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When Metal Replaced Stone: Skill, Learning, and Technological Change on the Plains

Lawrence Todd (GRSLE) and Riley Hamada (University of Utah)
Contact: Lawrence.Todd@colostate.edu

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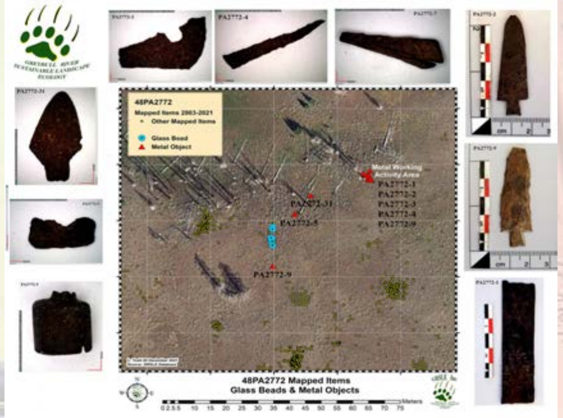
People living in the 21st century are accustomed to rapid changes in technology and the need to constantly learn new methods and approaches. Yet technological innovation not only demands the acquisition of new skills, it also diminishes the need to master older ones. Many traditional practices—from mapping with an optical transit to drafting with ink or using a slide rule—have become "lost skills" within a single generation. Archaeological data suggest a similar process may have occurred during the Contact Period, when Indigenous groups on the Plains began to manufacture metal arrow points. At several GRSLE sites, barrel hoop fragments and chisel marks indicate on-site production of metal points. Student experience during the 2025 field season highlighted how quickly a functional metal point could be made, compared with the years of practice required to achieve equivalent skill in knapping. This poster explores how the adoption of metal not only introduced a desirable new raw material but may also have rapidly reduced the incentive for younger people to learn traditional stone-working skills, reshaping technological knowledge transmission across generations.

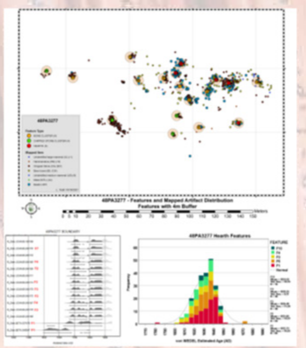
Over the last two decades, we've recorded basic landscape-scale, artifact-based information on 266,951 pieces of chipped stone on portions of the Shoshone National Forest in the Greater Yellowstone Ecosystem (GYE), northwestern Wyoming (Todd 2015, 2019). Of these, 2624 of the objects are projectile points ranging in age from Early Paleoindian to Contact Period metal points. In this poster, we take a closer look at the full lithic assemblage, particularly raw material type in the few localities where there is evidence of a new technology – metal point manufacture – being incorporated into the system. The question asked is "are there indications that lithic technology was changing as metal technology was being introduced?"

Examples of some of projectile points recorded in 2022.

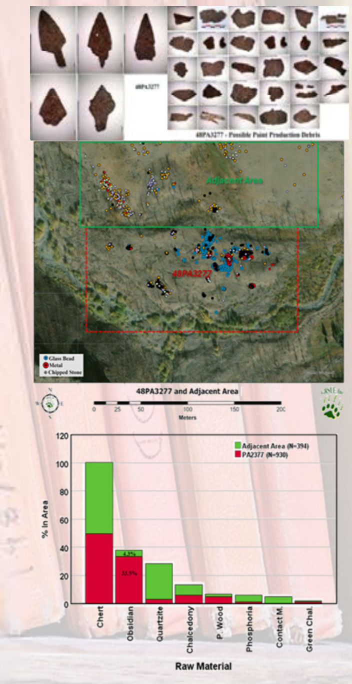


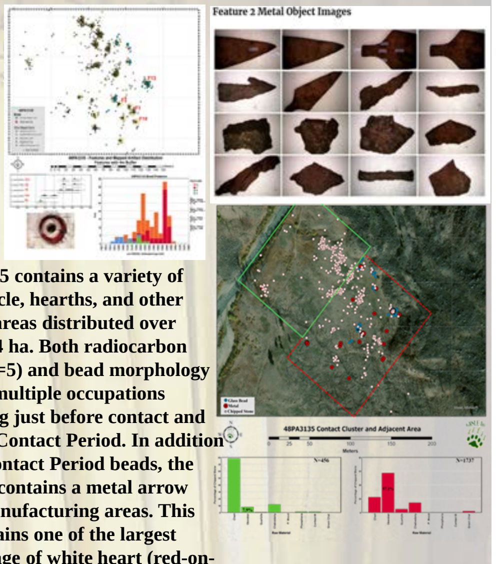
Example of cluster with evidence of metal point making.

Learning to knap stone projectile points often takes a good deal of time, while a fully functional metal point can be produced on first attempt as shown here.



The ease of learning metal point making prompted questions about how such a new method might impact aspects of stone tool working. Does stone working shift as the need to acquire specialize knapping skills deceases. At site 48PA3277 shown above, a series of features are associated with both glass beads and metal point manufacturing debris. The 14 radiocarbon dates from the site suggest a rather uniform Contact Period occupation, although the complexity of the calibration curve for this time period makes assigning a specific date(s) of occupation difficult but the lack of white-heart beads (Billeck 2008) and the bead diameter based age of manufacture estimates (using von Wedell 2011) suggest likely last used before the 1840s.





48PA3135 contains a variety of stone circle, hearths, and other activity areas distributed over about 2.4 ha. Both radiocarbon dates (N=5) and bead morphology suggest multiple occupations beginning just before contact and into the Contact Period. In addition to the Contact Period beads, the site also contains a metal arrow point manufacturing areas. This site contains one of the largest assemblage of white heart (red-on-white or cornelian) beads from the GRSLE project area. These are a temporal marker that suggests a most likely age of occupation of the associated features as being after 1840 (Billick 2008).

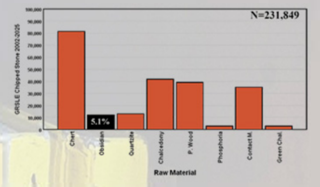
Looking at only one attribute of the chipped stone assemblages associated with these Contact items give some provocative glimpses.

For both sites, the tools and debitage in proximity to the metal point making debris show clear differences from other nea[r] by raw material. In both sites, obsidian is much more abundan[t] in association with metal point manufacturing areas. In areas distant from the distinct Contac[t] materials, obsidian makes up a much lower percentage of the chipped stone.

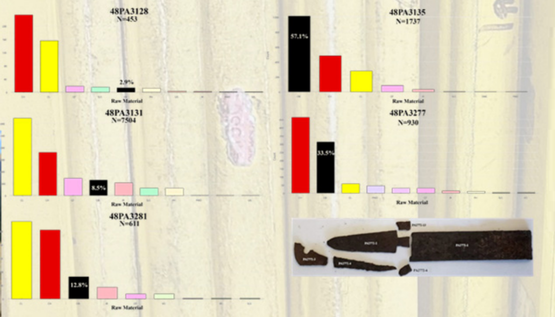
As technology changes, the skills needed to be learned change – for example collecting archaeological spatial data. Basic skills of the past are of little relevance today – perhaps similar changes took place in transition from stone to metal use technology:

Poster available at:
http://grsle.org/Conferences/2025%20Posters/Todd_Hamada_Changing_Technology.pdf

This abundance of obsidian is unusual in the GRSLE project area (Reckin and Todd 2019, 2020). As shown in the bar chart to the right, of the nearly 232000 chipped stone pieces recorded, obsidian makes up just over 5% of that recorded pieces. At both metal point manufacturing areas (48PA3277 and 48PA3135) the obsidian percentage is 33.5% and 57.1% respectively. Looking more specifically at materials of roughly similar ages (clusters with Intermountain Ware ceramics, but no contact period European goods so likely older than the sites with metal point manufacture), the pattern in increased obsidian abundance when associated with metal point making is striking.



While there are a number of potential reasons for the increase in obsidian use on these Contact Period clusters (e.g., mobility, social boundaries, or trade networks), it is also possible that the abundance may relate to different lithic technological needs and skill requirements. This poster is designed to expand our range of lithic assemblage research questions.



Differences in Obsidian Abundance

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