State Archaeologist Reports On His Research At Vore Buffalo Jump

By Dr, Greg Pierce—Wyoming State Archaeologist

The Vore Buffalo Jump was used at least 20 times between approximately 1550 and 1800 A.D. Each one of these episodes represents a unique buffalo hunting and kill event by a group or groups of Native Americans living in the region. Evidence from the site indicates that the sinkhole was used by a number of different cultural groups over the 250 odd years the locale was exploited. While no specific level has been designated to a cultural group, the tribes who most likely used the sink hole were the Lakota Sioux, Cheyenne, Arapaho, Crow, Kiowa, Plains Apache, and Shoshone.

These tribes all occupied or moved through the area between approximately 1500 and 1800 A.D. This timeframe, spanning the Late Prehistoric through the Historic period was a time of transition. Beginning in the Late Prehistoric era, as early as 1300 A.D. the climate across much of North America became cooler and wetter. This phenomenon has come to be known as the "Little Ice Age". Environmental conditions during the Little Ice Age resulted in improved foraging for bison in the region resulting in larger, more densely distributed herds. Taking advantage of the situation, many native groups intensified their bison hunting activities. This resulted in a number of tribal groups living in the Great Lakes region of North America slowly moving westward onto the Plains as bison hunting took an ever increasing role in their subsistence practices. As part of this transition these people gave up a semi-sedentary village lifestyle for a mobile, pedestrian bison hunting way of life.

By the 17th century Euromericans and Euromerican goods began to influence native lifeways. Native American groups began moving westward, away from European settlements. These groups, displaced by the advance of Euromerican settlement in turn disrupted the balance in the Great Lakes and beyond. The influx of new populations had an impact on existing political alliances, hunting practices, and tribal territorial claims. In some cases these movements led to conflict, pushing existing populations in the region further west or south. This domino effect ultimately proved to be yet another factor in the migration of tribal groups into the High Plains and Black Hills during the 18th and 19th centuries. Part of this process involved the dissemination of the horse and gun throughout the West. The horse moved north out of the Spanish southwest and the gun moved west out of the northeast traveling with the native populations migrating or trading from these regions. The horse, gun, and accompanying Euromerican goods reached the Black Hills and High Plains by at least the 18th century and were quickly integrated into native hunting and warfare practices.

For over a century researchers have debated the implications that the introduction of these items had on native groups. The most important result was the development of the Plains horse culture. This cultural complex is characterized by a mobile lifestyle relying heavily on bison hunting, increased levels of political organization, and a highly developed warrior culture invested in warfare and raiding to gain social status and prestige. Some believe that all of these cultural characteristics were already in place prior to the introduction of the horse and gun that and these items were simply integrated into cultural changes that were already ongoing. Regardless of which side of the debate you

Greg Pierce was appointed as Wyoming State Archaeologist in 2014. Part of his doctoral dissertation was based on research he did at the Vore Buffalo Jump to distinguish between butchering cut marks on buffalo bones made by stone vs. metal knives. The research can help document when European trade goods reached Northern Plains Tribes. Pierce is on the VBJF Advisory Committee, attends some Board meetings, and is interested in possible further research at the VBJ.

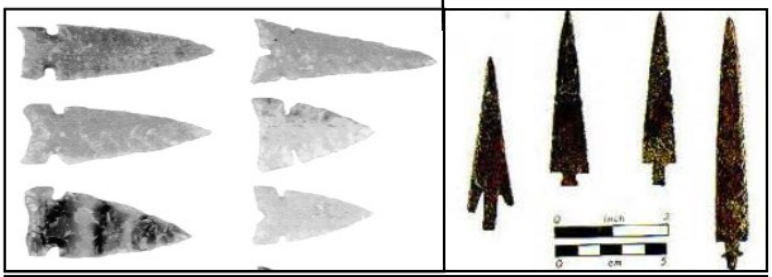
Metal knife typical of those available to Indians through the fur trade

Stone Biface to Metal Trade Knife

During the period of Vore Site use, Indian tribes experienced profound changes including the transition from stone tools to metal trade goods. Excavation at the VBJ may document when that transition occurred on the Northern Plains

come down on, it is clear that beginning as early as 1300 A.D. significant environmental, demographic, and technological changes were being experienced by the native populations of North America.

The Vore site was used repeatedly during this time period, what some call the Late Prehistoric/Protohistoric/Early Historic transition. The site saw the Kiowa, the Crow, the Lakota, and others move into or through the region. It saw the transition from stone tools to metal tools, and it saw the transition from the pedestrian bison jump method to the introduction of the horse. The unique history of the use of the Vore site makes it an ideal dataset from which to examine this tumultuous era as this single site provides a cross section of time, in one location that researchers can use to investigate historic events, activities, and processes.



Stone projectile points were used by Native Americans for millennia and many types are found in the Vore Site. Later, some hunter/warriors acquired metal arrowheads manufactured in Europe through the fur trade or fashioned them from other metal trade goods such as kettles or bands from wooden barrels. No metal objects have yet been found at the Vore Site, but studies of bones at the site provide strong evidence that metal tools were used there.

Central to these types of discussions is the ability to clearly define the Late Prehistoric/Protohistoric threshold so as to be able to identify the manner in which the site was used prior to and after Euroamerican items were made available and integrated into tribal subsistence activities. At Vore, radiocarbon dates show the site was used from the Late Prehistoric into the Historic period and there is ample evidence of bison butchering, but we have recovered no metal implements to date. As less than 10% of the site has been excavated, steel implements may yet be found. The lack of steel tools does make it difficult for researchers to differentiate between pre- and post- contact levels, or use events.

One means of dealing with this issue is to look for evidence of the presence of Euroamerican goods when the items themselves may be missing. Even as the artifacts themselves have not been located evidence of their presence may remain in the butchering marks left on the bones. An analysis of bone surface modifications can identify human made marks such as cutting, chopping, and scraping associated with bison skinning, butchering, and marrow processing. This analysis can also differentiate between stone and metal tool marks. To accurately delineate the Late Prehistoric/Protohistoric we sought to identify layers and strata where metal tool marks are present.

To accomplish this, a selection of femora, humeri, metacarpals, scapula, and mandibles from the top six cultural levels of the Vore site were examined. Initially researchers intended to include bone elements from all 22 cultural levels. Initial excavations at the site in the 1970s reached the bottom of the bone beds, making elements from every cultural event at the site available for study. Unfortunately, the bones from the original 1970s excavations could not be used in this analysis. This is due in large part to the nature of the work. To differentiate between metal and stone cut marks researchers must be able to examine the marks under a microscope at up to 70x magnification. Thirty plus years of storage had destroyed or obscured the diagnostic traits that researchers rely on for analysis. Thus, we turned to bone samples from the more recent excavations began in the 1990s. As at the time work had only uncovered portions of the top six cultural levels, this is where we drew our sample.

Using established bone modification analysis techniques each element was examined by two researchers, who independently recorded the origin of each modification on the bone as due to stone or steel. Results were then compared. When differences arose the bone was re-examined. When a conclusion could not be reached the mark was recorded as inconclusive.

The results showed that each of the cultural levels included in the study returned positive results for metal cut marks. The implication being that at least the top six kill events date to after native groups in the region made contact with Euroamericans or Euroamerican goods, dating them to the Protohistoric or Historic periods. Of interest is that each level also showed the use of stone tools in the butchering process, indicating that while new technologies were moving into the region traditional technologies continued to be used in the late-1700's..

Further analysis, examining cut mark frequencies per level, showed there to be clear differences between the levels. Cultural Levels 1-5 (with Cultural Level 1 as most recent at about 1800) showed that between 100% and 63% of the cut marks were generated by metal implements. However, Cultural Level 6 showed an even 50-50 break. The change is even more apparent when one looks not only at raw cut mark counts, but at butchery attempts. In this instance metal butchery attempts for Cultural Levels 1-5 range between 100% and 67%. However, in Cultural Level 6 we see only 33% of the butchery attempts coming from metal implements. The implication being that there were fewer metal tools onsite during the kill event which created Cultural Level 6.

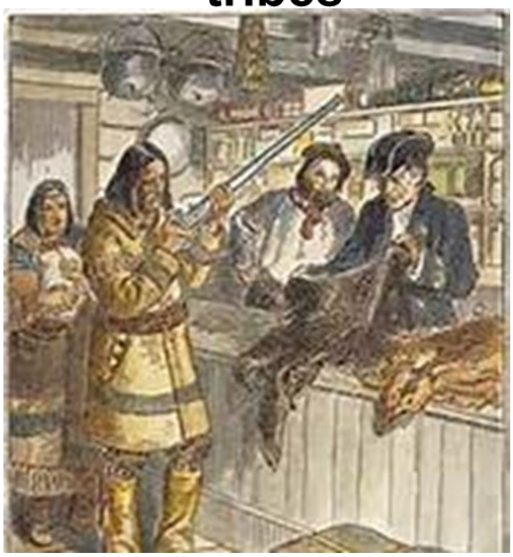
To verify this assumption researchers examined the stone tool assemblage from all 22 levels of the Vore site. This investigation focused on the relative frequency of stone tools and debitage, small stone flakes created during the process of making or sharpening stone tools, in each level. The

assumption behind this work was that as the number of metal tools increased the number of stone tools would decrease, correlating to a similar drop in the amount of debitage. The examination of the Vore lithic assemblage met these expectations with higher numbers of stone tools and flakes being present in lower levels, decreasing in the vicinity of Cultural Level 6.

While the bone modification study did not reveal any pre-contact levels, the cut mark and stone tool data do indicate a shift in the presence of tool types at the Vore site in the vicinity of Cultural Level 6. It seems likely, based on this information, that Cultural Level 6 and the levels immediately below it date to the Protohistoric period, a period when Euroamerican tools were first making their way into the region. Should this be the case, as excavations continue at Vore the pre-contact levels dating to the Late Prehistoric period will be uncovered; allowing researchers to begin the study of how the site was used before and after the introduction of Euroamerican goods.

With the discovery of these pre-contact levels comes the ability to add to our understanding of the impact that the environmental, demographic, and technological changes ongoing during the Late Prehistoric, Protohistoric, and Historic periods had on native populations living in, and moving through, the High Plains and Black Hills regions of the West. In addressing important issues such as these, research conducted at the Vore site has the ability to add to the growing discourse on the nature of native life during an important and transitional period in the history of the American West.

Access to guns and other trade items influenced the distribution of tribes



For most of their history, the meat and hides obtained from buffalo jumps were used by Indians for their own subsistence. However, in the 1700s, as Euroamerican manufactured items became available, Plains tribes sometimes traded tanned buffalo robes, jerky and, pemmican for products like those shown above. Eventually horses made buffalo jumps obsolete, but trade expanded. Archaeology at the Vore Site will help us understand when and how the transition occurred.