

Abstract
This research evaluates the impacts of wildland fire on archaeological sites. Following the 34,000 acre Little Venus Fire in northern Wyoming, known archaeological sites along the Greater Greybull Drainage where 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 wildland fires and indicates that such change can be predicted and incorporated into a more general understanding of archaeological site formation processes.

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Wildland Fire and Site Formation



Smoke from the Little Venus Fire July, 2006

- ✓ Wildland fire is a powerful site formation process in the ways in which it effects archaeological sites.
- ✓ Artifacts can have their 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.

Findings on Site 48PA2789

Predicted Fire Behavior

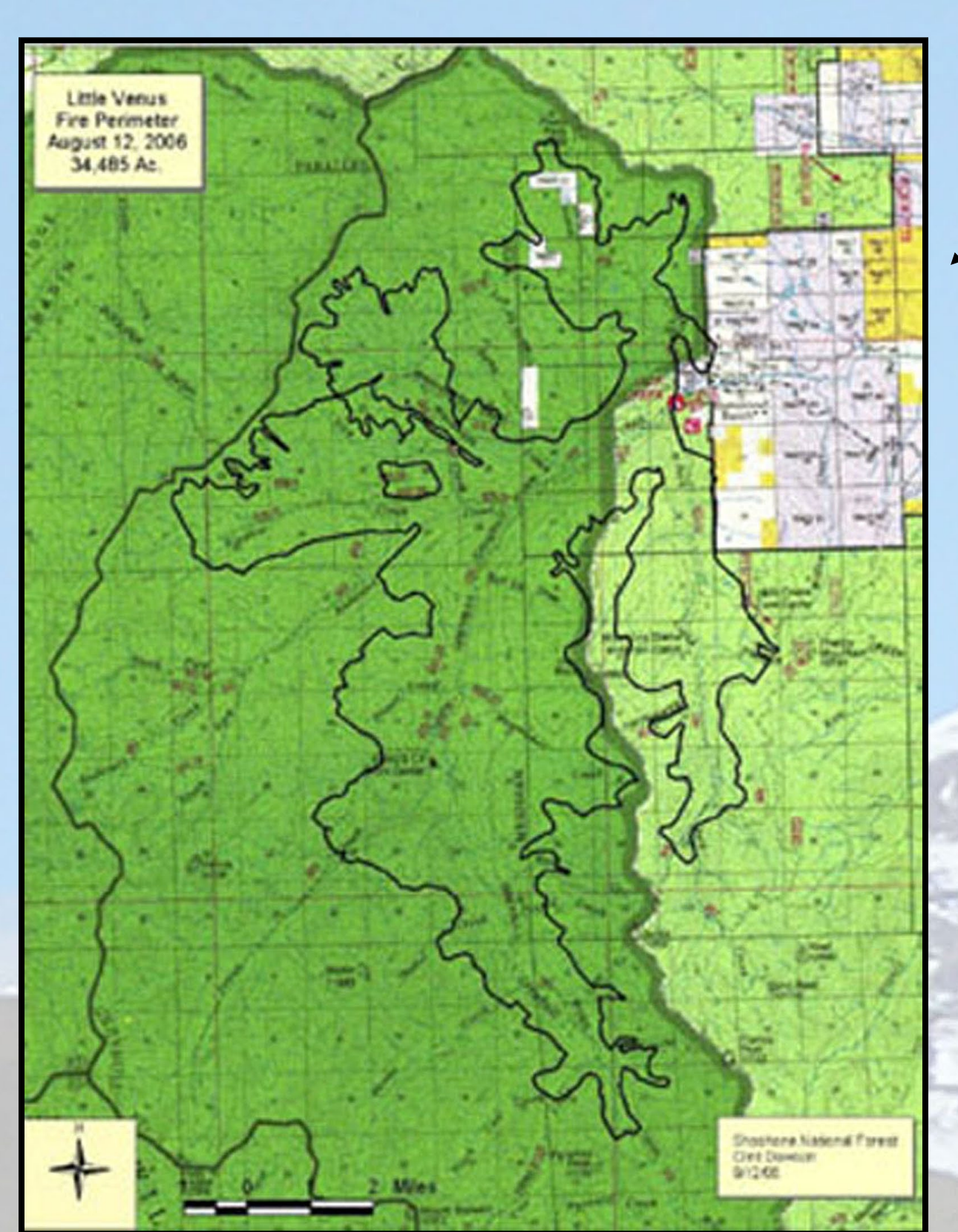


It is difficult to determine burn intensity, duration and fuel load because data regarding vegetation was not gathered before the fire. It is known that site 48PA2789 was in a wooded area probably with a variety of combustible vegetation. There are indications that the fire reached high temperatures in this area. For example, chert artifacts exhibiting thermal fractures and color change would have experienced temperatures reaching 725 degrees Celsius.



Trends in Head Modification

- ✓ Potlid fractures were not present on all material types and were more common on petrified wood and cherts. The majority of potlids were on the underside of the artifacts, rather than the top where temperatures are predictably higher during a fire. A possible explanation for this is greater differential heating on the underside.
- ✓ Thermal crazing was also more common on petrified wood and cherts, usually occurring with another form of heat modification, like carbon residue deposits and potlids.
- ✓ The metallic sheen was present on some obsidian artifacts, but seem have been limited to only large obsidian pieces.
- ✓ Carbon residue deposits on artifacts occur throughout the site and are present on all material types.



[courtesy of the United States Forest Service]

Little Venus Fire Perimeter Map, Greater Greybull Drainage System, Wyoming

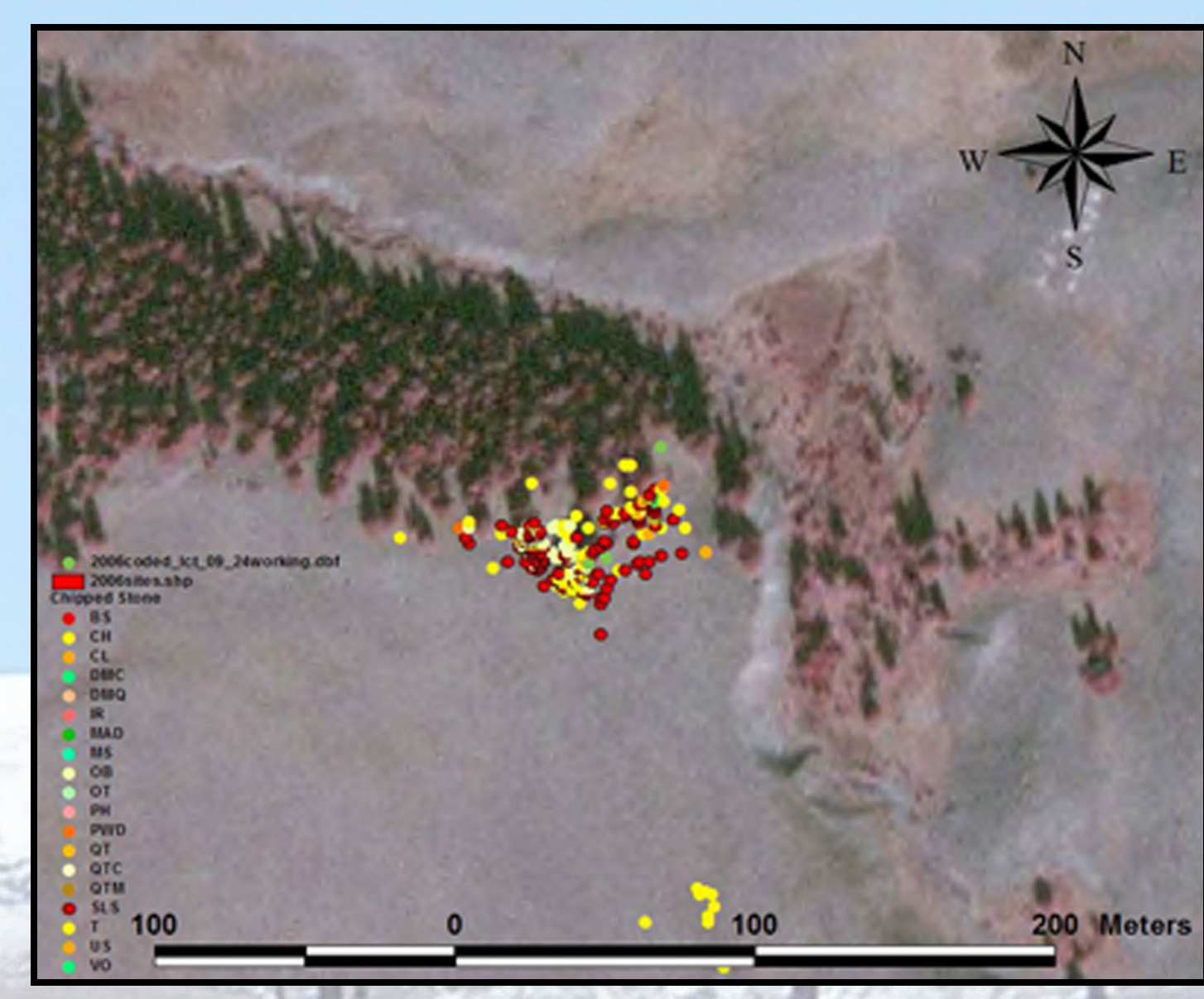


Site 48PA2789

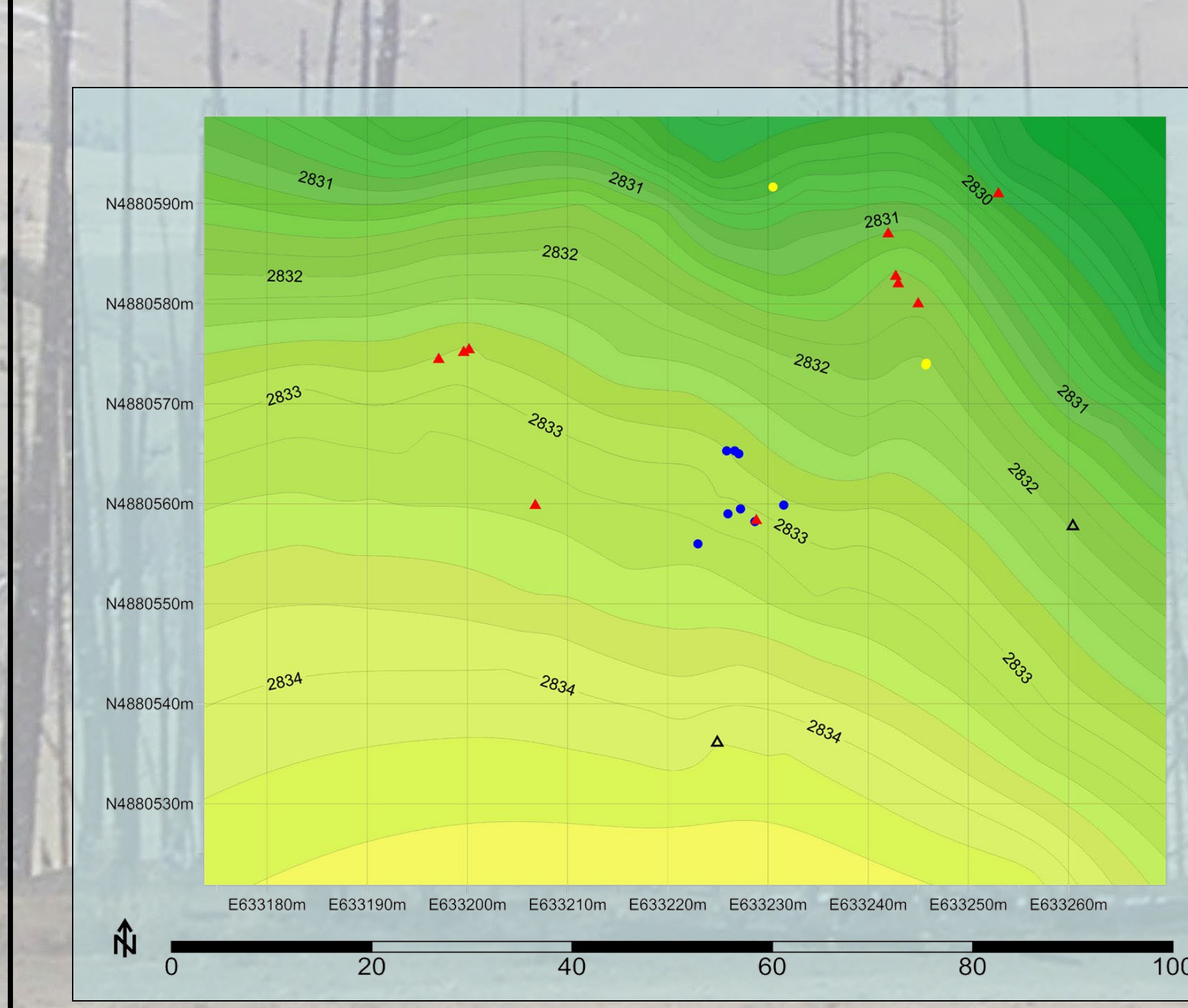
Although over 50 sites have been revisited after the Little Venus Fire, a limited amount of research time due to weather conditions only allowed for the more intensive investigation of only one site. Site 48PA2789 was chosen because it was one of the more extensively burned areas, and due to its location in an exposed, recreationally active area at risk for looting.

2004 Data Recorded for Site 48PA2789

- ✓ The goal in the initial recording of the site was to document present artifacts at 48PA2789 and other nearby sites.
- ✓ The 2004 CSU field school systematically surveyed the area and coded found artifacts.
- ✓ The site remained nondescript as there were few formal tools, only a scraper and three bifacial performs, 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 in rerecording the site was to document the impacts of the forest fire on previously recorded sites with a hope of comparing data and establishing predicable 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 asystematic survey.
- ✓ The projectile points and metates were found due the in 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

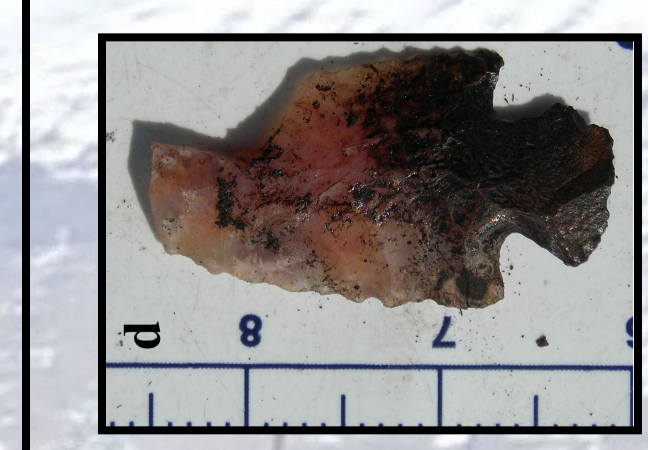
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Photographs and graphics courtesy of Larry Todd.



A special thanks to Kristin Hare, Becky Thomas and Larry Todd for waiting out Mother Nature and recording the impacts of the Little Venus Fire with me.

Lithic Tools



Projectile Points

Eleven projectile points found on the site were all classified as Late Prehistoric points and were made from a variety of materials including obsidian, petrified wood, and chert. No projectile points were found in the 2004 investigation of the site probably due to visually obstructing vegetation.

Metates

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

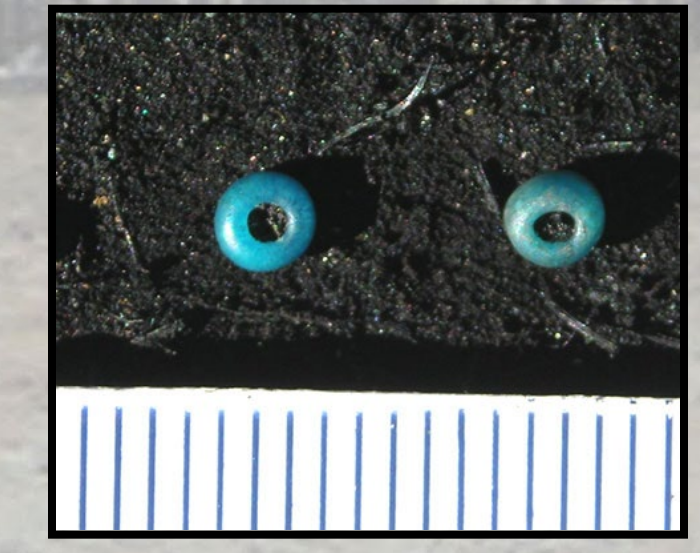
Beads

Two clusters of glass beads were found near transect 2. The beads did sustain some crazing due to the fire. There also may have been some melted beads. The discovery of the beads further identified the time period of the site as early Contact. There is little known about the Early Contact period in this area.



Bracelet

Nearby the beads a metal bracelet was discovered.

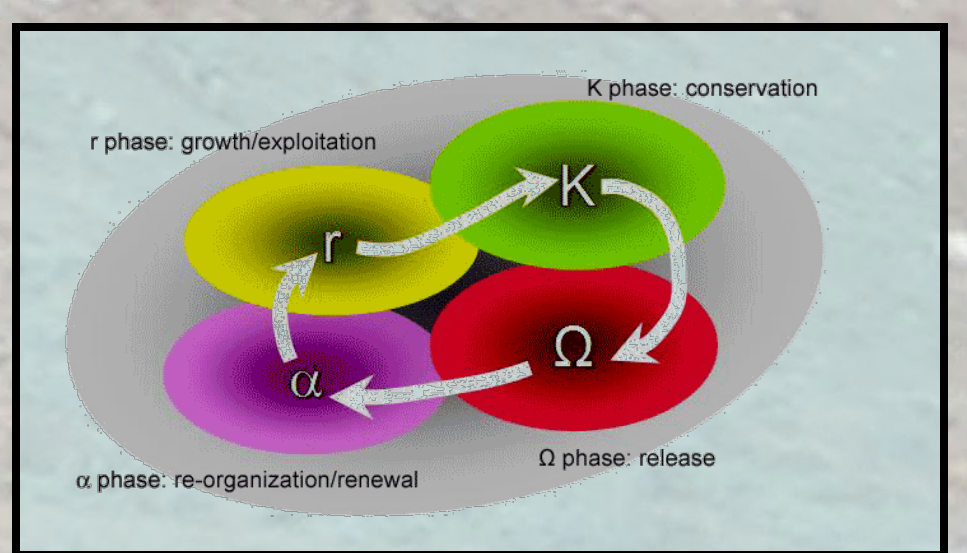


The locations of the humans indicate where the artifacts, two clusters of glass beads and the metal bracelet, lay in the landscape.

Following the Little Venus Fire

Adaptation Cycle

The Greater Greybull Drainage ecosystem is at a possible point of change between the alpha and r phases. The re-growth of the forest is dependent on a sufficient amount of precipitation in the coming months. It is possible that much of the previously forested landscape will be converted into high plains, like after the fires in the late 18th century.



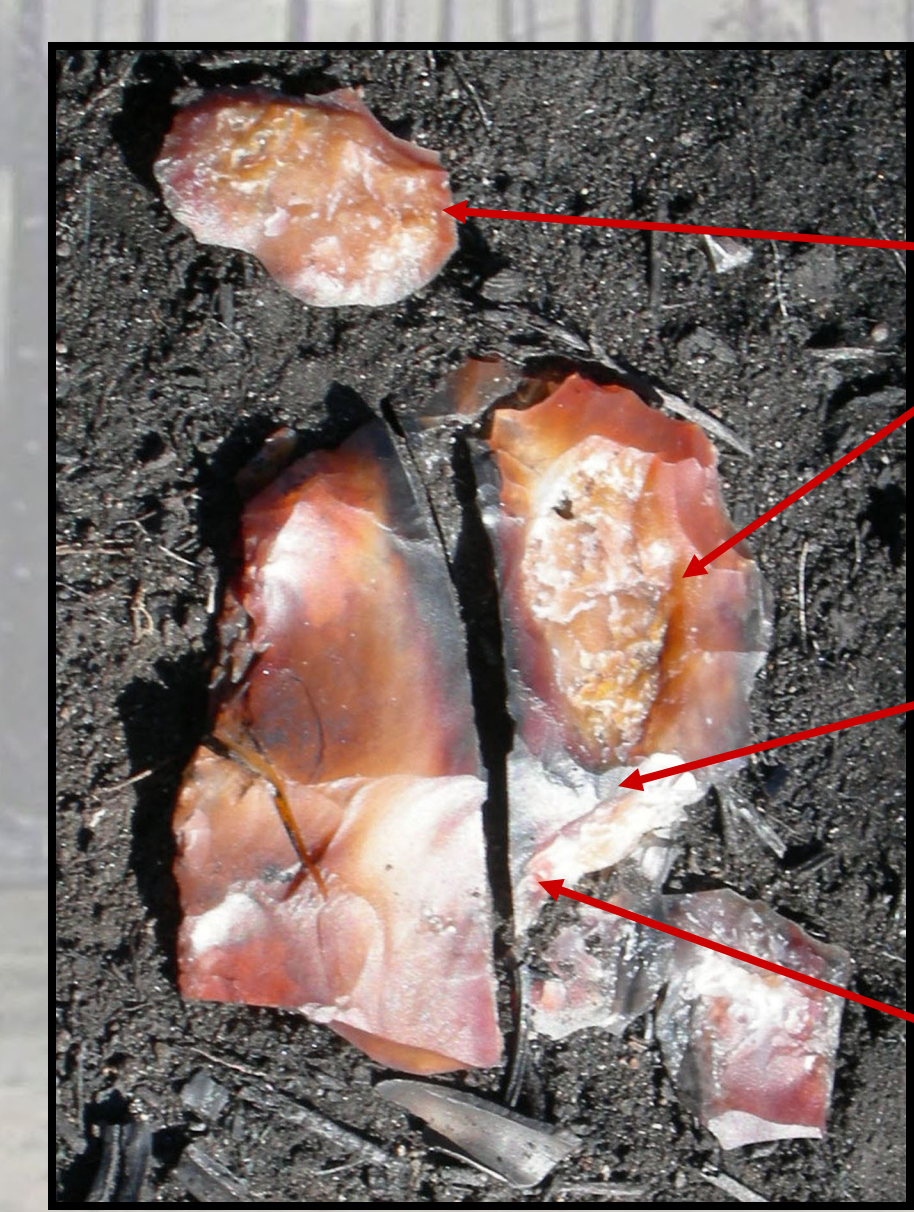
[courtesy of Resilience Alliance, www.resalliance.org]

Research Needs

Further investigation of site 48PA2789 and the impacts of wildland fire on other sites in the area is necessary. Specific research questions to be answered include questions of the long term impact of wildland fire and preservability of sites afterwards, and questions regarding the Contact period in the mountains and high plains of Northern Wyoming.

Some Effects of the Little Venus Forest Fire on Archaeological Sites

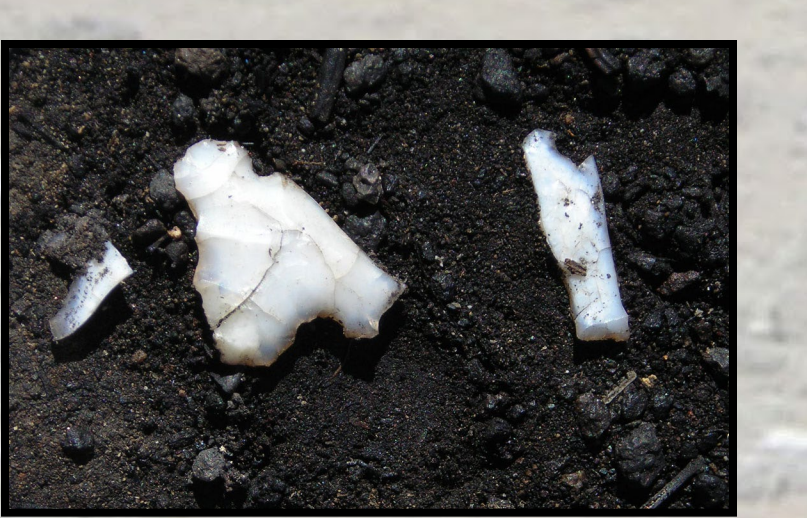
Heat Modification of Lithic Artifacts



- Thermal Spalling
- Material Color Change
- Thermal Fracture



Potlid Fracture



Thermal Crazing



Carbon Residue



Metallic Sheen

Fire Effects on Soil

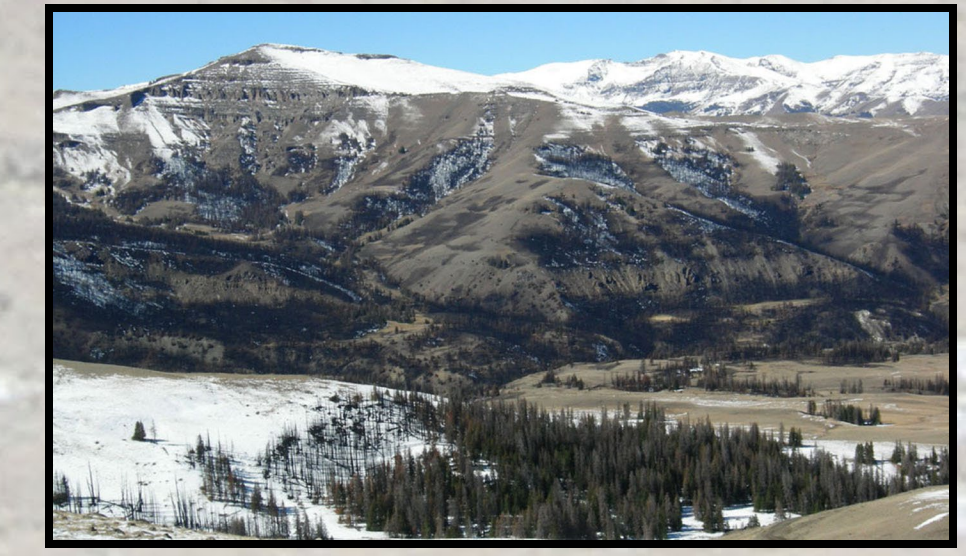


Oxidized Sediments



Erosion

Fire Effects on Vegetation



Patchy Burn Pattern



Removal of Visually Obstructing Vegetation