (including, but not limited to, uncharacteristically severe wildfire) can pose a threat to the sustainable production of these plants in the quantity and quality desired by Native Americans to sustain traditional lifeways and livelihoods. Three species that are culturally important and may have broader ecological significance are discussed below.

Beargrass—

Beargrass is an important plant in the understory of conifer forests, where it has declined in abundance in part because of fire exclusion (Charnley and Hummel 2011, Shebitz et al. 2009). Across its range, beargrass provides food and habitat for several animals and pollinating insects, especially flies, beetles, and bees (Charnley

Frank Lake

Figure 3—Black oak acorn mush, a traditional food prepared by Lois Conner Bohna in a basket made by her grandmother, Lilly Harris, circa 1920 from roots of Santa Barbara sedge (*Carex barbarae* Dewey) and bracken fern (*Pteridium aquilinum* (L.) Kuhn) and stems of redbud and deer grass.

and Hummel 2011, Hummel et al. 2012). A fire return interval of less than 20 years may be necessary to limit encroachment and maintain desired reproduction and growth of beargrass, as well as other valued resources associated with relatively open understories (Shebitz et al. 2008). Consequently, efforts to replicate traditional burning may be necessary to maintain these communities in a state similar to their historical condition (Hummel et al. 2012).

California black oak—

California black oak is another example of a Sierra Nevada culturally significant species that depends on forest fire. Archaeological and ethnographic evidence indicate that black oak was historically one of the most important tribal food resources, and it remains an important species of concern to Native Americans in the Sierra Nevada (Anderson 2007, Haney 1992, Morgan 2008). The trees provide acorns for a variety of wildlife and valuable habitat for fisher and spotted owls (North 2012). Therefore, the tangible and intangible values of these traditional use sites connect past tribal use to contemporary cultural and ecological values, and they reveal the importance of promoting recovery and resilience of black oak in Sierra Nevada mixed-conifer forests. This species has several adaptive traits to survive repeated fires; in the absence of fire, conifers encroach, compete with the oaks for resources, reduce the crown openings needed for robust mast production, and increase fuel loads (Cocking et al. 2012). Mature black oak trees are susceptible to topkill by fire, although they generally resprout from the root collar (Cocking et al. 2012, Stephens and Finney 2002). Treatments focused solely on reducing fire hazard may not result in retention or recruitment of California black oak (Moghaddas et al. 2008). Consequently, management to promote resilience of black oak in the long term while mitigating short-term losses of mature trees is an important challenge when designing treatments to promote socioecological values.

Bearclover—

Another plant that demonstrates complex interactions in managing fire for ecocultural restoration is bearclover, also known as mountain misery (*Chamaebatia foliolosa* Benth.). Bearclover is a low-stature shrub found in large areas of the Sierra Nevada, and it is commonly associated with black oak. Bearclover is a traditional medicine for Native Americans, provides for honey bees and native wildlife, fixes nitrogen, competes strongly with conifer seedlings, and provides highly flammable fuels to carry fires (McDonald et al. 2004). Black oak sites favored by Native Americans for gathering acorns do not have bearclover under the trees (Anderson 2006a). Treatments intended to reduce bearclover have promoted increases in grasses, including, where introduced, highly invasive cheatgrass (McDonald et al. 2004). Because bearclover is well adapted to burning and can be widespread, it is likely to have had an important role in maintaining fire regimes and affecting other forest understory species.

Landscape-Scale Effects of Burning Practices

Traditional burning practices served as a disturbance that not only maintained desired growth forms of individual plants, but also promoted desired plant communities across broader scales (Anderson 2006b). Though there has been debate about the extent of burning carried out by Native Americans in different regions (Keeley 2002), a comprehensive review suggests that the extent was large across various habitat types (Stephens et al. 2007). Davis et al. (1996) note that the frequency of fire necessary to perpetuate specific resources in conditions needed by Native Americans in the Sierra Nevada would have required extensive and intensive burning in important vegetation types. A primary mechanism by which fire contributes to the maintenance of culturally important plant species is by limiting the encroachment of trees and shrubs in meadow and woodland habitats (Anderson and Barbour 2003, Turner et al. 2011). Tribal land management practices served to maintain valued habitats and species diversity across landscapes, from riverine riparian areas to oak and mixed-conifer forests to montane meadows (Anderson 1994). Traditional burning practices occurred at different frequencies and during different seasons, with ignition strategies that varied according to the goals of fire use (Anderson 1999). These practices fostered a mosaic of vegetation types in different stages across landscapes, which promoted food security (Charnley et al. 2008, Kimmerer and Lake 2001). Reintroducing traditional burning management practices would help increase heterogeneity in fuel conditions and reinstate finer grained landscape patterns where burning by Native Americans was important in the past and is of value today (Anderson 1994, Anderson and Barbour 2003, Miller and Urban 2000).

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Ecological Issues in Reestablishing Frequent Fire

Plans to restore frequent fire as an ecological process must consider various effects and interactions, especially generation of smoke. Prehistoric Native American burning practices are thought to have been significant contributors of smoke and carbon emissions in the Sierra Nevada (Anderson 1994, Stephens et al. 2007). However, these emissions should not necessarily be seen only as a pollutant, because smoke in appropriate seasons can provide ecological benefits, such as control of insect pests and enhanced germination of various plants, including beargrass (Shebitz and James 2010) and tobacco (Preston and Baldwin 1999). For plant germination, there are potential substitutes for natural smoke that may help compensate for fire deficits (Landis 2000, Shebitz and James 2010). However, smoke may provide other benefits that are not substitutable; for example, smoke from extensive fires has been hypothesized to be important in moderating water temperatures by diffusing direct solar radiation, which could in turn benefit cold water fisheries (Mahlum et al. 2011).

Additionally, smoke particles can have physiological effects on plants that could have wider implications for ecosystem function (Calder et al. 2010).

Proposals to reintroduce frequent burning may generate other ecological concerns. Where nonnative species are widespread, burning has potential to negatively affect native biodiversity, including culturally valued species (Brooks et al. 2004). For example, a study in Kings Canyon National Park cautioned that frequent burning in areas that have been invaded by cheatgrass might facilitate spread of the invasive grass (Keeley and McGinnis 2007). Further study would help to understand how season of burning influences these effects (Knapp et al. 2009). Ethnographic reports indicate that tribal burning occurred at various seasons and may have differed from the natural lightning ignition season (Anderson 2006a). In addition, effects of fire frequency are an important subject for research. Chapter 5.1, “Soils,” discusses the potential for frequent prescribed burning to deplete soil nitrogen in certain circumstances. However, at present, many locations targeted for cultural use burns are relatively nutrient-rich, have an abundance of nitrogen-fixing plants, and occur in areas along the western slope of the Sierra Nevada region, where nitrogen deposition rates tend to be elevated (see chapter 8.1, “Air Quality”). Currently, the areas treated with prescribed fire for tribal cultural purposes are so limited that concerns about nitrogen loss at the local to regional scale appear minimal. For those reasons, burning to emulate traditional burning is not likely to pose a risk of depleting nitrogen or adversely affect forest productivity.

Collaborations to Promote Traditional Burning and Cultural Resources

Productive, collaborative relationships between federal forest managers and tribal governments, communities, individuals (where appropriate), and organizations (e.g., the California Indian Basketweavers Association) can help to prioritize forest treatments and promote alignment with tribal concerns. Collaboration, consultation, and other forms of engagement with local tribal governments and Native American communities help to incorporate tribal traditional ecological knowledge in research and forest management and to respect tribal needs and traditions regarding access and caretaking (see chapter 9.6). Several examples of collaborations are shown in box 4.2-1.

These types of collaborations will assist forest managers in understanding which habitats, specific plants, or other valued resources can be perpetuated to serve tribal needs (Anderson and Barbour 2003). Each resource of interest (e.g., basketry material or food-producing plants) may have a favored season, frequency,

Box 4.2-1

Examples of National Forest–Tribal Collaborations

- Deergrass has been a subject of collaborative work by the Sierra National Forest and Mono tribes (Anderson 1994, 1999, 2006a).
- As part of the proposed Sage Steppe/Dry-Forest Restoration Project, the Modoc National Forest worked with Cultural Advocates for Native Youth, an organization based in the Cedarville Indian Rancheria, to restore native tobacco plants at burn piles.
- Beargrass restoration has been a subject of collaborative restoration on the Plumas and Lassen National Forests involving Maidu tribes (Charnley et al. 2008), as well as studies on the Olympic National Forest involving the Quinault and Skokomish tribes (Shebitz et al. 2009).
- The Klamath and Six Rivers National Forests entered into an agreement with the Karuk tribe to manage the Katimiin Cultural Management Area, identified in the Klamath National Forest Land and Resource Management Plan, to allow for specific cultural management activities, including reintroduction of fire onto the landscape. The Karuk hold the culmination of their Pikyawish (world renewal) ceremonies in this area near Somes Bar, California. The Karuk, prior to government fire-suppression policies and efforts, used to ceremonially burn the mountain above Katimiin, a historical village site. This cooperative agreement between the Forest Service and the Karuk tribe may serve as a model for other federally recognized tribes in California.

or intensity of burning, and prescriptions may reflect a multitude of objectives for burning (Anderson 1999, 2006a). This information can assist restoration efforts that promote enhancement of cultural resources and address tribal values, and it can promote landscape resilience to climate change and detrimental wildfires. Landscape-scale modeling approaches (see chapter 1.2, "Integrative Approaches: Promoting Socioecological Resilience") could incorporate Native American values and traditional burning strategies. Riparian and meadow restoration activities in particular may provide important opportunities to promote habitat for culturally important species (see chapter 6.3, "Wet Meadows").

Research Gaps

Traditional burning regimes may have been an important factor in maintaining larger vegetation communities, such as open mixed-conifer forests with sugar pine, montane mixed-conifer forests with beargrass understory, montane meadows, and other relatively open riparian types. Evaluating the ecological outcomes of fuels and fire treatments that reinstate or emulate traditional burning practices in different habitats, as suggested in the Sierra Nevada Ecosystem Project report by Anderson and Moratto (1996), remains a potentially valuable avenue for research (Charnley et al. 2007). A useful way to examine potential effects of tribal burning practices is to consider a range of ecologically relevant scales (e.g., organism, population, community, and landscape), and the implications of burning on food webs, including animals of ecological and cultural significance (Anderson 1997). In addition, the historical and current responses of desired forest resources to fires of different size, season, and severity are an important research gap, especially given the potential for larger high-severity burn patches in the future (see chapter 1.2).

Management Implications

- Integrating cultural values into design of landscape-scale treatment strategies could increase access to tribally valued resources for food, materials, medicine, and ceremonial uses.
- Reintroducing traditional Native American burning practices at appropriate locations within the synthesis area may yield important social and ecological benefits, including landscape heterogeneity. Research is needed to understand how factors such as season, frequency, and scale of burns (considering traditional burns, other kinds of prescribed burns, and wildfires) influence fire effects on social and ecological values.
- Collaborations and consultations with tribes and Native American groups can promote opportunities to learn about these fire effects and incorporate them into forest management practices and applied restoration efforts.

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