

Unintentional Thermal Alteration to Chipped Stone: Documentation of Artifacts Exposed to Wildland Fire

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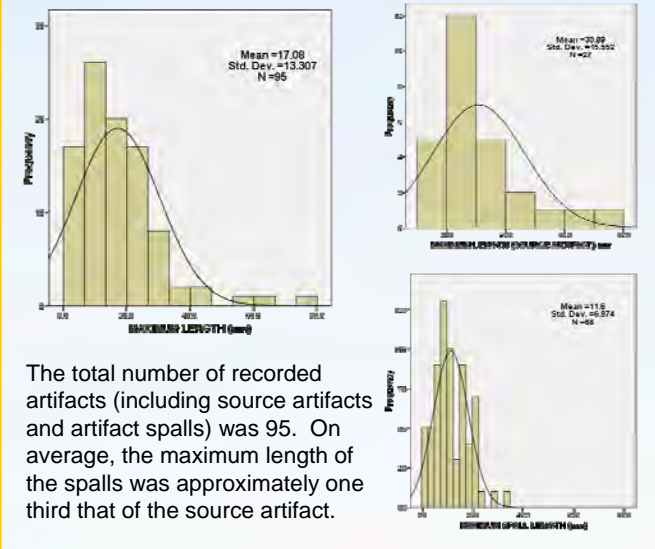


Survey transects along the East bank of the Greybull River



View from a patch of burned timber burned by the Little Venus Fire of 2006, Upper Greybull area, NW Wyoming.

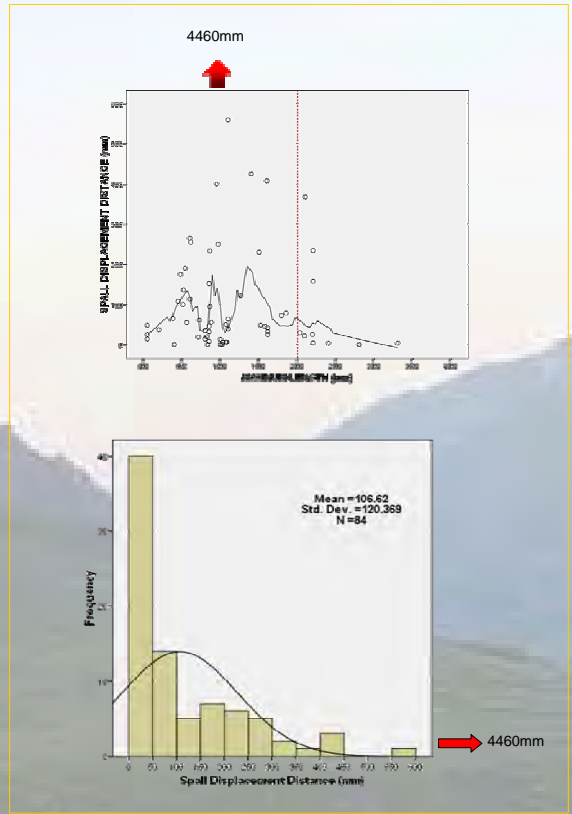
Abstract
Understanding the characteristics of unintended thermal alteration to chipped stone is fundamental to evaluating many aspects of archaeological sites. Developing a set of criteria to help identify aspects of unintended heat alteration to chipped stone can aid in intra and inter site comparisons. The better our ability to recognize unintentional heat alteration characteristics, the more accurately we can segregate intentional human involvement in the use of heating in the manufacturing of stone tools prehistorically from other forms of heat alteration.
Heat altered chipped stone was examined in the Upper Greybull area of northwestern Wyoming's Shoshone National Forest. The Little Venus Fire of 2006 fueled large-scale surface burning of grassland and patches of timber which improved the surface visibility of archaeological materials, allowing for intensive observations to be made of lithic debitage on archaeological sites. The juxtaposition and dimensions of over thirty heat altered fragments of chipped stone were documented paying special attention to the intensity of heat alteration, the effect of heat altering that had taken place, the material of the chipped stone, and the area of displacement caused by the materials' reaction to heating and the exerting of energy. The spalled and thermally fractured artifact sample included a range of fracture types (i.e., potlids, crazing, spalling), fracture intensity, distances between fractured pieces (with a maximum pot lid distance of >4m recorded), and frequency of thermally altered artifacts within the site.



The total number of recorded artifacts (including source artifacts and artifact spalls) was 95. On average, the maximum length of the spalls was approximately one third that of the source artifact.

Methods and Materials
In recording archaeological sites in the Upper Greybull, artifacts found to have been thermally altered were left untouched until I had finished recording the position, material, and dimensions of those artifacts. This recording process included photographing the artifacts in-situ as well as attempting to refit those which had potlids or thermal fractures. Also noted was the specific effect of heat alteration that the artifacts exhibited (i.e. pot-lidding, crazing, carbonization, thermal fracturing).
In addition to noting the physical characteristics of heat altered artifacts, the context in which they existed on the site was recorded. While most were found in burned areas, some were recorded in the mountain grassland context.
A Garmin GPS system as well as a Trimble Juno were used to record a fairly precise location of the artifacts on their individual sites.

The Refitting Process



Data and Results
In total, over 30 different heat altered artifacts were recorded and entered into a data bank where inter and intra-site comparisons could be made. When comparing the displaced fragments of chipped stone you will notice that there was a great range in the distance from the source artifact. While the pieces were most commonly found in proximity to their source, many were found to have moved over 5 cm and on a rare occasion, one heat spall was found to have been displaced over 4m from its original location.
When observing trends in the maximum lengths of spalls to the distances that they were displaced, it was shown that those under 20mm in length moved to a variety of distances from their source. Spalls over 20mm in length commonly traveled fewer than 50mm from their source.
Nearly all of the recorded artifacts were of the chert variety. Some silicified sediment chipped stone was documented as well but was not seen altered as commonly as the cherts.

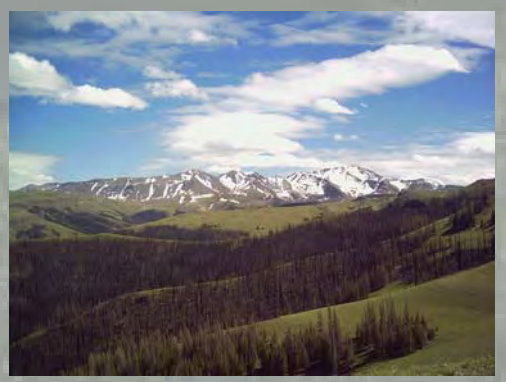
Pot Lid Spalling



Carbonization

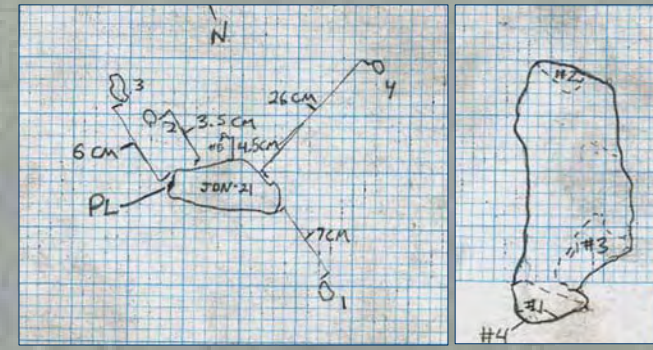


Thermal Fracturing



Artifacts which were found to have been thermally altered were photographed and their general displacement was recorded into a field journal

Field Journal Documentation



I would like to express my appreciation to those who attended the 2007 CSU field session. These people contributed in numerous ways to both my understanding of this research project and to the gathering of the data – Thanks to Dr. Larry Todd, Greta, Jena, Amanda, Katherine, Abe, Chrissie, and Becky!