PRESERVATION MATTERS: DISASTERS CULTURAL RESOURCES AND WILDLAND FIRE

Topics covered in this brief:

CULTURAL RESOURCES IMPACTS OF FIRE COMMON SCENARIOS



National Center for Preservation Technology and Training www.nps.gov/ncptt Wildland fires occur in grasslands, forests, desert regions, and the interface with urban areas and can result from natural or human causes. Beyond the impacts to human life and property and natural resources, wildland fires damage cultural resources both directly and from the human actions taken in response to wildland fire. Cultural resources involved in wildland fires maintain legal protections and processes that are put in place to ensure their preservation for generations to come.

To better care for the many cultural resources found where wildland fire occurs, we must understand the factors in this relationship. This document provides a summarized introduction into the topic of how wildland fires affect cultural resources directly, indirectly, and operationally.

Cultural resource is a broad term used to describe something that has significance and cultural value to a community. While natural resources have economic value, cultural resources have social value because communities use them to form their identities today. Cultural resources are inherently valuable to diverse groups of people who have a living connection to the places, people, and events of the past. There are four categories of cultural resources: archeological, ethnographic, landscape, and structural.

CULTURAL RESOURCES

Archeological: Physical evidence associated with past human activity

- Archeological sites
- Archeological features
- Artifacts
- Ecofacts

Ethnographic: Tangible or intangible natural and cultural resources that traditional users have determined to be vital for cultural perpetuation

- Traditional Ecological Knowledge/ Traditional Knowledge (TEK/TK)
- Traditional crafts
- Rituals
- Plants and animals

Landscape: Geographic area with natural and cultural resources associated with past human activities, use, or occupation of land

- Battlegrounds
- Cemeteries
- Industrial sites
- Landscape features
- Traditional subsistence grounds

Structural: Constructed and immovable works intended to serve human activity

- Bridges
- Dams
- Forts
- Earthworks
- Trail or road

A cultural resource may fit into more than one of the categories listed above. For example, many structural resources are also archeological resources, and some archeological resources are also ethnographic resources.

Cultural resources most likely to be affected by a wildland fire are those that are located on or above the ground's surface. In certain scenarios, subsurface cultural resources are also susceptible to impacts from wildland fire. The effects of wildland fire can be categorized in three ways: as direct and indirect impacts, and as operational effects.



IMPACTS OF WILDLAND FIRE

Direct Impacts: The result of fire and its byproducts

- Burns, scorching, melting, incineration
- Soot and/or ash deposits
- Fracture, crazing, or pot-lidding from prolonged exposure to high temperatures

Indirect Impacts: Result from the occurrence of fire

- Soil erosion due to loss of vegetation
- Introduction of non-native or invasives plant species
- Cavities in soil due to burned-out stumps
- Downed trees
- Changed viewshed

Operational Effects: The result of human actions during the suppression of fire or rehabilitation of burned areas

- Manual or mechanical construction of fireline
- Suppression damage repair
- Application of water or fire chemicals
- Tree felling operations
- Drop points for staging resources
- Mechanical construction of escape routes and safety zones

Preservation Matters: Disasters Cultural Resources and Wildland Fire



COMMON SCENARIOS

Direct Impacts

Burnt/charred or melted material

After ignition, wildland fire temperatures range from 300-1000 °C (572-1832 °F). Decomposition of cellulose occurs at 100-200 °C, and with sustained exposure to heat wood will begin to char. The common range of temperatures at which flames are present in a wildfire is 500-1000 °C (932-1832 °F). Cultural resources with melting points within this range include glass, unrefined earthenware ceramics, and metals such as aluminum and silver. Melting of these materials can result in their disfigurement and discoloration.

Soot/ash deposit

• Soot is a solid residue that occurs in wildland fires. Soot contains carbon which can stain many cultural resources. Porous materials such as bone, some ceramics, and certain stones are damaged most easily by soot.



A white headstone is stained dark grey by soot from a wildfire (Jenny Floyd)

Indirect Impacts

Soil erosion

- After a wildland fire, soil is often vulnerable to erosion. Where a high burn severity has caused a loss
 of vegetation, erosion may result from winds or heavy rains such as the summer monsoons in the
 Southwest. Weakened soil on slopes is most vulnerable to erosion. As soil erodes, cultural resources can be buried, displaced, or toppled if in the path of a debris flow.
- When fire consumes the root system of a tree stump, a large cavity is left in the ground. As a result, cultural materials that were held in place by the roots are removed from their context and may also suffer heat damage. A loss of tree stumps can also compound soil erosion impacts. rinsing the surface with water.



A large pit filled with ash and charcoal is what remains of a tree stump after a fire (Kaitlyn Eldredge, NPS)

Operational Effects

Fireline construction

•A fireline is a tool used in wildland fire suppression that helps fire personnel work safely and effectively. A fireline is a barrier to the spread of fire where vegetation has been removed so that the mineral soil is exposed. Firelines can be constructed by fire crews using specialized hand tools, or by fire personnel operating heavy equipment such as bulldozers, excavators, skidsteers, and more. Cultural resources are often physically damaged and displaced by several feet when in the path of fireline construction. As a ground disturbing activity, fireline construction removes artifacts from their context.



A dirt path with a berm along one edge cuts through a grassy forested area. (Kaitlyn Eldredge, NPS)

Application of water/fire chemicals

• Water and fire chemicals are other tools that aid in wildland fire suppression. When dropped from aircraft these can break or topple fragile cultural resources. If a resource made of stone has been preheated by the fire and water or fire chemicals are applied to it, thermal shock may cause the resource to spall or fracture. Colored fire chemicals can temporarily or permanently stain numerous cultural resources. Additionally, some fire chemicals may trap water and salt inside porous materials. In these ways, water and fire chemicals may contribute to the deterioration of sensitive cultural resources.



A colored long-term retardant was applied at various areas, including this ridgeline, within Sequoia and Kings Canyon National Parks. (Tony Caprio, NPS)

Incidental and intentional vandalism

 Due to an increased human presence during suppression and rehabilitation, cultural resources are more vulnerable to vandalism and looting by those inexperienced with working in culturally sensitive areas. Some wooden resources may be mistaken for heavy fuel loads and could be deconstructed. Fire suppression actions such as fireline construction often expose previously unknown resources that would be vulnerable to vandalism and looting during or after the fire.

*Artifacts and other cultural resources like buildings, bridges, and rock imagery are legally protected and should be left undisturbed and in place. Doing so provides others with the opportunity to enjoy these resources and share in the experiences of wonder, self-discovery, and inspiration that the past offers.

CONCLUSION

Just as each site where cultural resources are found is unique, so too is each wildland fire. The fire, suppression activities, and post-fire environment will differ from place to place. This means that in some situations cultural resources will be harmed by a variety of fire and fire management related impacts, and in other cases only a few impacts will occur.

Wildland fires can introduce many sources of harm to cultural resources. Identifying these sources and understanding their effects provides a starting point for preventing, mitigating, and recovering from complex disasters. In doing so, we can also ensure that our response actions to disasters are not worsening the harm to cultural resources.

REFERENCES

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ABOUT NCPTT

The National Center for Preservation Technology and Training (NCPTT) is the leading research, technology and training center within the National Park Service.

NCPTT helps preservationists find better tools, better materials, and better approaches to conserving historic buildings and landscapes, archaeological sites, and museum collections. It conducts research and testing in its laboratories, provides cutting edge training around the U.S., and supports research and training projects at universities and nonprofits. NCPTT pushes the envelope of current preservation practice by exploring advances in science and technology in other fields and applying them to issues in cultural resource management.

NCPTT publishes its Preservation Matters Series to provide easily accessible guidelines for preserving cultural materials. To download more in the series, visit <u>https://www.nps.gov/</u> <u>subjects/ncptt/preservation-matters.htm</u>.

National Center for Preservation Technology and Training 645 University Parkway Natchitoches, LA 71457 Website: www.nps.gov/ncptt



Series Editor: Kirk A. Cordell, NCPTT Executive Director Author: Kaitlyn Eldredge, Research Associate, NCPTT Cover Photo: NPS