Archaeology Under Fire: the Impacts of Forest Fire on Archaeological Inquiry

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Abstract
This research evaluates the impacts of wildland fire on archaeological sites. Following the 34,900 acre Little Venus Fire in northern Wyoming, known archaeological sites along the Greater Greybull Drainage were categorized by the degree of burn intensity – severe, moderate, and low – to determine differential heating patterns in the area. Colorado State field school students also documented the change caused by fire on cultural artifacts and the surrounding landscape. A noteworthy effect of forest fire is the expansion of many previously documented sites, either by spatial scale or in number of artifacts, due to the removal visually obstructing vegetation. The presence of oxidized sediments that are remarkably similar in appearance to hearth spots is another significant effect. The forest fire directly altered surface artifacts in ways including, a variety heat related fractures, the color and texture change of raw material types, vulnerability to processes of erosion, and looting due to exposure. Effects varied depending on position and the suggested intensity of the fire in that location. However, most of the findings and results follow expected patterns suggesting that these patterns can be applied to help decipher other sites that have witnessed similar fires and predict that such change can be predicted and incorporated into a more general understanding of archaeological site formation processes.

Wildland Fire and Site Formation

Wildland fire is a powerful site formation process in the ways in which it effects archaeological sites. Artifacts are affected by the shape altered through melting and thermal fracturing, and artifacts that are impacted by fire may be less likely to preserve well. The removal of visually obstructing vegetation exposes artifacts to archaeologists, other humans, and natural forces. Light winds can expose smaller, previously unseen artifacts by removing a small amount of sediments; heavy winds can transport larger particles including small artifacts depositing them elsewhere. Wild land fires are capable of redesigning entire landscapes. For example, in the late 18th century, the Greater Greybull region witnessed forest fires leaving ghost forests and high plains environments rather than returning to a mature forest.

Some Effects of the Little Venus Forest Fire on Archaeological Sites

- Heat Modification of Lithic Artifacts
- Fire Effects on Soil
- Fire Effects on Vegetation
- Material Color Change
- Thermal Fracture
- Erosion
- Potlid Fracture
- Thermal Crazing
- Patchy Burn Pattern
- Carbon Residue
- Metallic Sheen
- Removal of Visually Obstructing Vegetation

Findings on Site 48PA2789

- Wildland Fire is a powerful site formation process in the ways in which it effects archaeological sites. Artifacts are affected by the shape altered through melting and thermal fracturing, and artifacts that are impacted by fire may be less likely to preserve well. The removal of visually obstructing vegetation exposes artifacts to archaeologists, other humans, and natural forces. Light winds can expose smaller, previously unseen artifacts by removing a small amount of sediments; heavy winds can transport larger particles including small artifacts depositing them elsewhere. Wild land fires are capable of redesigning entire landscapes. For example, in the late 18th century, the Greater Greybull region witnessed forest fires leaving ghost forests and high plains environments rather than returning to a mature forest.

2004 Data Recorded for Site 48PA2789

- The site was documented present artifacts at 48PA2789 and nearby sites.
- The 2004 CSU field school systematically surveyed the area and coded found artifacts.
- The site remained nondoncrod as there were few formal tools, only a scraper and three bifacial biface forms, and fewer than 400 artifacts recorded.
- It is noteworthy that the lithic material types seem to be a nearly accurate representation on the types present at the site.

2006 Data Recorded for Site 48PA2789 after the Little Venus Forest Fire

- The goal is to record the impacts of the forest fire on previously recorded sites with a hope of comparing data and establishing predictable patterns.
- The four person team began recording formal tool types and an obsidian retouch location that were unseen when recorded in 2004, artifacts along two transects located in highly burned areas, and topographic points for mapping of the site.
- As opposed to the 2004 data, 11 projectile points dating to the Prehistoric period and other formal tools were found, recorded, and collected.
- While working in Transect 2 glass beads were discovered, which drastically changed the dynamics of the site and the concentration of documentation.
- Following the discovery of the glass beads, the team recovered more beads, a metal bracelet, and two metates through systematic survey.
- The projectile points and metates were found due to the increased surface visibility after the majority of the vegetation burned in the fire.
- The beads became visible probably due to a combination of increased surface visibility and erosion moving surface soils exposing the tiny beads.

References
- Panarchy
- Carbon residue: deposits on artifacts occur throughout the site and are present on all material types.
- Metallic sheen: deposits on artifacts occur throughout the site and are present on all material types.
- Thermal Spalling: cracks along the grain of the artifact.
- Oxidized Sediments: deposits on artifacts occur throughout the site and are present on all material types.
- Material Color Change: alteration of color due to heat.
- Thermal Fracture: fractures that form due to heat.
- Erosion: wear or damage caused by natural forces.
- Potlid Fracture: fractures that form along the lip of the artifact.
- Thermal Crazing: crazing due to heat.
- Patchy Burn Pattern: pattern of burn on the artifact.
- Carbon Residue: residue left on the artifact.
- Metallic Sheen: sheen left on the artifact.
- Removal of Visually Obstructing Vegetation: vegetation removed to reveal artifacts.

Lithic Tools
- Projectile Point: a tool made of stone.
- Metal Bracelet: a bracelet made of metal.
- Two metates were found in the 2006 investigation of the site – one broken and the other entirely intact. The latter would probably not have been found before the forest fire in that it was located in a previously, heavily treed area.
- Obsidian: in the 2004 analysis of four obsidian samples, all were sourced to Obsidian Cliff. This source corresponds with predicted quarry behavior and the estimated time period of the site.

Contact Artifacts
- Beads: clusters of glass beads were found near transect 2. The beads did sustain some crazing due to the fire. There also may have some melted beads. The discovery of the beads further identified the time period of the site.
- Bracelet: the metal bracelet was discovered near the location of the humans indicating where the artifacts, two clusters of glass beads and the metal bracelet, lay in the landscape.

Trends in Head Modification
- Smoke from the Little Venus Fire [courtesy of the United States Forest Service]
- Following the Little Venus Fire [courtesy of Resilience Alliance, www.resalliance.org]

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