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## Effects of Wildland Fire on Cultural Resources

Wildland fire on our public lands can be a double-edged sword with respect to the historic cultural resources we try to protect. Recent fires in Mesa Verde National Park have illustrated the complicated role that raging fires can play. In 1996, a 1,000-year-old petroglyph was irreparably damaged by the heat of wildfire. The apparently indelible images in the sandstone can be exfoliated away under sustained intense heat. However, just four years later, another massive wildland fire revealed more than a dozen previously undiscovered sites as it stripped the blanket of vegetation that had concealed them for hundreds of years. As we move into a new era of ecosystem management, we are increasingly appreciating the role humans play in those ecosystems. Correspondingly, we are working to protect the physical manifestations of that role, both past and present, which are embedded in the landscape we manage.

People and their cultures are a natural part of our ecosystems. We have a rich history of interaction with the land and each other. The evidence of our cultures, past and present, can be found throughout our forests, prairies, and deserts. Whether a stone tool from a native prehistoric community or a long-abandoned cabin from an early European or African American settler, over time cultural artifacts become incorporated into the landscape. Therefore, when managing the land it is impossible to ignore the cultural resources contained therein.

Fire, too, is a natural part of Earth's ecosystems. Almost every landscape has a history of fire activity, some more active than others. An ecosystem's fire history is contained within its landscape—in tree scars, soil layers, or charcoal seams within the ground. Some fires occurred prehistorically as the result of lightning strikes, but even ancient cultures manipulated the plant and animal life around them through the use of fire. Managing the land, its cultural resources, and the behavior of fire within the natural systems become inseparable as we strive to protect both our natural and cultural heritage.

Research conducted in southern California indicated that U.S. Forest Service employees have had very limited contact with cultural resources and their management; however, they have favorable opinions regarding cultural resources (Conner et al. in Ewert et al., 1993). As we move into a more cooperative era of fire, land, and cultural resource management, we can build on these positive opinions. By communicating both strategies for protection, as well as an understanding of their historical importance, cultural resources may be better protected during all phases of management, including fire. But who needs to know this information? Managers and planners certainly can benefit from an understanding of protection strategies for archeological sites or other cultural resources under their jurisdiction, but additional attention must be paid to the information needs of frontline firefighters, the public, educators, and the media. With ecosystem management increasingly accounting for the human dimensions in all aspects of land management, community support for (and understanding of) management practices is even more important (Eisenhauer, 2000).

### Protected Cultural Resources

The diverse cultural resources of any area can include artifacts, structures, and traditionally significant gathering places from both prehistoric and historic eras. Memorials built to commemorate historic events, the crumbling foundations of pioneer homes, and tools from the earliest occupants of an area are all examples of significant cultural resources that help us decipher the human history of a landscape. Sites considered sacred or used for

ceremonial purposes by people of today are also significant cultural resources. Areas in which medicinal plants are collected, clays are dug, mounds and other earthworks are found, and traditional gathering places are valued by various groups of people as a link to their cultural history. The contribution of such sites to the recreational economy of some areas is significant as well. Often the direct costs of damage to sites of historical and cultural interest are difficult to assess. Damage to re-created villages, scenic overlooks, and historic battlegrounds can severely impact an area that depends on tourism to sustain its economy.

In addition to their value for popular and historical interest, natural and cultural resources are valued and prioritized by federal policy to be protected during wildland fire management (U.S. Depts. of the Interior and Agriculture, 1995). Cultural resources on federally managed lands are protected by law (for a list of related federal laws, see Pyne, *Introduction to Wildfire*, 1996, p. 337). Often the resources to be protected are well-known, traditional sites whose preservation is part of an official mandate by a management agency. However, we can only guess at the number of cultural resources that remain undiscovered or at least unrecorded. Understanding the potential impact of wildland fire on cultural resources is imperative to a comprehensive management plan.

## Damage to Cultural Resources

The damage to cultural resources during a wildland fire can occur both from the fire itself and from the actions of those fighting or managing the fire. During the early years of firefighting on public lands, fighters, unaware of laws banning the removal of artifacts, 'looted' archeologically significant sites during the suppression activities. Much has been done to prevent such misunderstandings from reoccurring; but less obvious effects of fire and firefighting remain to be fully understood.

Effects of fire itself vary tremendously depending on the intensity of the fire, its duration, and the depth of the heat's penetration into the soil. A fire's intensity, the measure of the severity of a fire, is often expressed for archeological purposes as either low, moderate, or heavy (Lentz et al., 1996). Some ecosystems' fire regimes indicate much hotter fires (standing grass on a prairie, for instance). Others, like those whose winds blow up steep hills, allow more quickly moving fires. Knowing the fire regime of the ecosystem you are managing—the vegetation, climate, and terrain—is key to understanding the behavior of fire. Add to this an understanding of the fire suppression activities in the area, including physical impacts from both fire and the firefighters, and a clearer picture develops of the potential for damage to cultural resources from wildland fire.

Fires in any system will burn longer and hotter if there is an abundant accumulation of dry fuel, or duff, on the ground. When fire has been prevented over a long period of time, often the duff layer is too thick for any hope of a cool, low-impact burn. The below-ground heating will depend on factors such as soil moisture, soil type and coarseness, weather conditions, the accumulation of duff, organic litter, or fuel above ground. Understanding the local fire regime and pairing that knowledge with an understanding of the types of cultural resources your site may contain is the first step in ensuring that your fire management practices help to preserve all aspects of the site. This type of informed planning often requires communication across local agencies and among various divisions within those agencies—the park historian or archeologist should be able to lend his or her expertise to the land management department and vice versa.

Many times protection efforts are confounded by the mixed goal of trying to preserve cultural resources no longer within their original cultural fire context. The area that no longer has the same cultural fire practices that shaped the early environment can be vastly different from the historical landscape. A ceremonial area, significant in part due to its proximity to ritually used plants, may have existed only as a result of early burning by Native Americans. In this case, burning can actually serve to preserve a cultural resource.

Firefighting can cause severe damage, not only to the artifacts on a site, but to the context of those artifacts as well. From an archeological standpoint, removing or damaging an artifact's setting in space, its context, can be even more detrimental than the damage from the fire itself. Why? Because artifacts lose their meaning when removed from the clues that place them within a historical context. A projectile point is interesting, but that same stone point found near the bones of a deer indicates much more about the cultural and natural setting of the artifact. Therefore, it is important that those on the front lines of fire suppression and prescriptive burning understand the consequences of using heavy equipment such as bulldozers to construct firelines. Attention must be paid also to post-fire mop-up and rehabilitation, and the potential corrosive properties of retardants. Simply knowing where culturally sensitive areas lie within our wildlands and which practices can damage those areas will help to minimize damage on the part of firefighters.

A primary factor in potential damage to a cultural resource is its location. In some instances, artifacts are strewn about on the ground. Many are buried below the surface, and some are large, above ground constructions or buildings. Artifacts on the surface are most vulnerable and those progressively deeper below ground are less prone to damage. Much as the underground seeds, roots, rhizomes, and bulbs of many plants are protected during a fire, so too can archeological remains survive a cool burning surface fire. Temperatures over 300°C can be damaging to many inorganic materials—ceramics, having already been through a firing process, are not critically effected until temperatures reach 600°C. (More information on temperature thresholds of specific materials can be found in the National Wildfire Coordinating Group's *Fire Effects Guide*, 1994.) In addition to causing deterioration of the materials such as cracking, chipping, and charring, heat can obliterate objects created from wood or plant material. Other culturally significant information in the form of pollen grains used to assess diet and environmental conditions of the past can be destroyed, and dating techniques can be rendered inaccurate when heat damages some artifacts.

## What to Consider

Ultimately, all of these factors bring us to the need for planning. No plan is foolproof against fires which are born of a combination of extreme weather, multiple ignition points, and exceptional fire behavior. We must remember that fire is not simply a tool for the management of resources, but an active part of the systems we want to protect. Managers must work with fire in mind and anticipate the needs of the areas they maintain. Key to an effective land/fire/cultural resource management plan is the proactive definition of protection priorities. When, as standards have dictated in the past, private or public property is the focus of protection, some cultural and natural resources may be neglected. However, the value of both natural and cultural resources can be a complicated calculation, with many considerations. Managers must be allowed the flexibility to balance the protection of low-value real estate and highly valued natural and cultural resources when necessary. These decisions can be controversial and are best made before a crisis emerges.

Prescribed burning, in which fires typically remain below 500°C and have a residence time of half an hour or less, is likely to do very little damage to archeological artifacts and resources at even shallow depths (Pyne, 1996). Important above ground structures must be protected from fire and may require alternatives to burning in surrounding areas. Coordinating knowledge of prescribed burning techniques, fire suppression practices, and archeological research can produce a proactive approach to natural and cultural resource protection.

## Planning for Protection

Prior to any tactical decisions, managers will want to assess the conditions for burning within the specific ecosystem context in order to determine if a cool burn is possible. Just as this inventory of ecological conditions is important, so too is a cataloging of the resources for protection within a management area. The technology of geographic information systems can greatly contribute to mapping the natural and cultural resources of an area, and there is potential for using geographical positioning systems in the field to assist firefighters in avoiding culturally sensitive areas. A thorough understanding of the laws surrounding burning and resource protection should be gained as well. Alternatives to the traditional approaches to burning may be considered. Manual fuel reduction may be needed in cases of extreme fuel load or near buildings in burn areas. The use of foams during suppression may also be a viable alternative to more damaging retardants. The professional removal of valuable artifacts prior to an intentional burn may be warranted when the conditions indicate a heavy fire intensity is likely. Lastly, it is equally important to perform post-burn inventories of cultural resources.

The impacts of fire on cultural resources are not fully understood, and it is often difficult to determine if an artifact was significantly more affected by current fire practices than by the fires of the historical regime. We do know that fire does not enhance the condition of archeological material, and heavy fuel load, even on a localized scale, is a primary factor in increasing the amount of damage to artifacts. Our ability to protect cultural resources during fire events is greatly dependent upon knowing where culturally valuable sites are located.

In order for a fire crew to adequately protect these areas from fire and firefighting, they must understand fully the location and relative sensitivity of the resources. Internal communications and the proactive planning described above are central to effectively protecting our cultural resources. Archeologists can benefit from an understanding of firefighting, and frontline fire crews should be educated about cultural resource protection. Without such communication among disciplines and agencies, our cultural heritage will continue to fall victim to wildland fires and, in some cases, prescribed fire.

The recent fire in Mesa Verde National Park is an example of the coordination needed in firefighting in order to minimize the damage to artifacts by modern fires. Burning through an area of great archeological significance, the Bircher fire was fought on the frontline by both firefighters and archeologists. As the flames continued to spread uncontained, both groups toiled alongside each other in a joint effort to save the natural and cultural resources of the past and the future. The fire crews hiked into the canyons and mesas, aided by archeologists who pointed out ancient ruins that needed special protection. As the fire continued to expose new sites in its deforested wake, archeologists helped firefighters identify these sites and marked them with color-coded flags. Where possible, frontline fire crews were able to construct the fire line around the marked sites and protect them (CNN, 2000). It is this kind of interdisciplinary teamwork that has been born out of a new understanding and appreciation for the significance and delicacy of our nation's cultural resources.

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