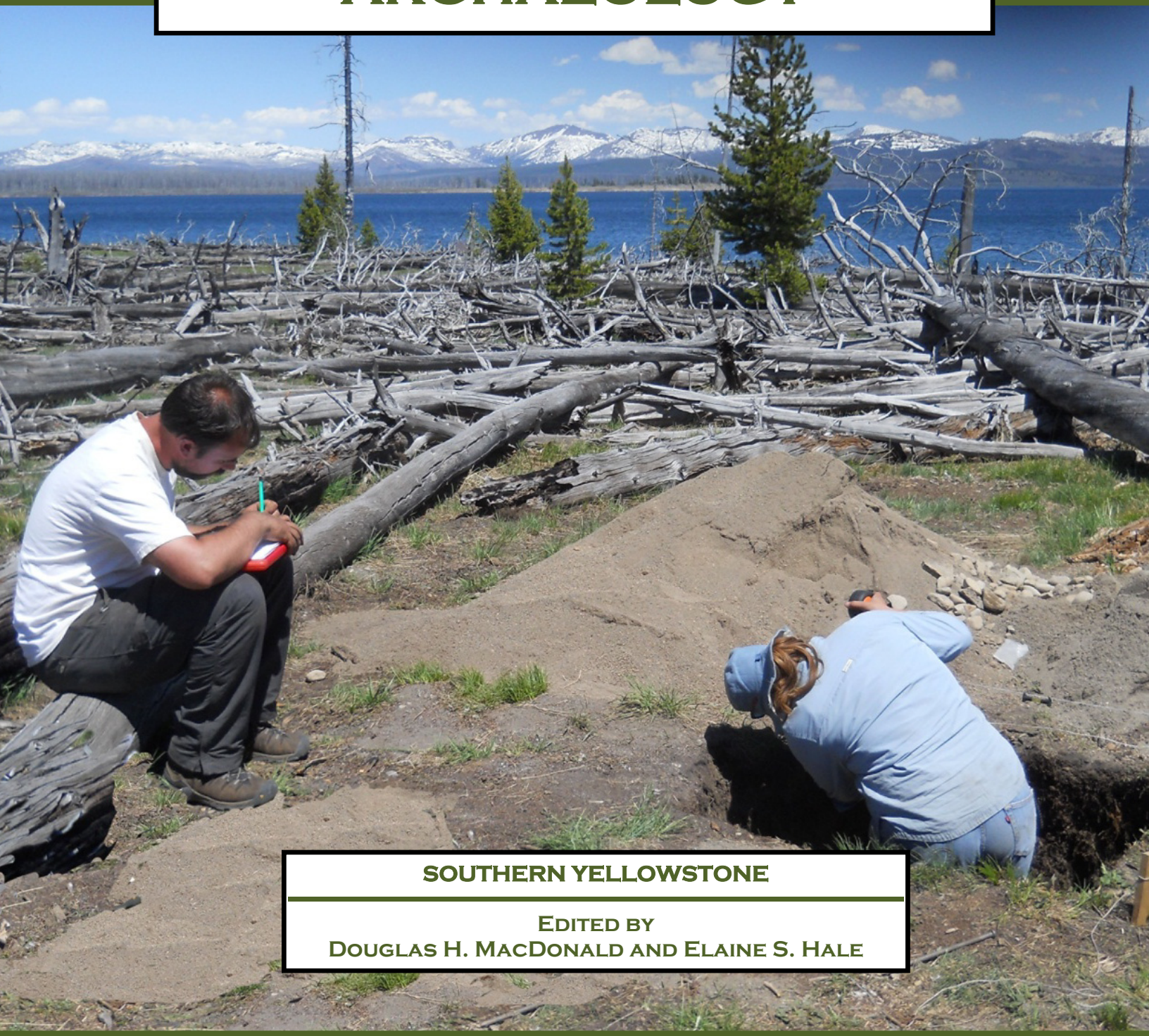
YELLOWSTONE ARCHAEOLOGY



SOUTHERN YELLOWSTONE

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CHAPTER 6

FROM ARNICA CREEK TO STEAMBOAT POINT: PREHISTORIC USE ON THE WEST AND NORTHEAST SHORES OF YELLOWSTONE LAKE

By Kenneth P. Cannon and Elaine S. Hale

During the 1990s, archaeologists from the National Park Service's Midwest Archeological Center (MWAC) conducted inventory, National Register testing, and data recovery excavations along Yellowstone Lake in support of Yellowstone National Park's (YNP) road reconstruction program. This work, in collaboration with Dr. Kenneth Pierce of the US Geological Survey, greatly expanded the knowledge of human habitation along the north and west shores of the lake (Cannon et al. 1994, 1996; Cannon et al. 1997; Figure 1). Chronometric data also contributed to knowledge of lake level change in relation to inflation and deflation of the Yellowstone Caldera (Pierce et al. 2007).

A complex of prehistoric archaeological sites at the mouth of Arnica Creek, on the West Thumb shores of Yellowstone Lake, was initially documented by the 1958-59 Montana State University (now The University of Montana) archaeological survey of YNP. One of the most important sites in this complex is the *First Blood site* (48YE449) so named because it produced the first evidence of pottery from YNP (Hoffman 1961). Excavations at the site in 1959 produced 33 sherds of pottery, likely from a single vessel, an obsidian triangular corner-notched projectile point, plus other tools and debitage manufactured from obsidian, chert, jasper, chalcedony, and quartzite. Also important was the presence of a buried soil. A Late Prehistoric occupation was suggested (Taylor et al. 1964).

Compliance-mandated investigations in 1992 by archaeologists from the Midwest Archaeological Center facilitated a return to Arnica Creek (Cannon et al. 1996). Limited excavations were conducted at four sites which produced a much richer story of periodic occupation from possibly as early as the Early Archaic through Late Prehistoric times.

Across the lake are the steaming geothermal features of Steamboat Point. There within the grassy bluffs overlooking Yellowstone Lake are a series of sites that produced a rich material culture of lithic and ground stone tools, as well as evidence of bison hunting. The sites, 48YE696, 48YE697 and 48YE701, provide evidence of seasonal occupation that dates back roughly 8,000 uncalibrated radiocarbon years ago (BP) based on the recovery of a Lovell Constricted projectile point. Obsidian, sourced predominantly to Obsidian Cliff, is the dominant lithic raw material of an assemblage that includes thousands of pieces of debitage, expedient tools, formal tools, bifaces and cores, indicating tool production was occurring at these sites. Ground stone artifacts were also recovered from the excavations, two of which tested positive for deer, another one for bovine/bison antisera, indicating domestic activities such as pemmican production or splitting of long bones for marrow extraction were taking place at the camp. Other tools tested positive for sheep blood, rabbit blood, cat blood on two artifacts, and canid blood, indicating a wide range of species were being utilized. The diverse tool assemblage at the Steamboat Point site suggests a longer term, multi-task, presumably warm seasons only, occupation (Cannon et al., 1997).

This chapter will present the unique qualities of each of the prehistoric occupation areas. Although different, they illustrate a uniformity of life ways of the hunter-gatherers through millennia of use of the landscape around Yellowstone Lake and a quality of life camped in a beautiful place with ample resources from which to secure sustenance. The work for this project was funded by the Federal Highway Administration, the National Park Service, and the U.S. Geological Survey. Many thanks to all who participated and made this project possible particularly Kenneth Pierce, George Crothers, Vince MacMillan, Linda Hulvershorn, Dawn Bringelson, the various field crew members, Cal Calabrese, Doug Scott, John Andresen, Ken Gobber, Ann Johnson, Adrienne Anderson, John Loundsbury, Dan Reinhart, Wayne

The information for this chapter was synthesized from portions of two archaeological reports*: Archaeological Investigations along the Arnica Creek to Little Thumb Creek Section of the Grand Loop Road, Yellowstone National Park, Wyoming* by Kenneth P. Cannon. George M. Crothers, and Kenneth L. Pierce, 1996, and *Results of Archaeological and Paleoenvironmental Investigations along the North Shore of Yellowstone Lake, Yellowstone National Park, Wyoming: 1990-1994* by Kenneth P. Cannon, Kenneth L. Pierce, Paul Stormberg, and Michael Vincent MacMillan, 1997. Both reports are publications of the Midwest Archaeological Center, Lincoln, Nebraska.

Hamilton, and Grant Meyer.

The West Shore of Yellowstone Lake: The Arnica Creek Complex

The initial documentation of the area identified several surface scatters of artifacts on several terraces of the Yellowstone Lake shoreline near the mouth of Arnica Creek on the West Thumb (Figure 2). The 1958-59 Montana State University (MSU) crew recorded each surface scatter as an individual site but later surface and subsurface investigations by the MWAC crew found no separation between the site 48YE449, the First Blood site where the first pottery sherds in the park were documented, and the nearby site 48YE457, The Brothers site, another surface and subsurface lithic scatter adjacent to 48YE449 but on a higher terrace of the shore. Appropriately the sites were combined and are further investigated and documented as 48YE449/457. The other sites located at the mouth of Arnica Creek are site 48YE395, named (somewhat dubiously) the Fish Trap site, and 48YE454, the Teton View site.

All of the sites lie within the lacustrine terraces at the mouth of Arnica Creek which flows into a lagoon protected from prevailing winds by naturally formed off-shore storm bar deposits –a spit on which site 48YE395 is located. The elevation of the area is around 7700 ft. (2367 m) AMSL with the main evidence of cultural activity in areas of open meadows adjacent to the lakeshore and creek and on the spit. Cultural materials were not found in the area of the lodgepole pine overstory and it is possible that the forest may be encroaching on the meadow area which may have been more open in the past (Jakubus and Romme 1993).

Vegetation in the meadow areas is fairly sparse, consisting of numerous low-growing species which favor very well-drained sandy soils. A cursory vegetative

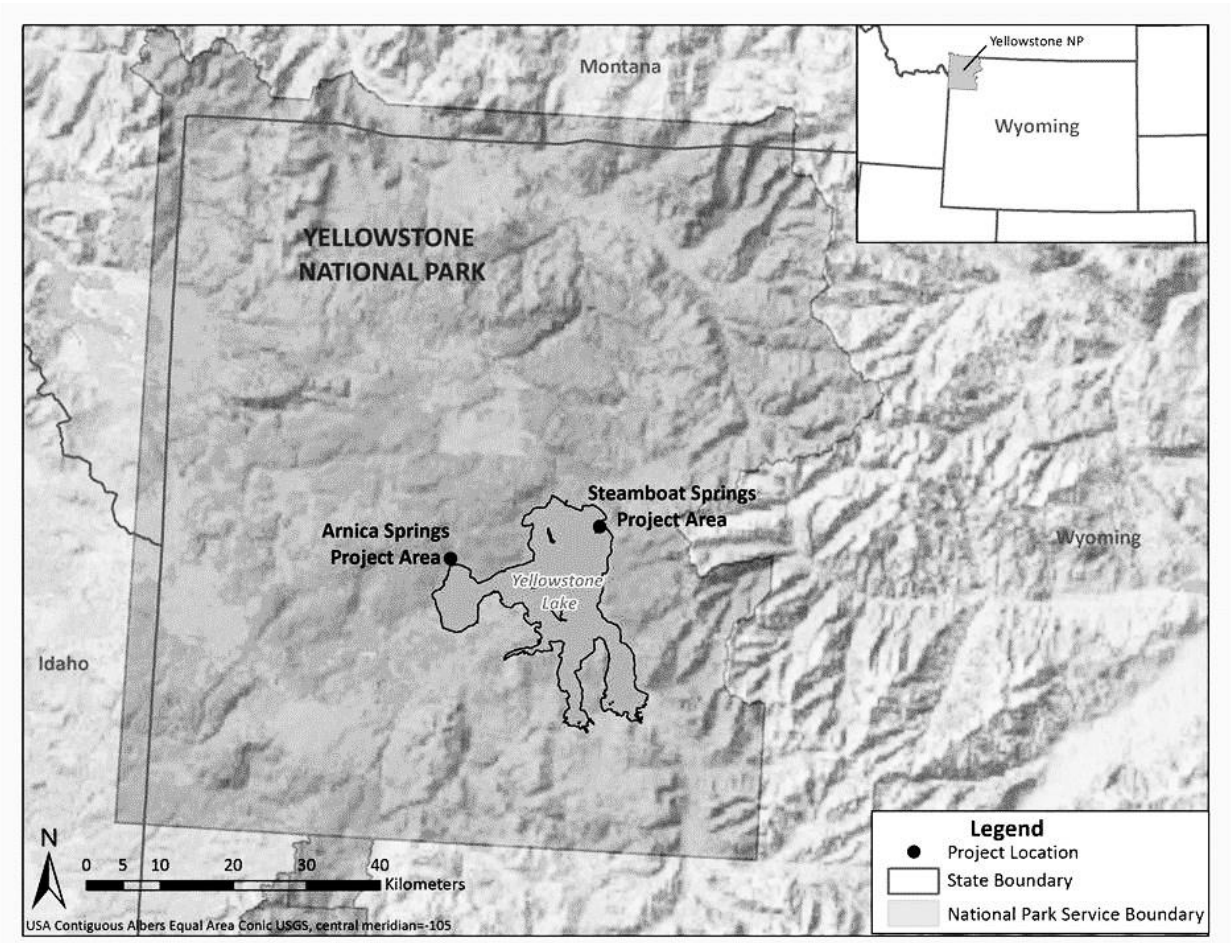


Figure 1. Location of Arnica Creek and Steamboat Point within Yellowstone National Park.

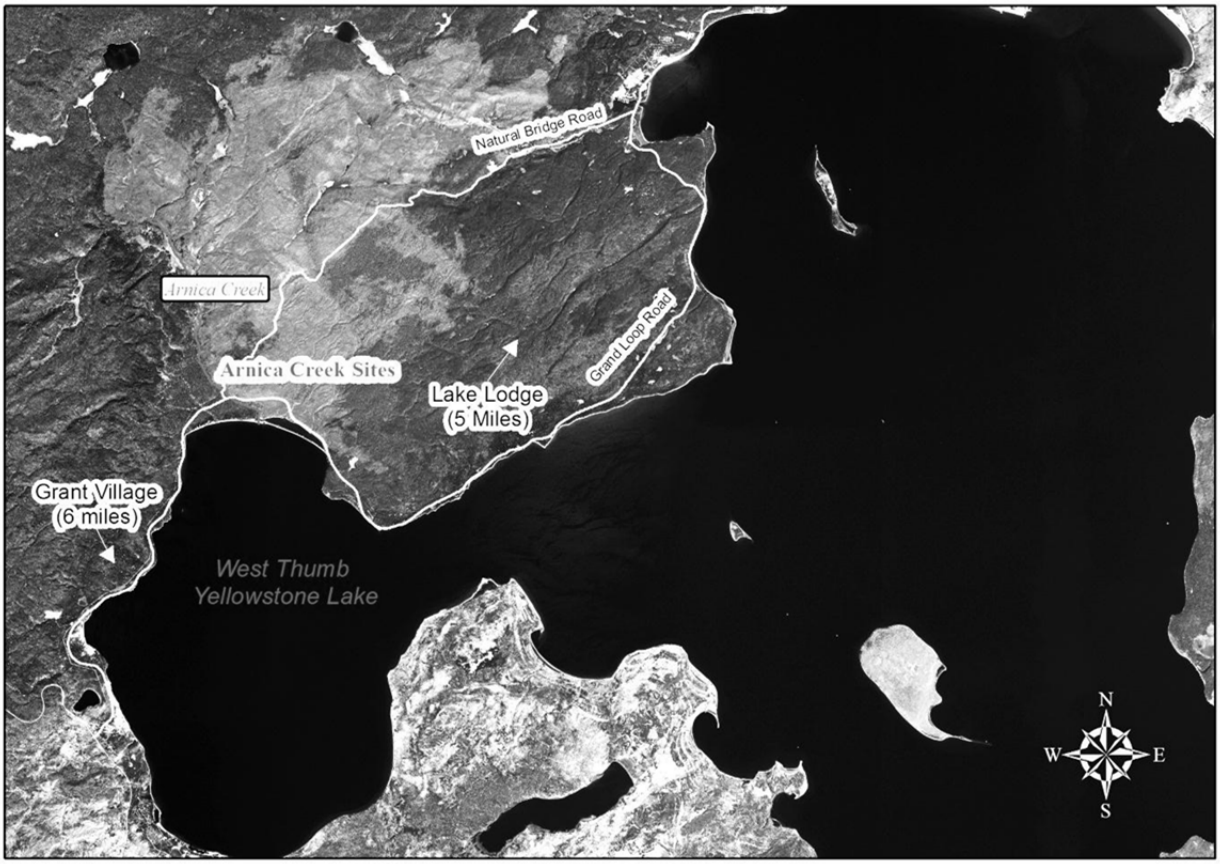


Figure 2. Map of Arnica Creek Project Area.

inventory found lupine, buckwheat, stipa, phacelia, wild rose, plox, *Potentilla* sp. Jacob's ladder, silver sage, yarrow, and penstemon, among others. There was less vegetation on the spit due to the seasonal reoccupation of the landform by the lake.

The modern climate regime for Yellowstone Lake is considered severe. Mean annual temperature at the Yellowstone Lake Station (elevation 7741 ft. [2359 m] AMSL) is 32.3^{o}F with the mean monthly temperature ranging from 10.7 ^{o}F in January and 55.2 degrees (F) in July. Precipitation, falling mainly as snow, exceeds 30 inches (76.2 cm) per year (Dirks and Martner 1982) and the lake is usually icebound from December until late May.

Yellowstone Lake represents the remnants of a massive caldera which collapsed approximately 600,000 years ago. The northern and western portions of the caldera were subsequently filled by successive rhyolite flows between 160,000 and 70,000 years ago. At present, geysers, thermally influenced areas, and hot springs surround the lake and attest to the continuing volcanic and geothermal activity in the area (Christensen and Blank, 1975). The West Thumb portion of the lake, where Arnica Creek is located, is also the result of volcanic activity, probably having been formed between 200,000 and 150,000 years ago after the collapse of another caldera (Christensen and Blank 1972).

The 1992 MWAC research interests were oriented towards gaining a better understanding of the occupation in light of current knowledge concerning lake-level change. In subsequent years it has been recognized that many sites located on the Yellowstone Lake shores are indeed being lost to erosion. The work conducted at Arnica Creek by MWAC incorporated the geologic expertise of Dr. Kenneth Pierce whose study and current understanding of lake level changes suggests at least three and possibly six major cycles of caldera uplift and subsidence which influenced changes in the levels of Yellowstone Lake over the past 10,000 years (Pierce et. al. 2007), possibly influencing human settlement (see McIntyre and Sheriff, this volume)

48YE449/457—The First Blood Site

In 1970 J. J. Hoffman returned to the site he initially documented and extended its boundaries farther west to the mouth of Arnica Creek and with the 1992 addition of site 48YE457, three subareas of the site were identified and investigated separately by the MWAC crew. Subarea East is the original site as defined by the 1958-59 MSU archaeologists and contained the ceramics. Subarea West is the meadow adjacent to the mouth of Arnica Creek, and Subarea 457 is the addition of the adjacent site. The extension of this site complex entails about 45,000 square meters.

Prior to excavation of the expanded First Blood site, a surface collection of artifacts resulted in the recovery of a chert projectile point, four retouched obsidian flakes, four obsidian biface fragments, one rhyolite biface fragment, one quartzite biface and a mottled reddish grey chert biface (possibly a preform). Twenty five shovel tests were conducted to assess the continuity of buried cultural material. Seventy-two percent were positive for buried cultural material and two obsidian projectile point fragments were recovered.

Excavations in the Subarea East recovered five more ceramic sherds, one of which is a rim sherd with a rounded tip (Figure 3). These may have been from the same pot reconstructed from the 33 sherds recovered by the MSU crew in 1958-59. The pot is stylistically similar to Intermountain Ware and the nature of the inclusions in the paste suggests a local origin for the clay (Figure 4). Three projectile points were also recovered in this subarea (Figure 5), one an obsidian corner-notched likely Late Holocene point, another a red obsidian serrated point tip suggesting a possible Late Prehistoric age and the third, a triangular obsidian point with wide corner-notches and a straight base, also suggesting a Late Holocene age. Subarea East also produced radiocarbon samples from the A Horizon or "the old occupation level" as described by Taylor et al. (1964) with the mean of the two dates at 1320 cal years BP (Figure 6). This date is consistent with ages obtained elsewhere for similar projectile point styles.

Subarea West, the portion of the site added on by Hoffman in the 1970s is located on the first terrace above the mouth of Arnica Creek. This area produced a much larger and more diverse array of cultural remains, implying more intensive utilization of the area. The artifact density was five times more than that of Subarea East. No ceramics were recovered from this unit. The projectile point fragments (Figure 5) include an indented base obsidian point with some affinity to McKean types (Figure 5c-d), but smaller; a point fragment with a straight serrated blade of banded tan chert, similar to Avonlea-type point (Figure 5h); one obsidian corner-notched straight-based point recovered in association with a 1500-year-old radiocarbon date (Figure 5g); and an obsidian point base fragment too incomplete for positive identification (Figure 5i), but an eared tang and the depth at which it was recovered suggests an Oxbow (Middle Holocene) association. Two radiocarbon dates were obtained from wood charcoal from within a feature deposit (F92-2) dated to 4575±67 (5297 cal) years BP (Figure 7), suggesting a middle Holocene age. Macrofossil remains from the feature include *Carex* sp., S*alvia* sp., and *Silene vulgaris.* The dominant taxa was initially identified as *Hydrophyllum capitatum* (waterleaf) but later suggested they were actually clubmosses or horsetail. Pollen samples from this feature were identified as *Artemisia* with low levels of *Pinus* and

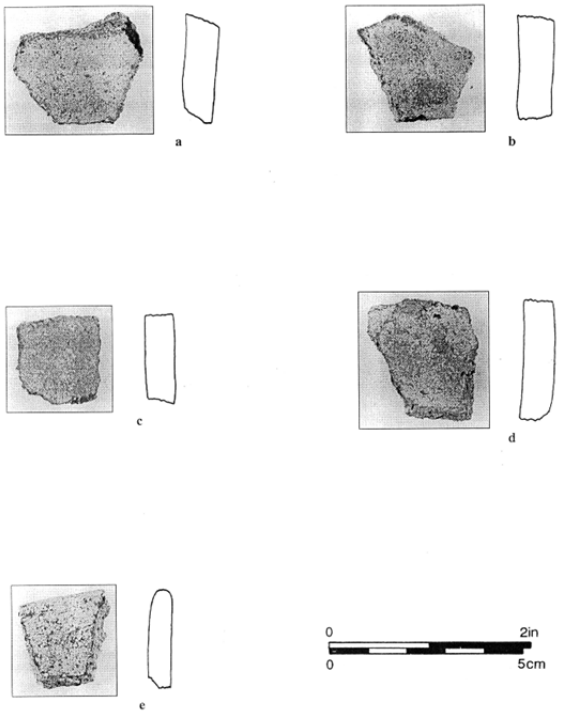


Figure 3. Ceramic Sherds, First Blood Site

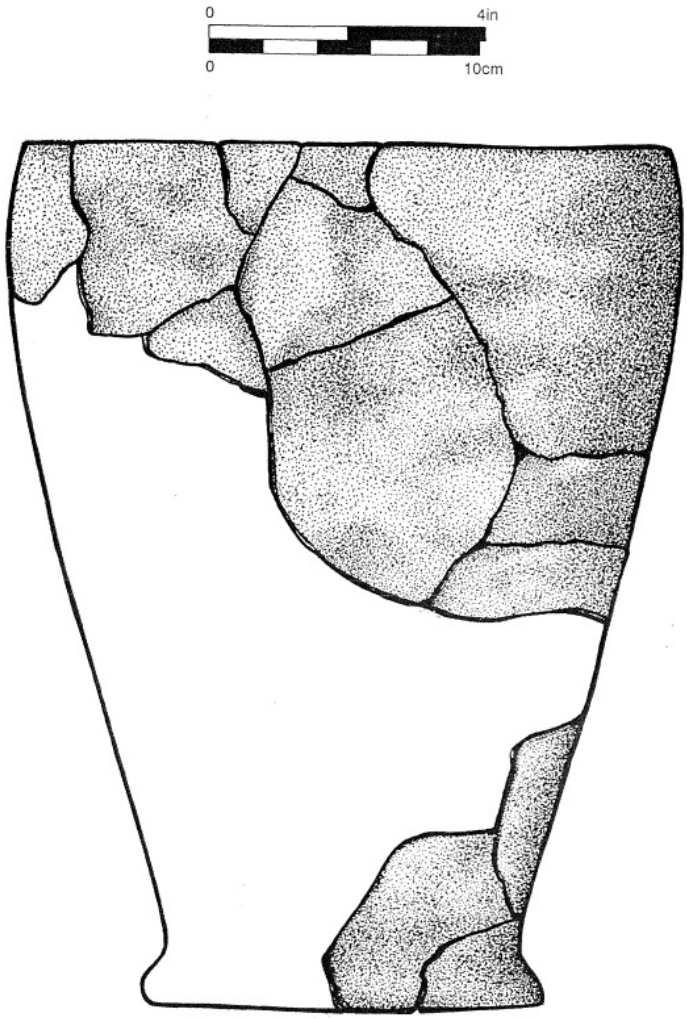
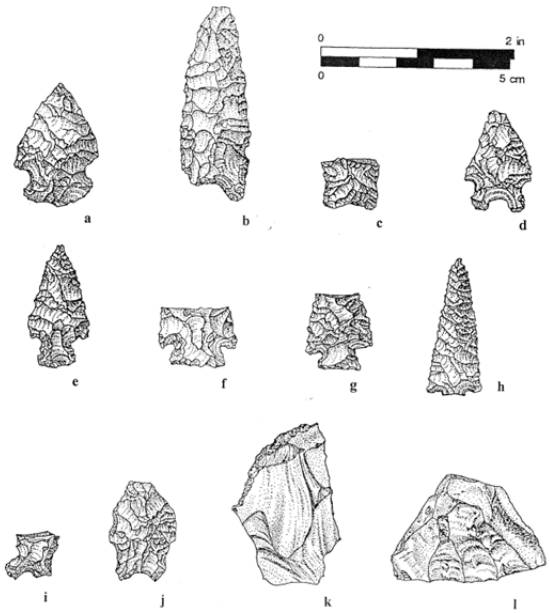


Figure 4. Reconstruction of Intermountain Ware Vessel, First Blood Site.

Figure 5. Projectile Points, First Blood Site.



Gramineae pollen types.

Radiocarbon samples of wood charcoal from a fired rock feature (F92-4) eroding out of a sloping cutbank provided dates statistically the same at 1626 cal years BP. Analysis of the macrofossils from this feature include *Carex* sp., *Chenopodium* sp., cf. *Hydrophyllum capitatum, Picea engelmannii, Pinus albicaulis, Pinus contorta, Pinus* sp., *Potamugeton* sp., *Spergula arvensis,* and *Viola* sp. A single pollen sample from the feature produced frequencies of *Pinus* and *Artemisia* similar to modern samples. The elevated frequency of Gramineae pollen suggests possible economic utilization of grasses.

The features excavated in Subarea West produced dates from the Mid-Holocene through the Late Holocene and evidence of plant processing, which in 1992 and to date, is very limited in the park.

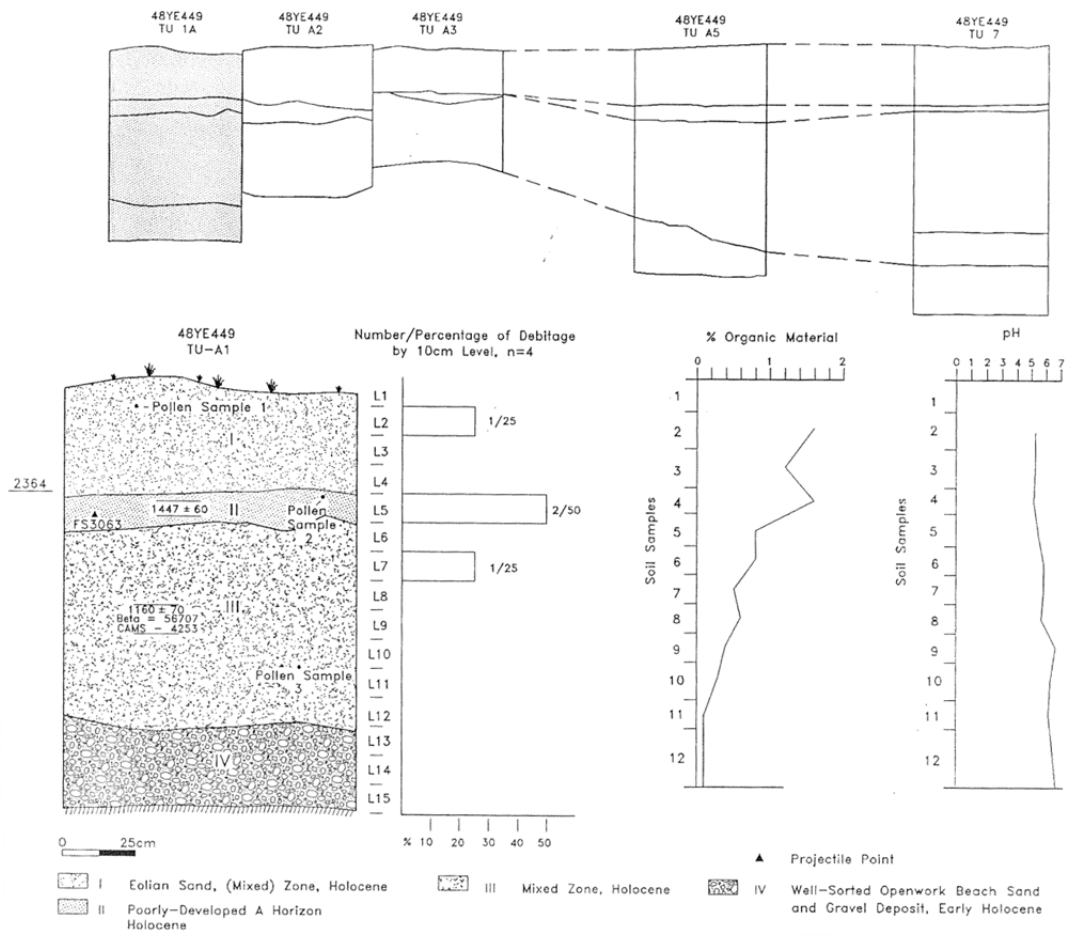


Figure 6. Profile of Test Unit A1, First Blood Site.

Investigations in Subarea 457 indicate continuous deposits along the eastern bank of Arnica Creek identifying it as a subarea of the First Blood site. Buried cultural deposits indicate a chronology contemporary with deposits near the mouth, as represented by several mid Holocene McKean-like projectile point bases (Figure 5). A large number of flakes recovered from this area provide an artifact density which is three times that of Subarea West. Obsidian dominates all of the artifact counts by about 80% throughout the site. Two general time periods are represented by both the diagnostic projectile points or point fragments and the radiocarbon dates: the Middle Holocene (Archaic) and the Late Holocene (Archaic). Possibly the earliest point represented in the assemblage is a side-notched point with a convex base (Figure 5a) which fits within the range of the Blackwater Side-notched points from Mummy Cave Layer 16 which dates to about 7630 years BP (Husted and Edgar 2002).

Curiously, few formal or expedient tools were recovered from this site. The assemblage consists only of biface fragments and utilized flakes. Only one scraper was recovered from excavations by MSU. Debitage from the site is consistent across the three subareas and fits the expectations of an assemblage associated with maintenance activities such as tool resharpening. No evidence of early-stage reduction is suggested by the assemblage, which is dominated (99.23 percent) by interior flakes.

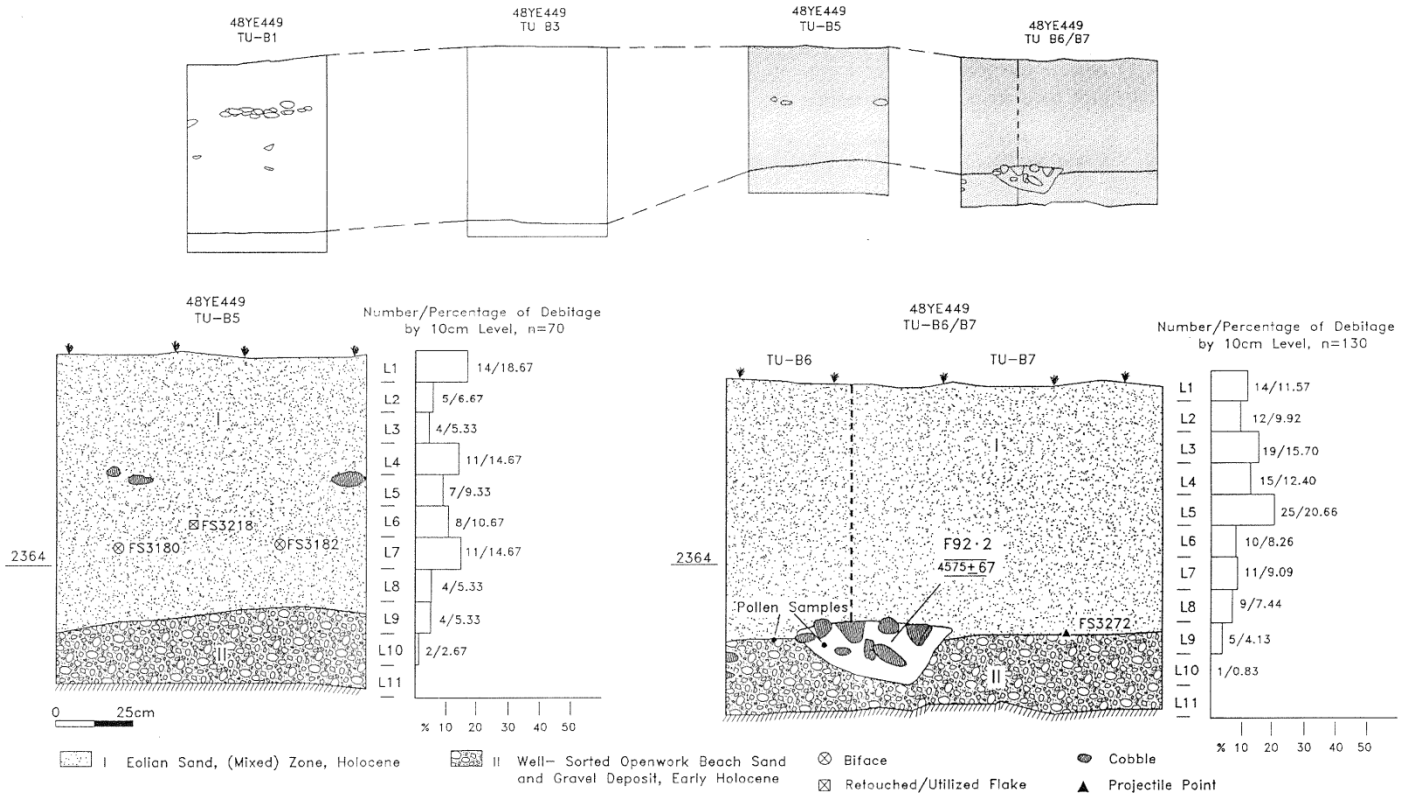


Figure 7. Profiles from the First Blood Site with detail of Test Units B5 and B6/7 (F9202).

48YE454—The Teton View Site

This site lies across the mouth of Arnica Creek from the First Blood site within similar aged deposits of eolian sands. The site was originally recorded in 1959 and the first National Register testing was conducted in 1992 for contemporaneity of deposits with the First Blood site as well as to understand the duration and nature of the prehistoric occupation.

A more substantial mantle of eolian sands is present on site 48YE454 than on the east side of Arnica Creek, and safety concerns (collapsing unit walls) did not allow excavations to continue until sterile levels. Therefore, the recovered assemblage should be considered representative only of the latest occupations; older, deeper deposits may also be present (Figure 8).

Diagnostic projectile points (n=8) were recovered from the surface and subsurface excavations (Figure 9). They include a quartzite Avonlea-like point (Figure 9a); a Late Prehistoric obsidian side-notched point; a broad corner-notched Late Holocene (Archaic) point with expanding base and serrated blade (Figure 9c); the base of an obsidian point too small for identification; two obsidian point tips (not diagnostic); the base of a split-stemmed obsidian point (Figure 9d); and the tip of a red chert projectile point (Figure 8).

Test Unit 8 produced a large number of chert flakes in Level 12 suggesting a lithic workshop area. Two radiocarbon ages provide a weighted average age of 3822 cal years BP dates (Figure 10). Nearly 900 artifacts were recovered from the surface and subsurface deposits at site 48YE454 with debitage being the largest class of artifacts at 878 items. In contrast with the First Blood site, obsidian is not the dominant material type recovered. Chert is the largest class but that predominance may not represent the site as a whole, possibly just the lithic workshop area (Figure 10). The debitage size and virtually no cortical flakes suggest late stage biface reduction and tool rejuvenation. The tool

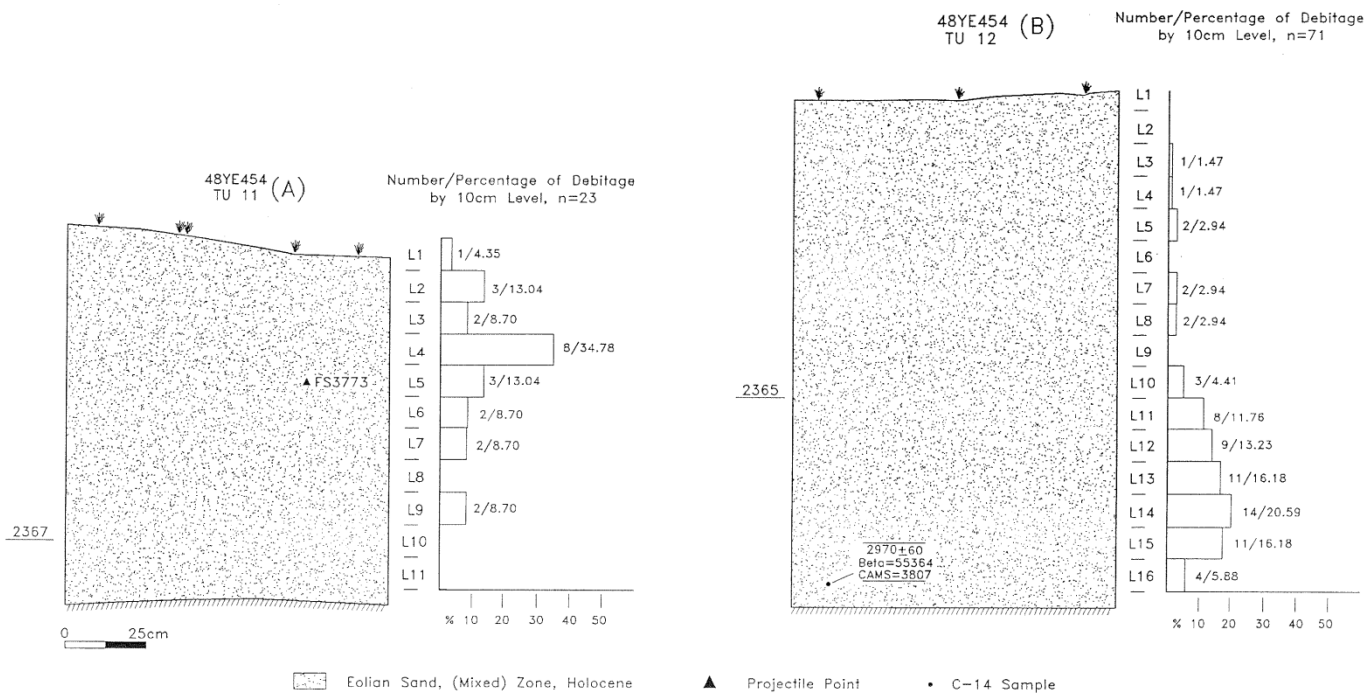


Figure 8. Profile of TUs 11 (A) and 12 (B), Teton View Site, 48YE454.

assemblage from the site is very limited, represented by only three expedient tools.

The age of occupation of site 48YE454 comes from two sources: radiocarbon dates and the cross-dating of projectile point styles from which two periods of occupation can be surmised. However, the sample may be biased since the potential of wall collapse prevented excavation below 1.5 meters. Middle Holocene (Archaic) occupation of this site is suggested by the three radiocarbon dates obtained from charcoal in stratigraphic association with cultural material. The split-stemmed base recovered from the site suggests occupation around 3980 years BP (Figure 9d). Other projectile points recovered from this site suggest Late Holocene occupation and several Avonlea-like points suggest Late Prehistoric occupation of the site (Figure 9a-b).

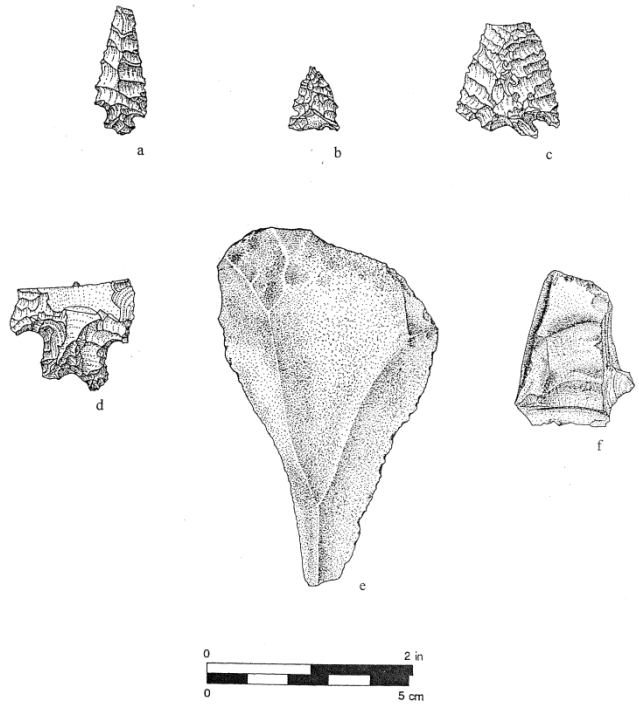


Figure 9. Projectile Points from the Teton View Site.

48YE395—The Fish Trap Site

Originally recorded by MSU in 1958 as a lithic scatter on the west end of a sand spit 75 yards south and 50 yards west of the mouth of Arnica Creek, the site (spit) receives the brunt of onshore winds and wave energy action. Vegetation is sparse with a few lodgepole pines,

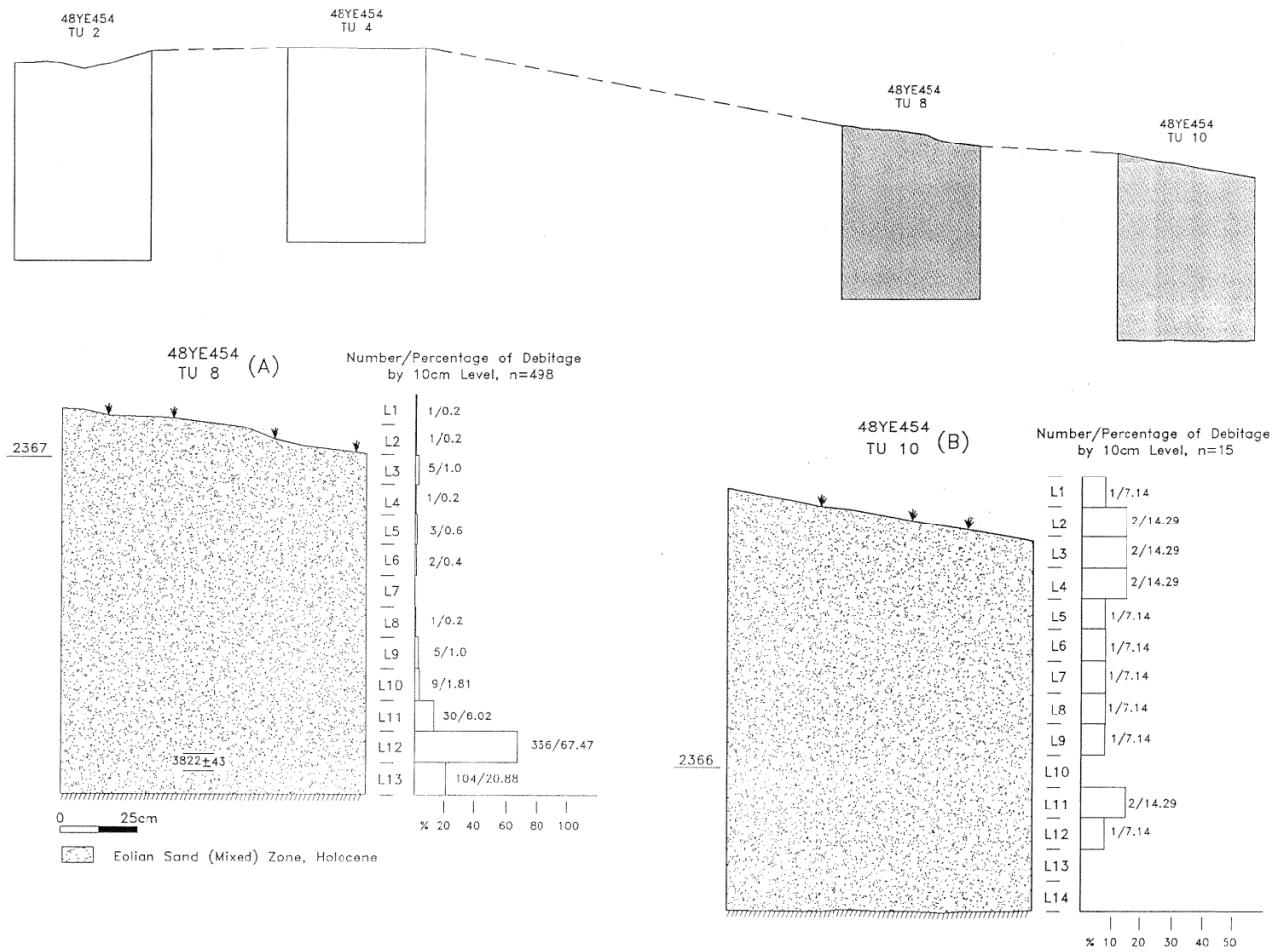


Figure 10. Profile of Test Unit 8 (A) and 10 (B), Teton View Site (48YE454).

and low-growing species such as penstemon, buckwheat, *Potentilla* sp., yarrow, silver sage, among others.

It is unknown whether fish were trapped behind the spit which never completely closes, or if prehistoric hunters used the spit to trap fish. Work by Kenneth Pierce, and more recently by YNP geologists, confirms that the spit is of natural origin. But from the prehistoric stone artifacts found on the spit, it is certain that prehistoric people used the spit.

A pedestrian inventory of the site in 1992 produced five obsidian bifaces, two expedient tools (one obsidian, one quartzite), and three projectile points from the surface. The projectile points include a side-notched brownish chert dart point that is similar to the Blackwater Side-notched point from Layer 16 (mid-Holocene) at Mummy Cave (Husted and Edgar 2002; Plate 13 and Table 3); a basal portion of an eared white chalcedony point that appears to have been notched at the base and is within the range of either McKean or Elko types; and an Oxbow-like point manufactured from tan translucent chalcedony. A black basalt lanceolate biface, with water erosion and an edge-worn obsidian flake which possibly functioned as a scraper were also recovered from the spit. Subsequent re-examination of the spit in 2002 with a student crew from Wichita State University and the University of Arkansas recovered seven chert and quartzite scrapers (Don Blakeslee unpublished field notes, 2002). The latest inventory took place after the extreme high water years of 1996 and

1997 which may have washed away sands and small gravels exposing the scrapers.

The possibility exists that the artifacts may represent re-deposited materials eroding from the sites on the terraces. However, the number of Middle Holocene (Archaic) projectile points and the limited subsurface assemblage suggest evidence of *in situ* deposits. This site likely represents a work area used by the same groups occupying the near-by terraces. It is logical that hide scraping, processing of game, and other similar activities which would be made easier with ready access to water could have occurred on the spit which is easily accessible most of the summer months.

Although the site does not have sufficient cultural material, and the fact that the site is cyclically deflated by rising lake levels, it is not considered eligible for the National Register. Nevertheless, it is an area closely associated with the First Blood and Teton View sites that are eligible for National Register listing and this area should be considered as part of the Arnica Creek Archaeological Complex.

Northeast Shore of Yellowstone Lake

Beginning in 1989 the MWAC began recording and assessing 17 sites along the north shore of Yellowstone Lake as part of road reconstruction of the East Entrance Road which included testing at sites 48YE1 and 48YE304 near the outlet of the lake (Cannon et al., 1994). The culmination of this work occurred in 1993 and 1994 with the data recovery excavations being conducted at three sites in the vicinity of Steamboat Point (48YE696, 697, and 701; Cannon et al. 1997). Of particular importance are the results of two sites, 48YE697 and 48YE701, which are discussed below. Figure 11 shows the general location of the sites.

<u>48YE697—The Windy Bison Site</u>

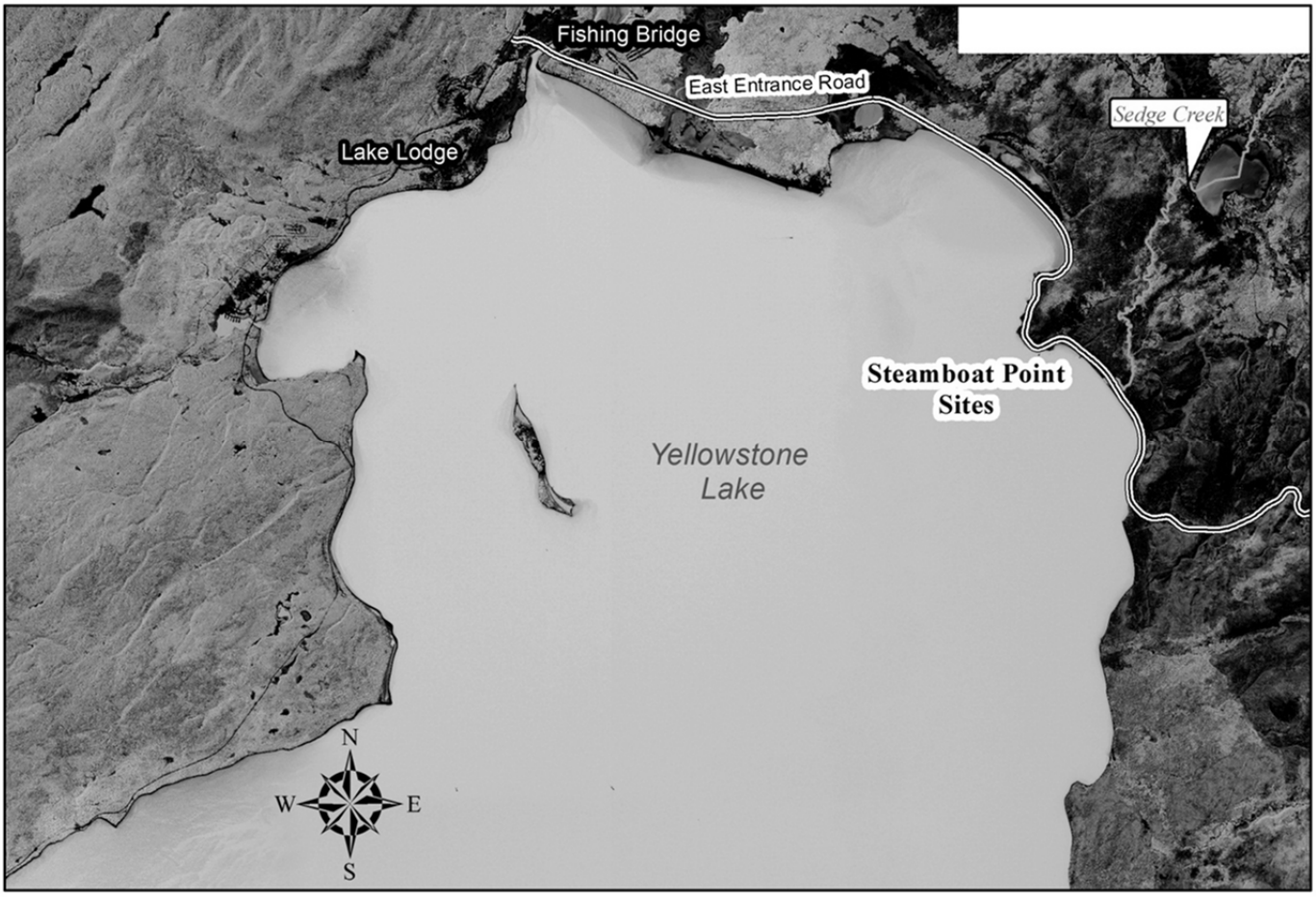
The Windy Bison site (48YE697) was initially recorded in 1989 during the East Entrance Road survey (Cannon 1990). Near the edge of the cutbank in an area that appears to represent a blowout, many flakes were observed on the surface. However, the aspect of the site that was most intriguing was the exposure of bone in the cutbank. Testing in 1990 was conducted in several areas across the site, but the small bone bed was the most significant aspect of the site.

In 1993 and 1994 data recovery excavations were conducted by MWAC which included excavation of the bone bed, as well as the investigation of other portions of the site. However, the bone bed was the main focus of the investigations. Excavations entailed 23.2 m^3, plus the excavation of two backhoe trenches for the investigation of the site's geomorphic history.

The Windy Bison site is within eolian sands along the north shore of Yellowstone Lake at the eastern boundary of Sedge Bay (Figure 12). The area has been referred to in the past as Earthquake Camp, named by Dr. F.V. Hayden after an earthquake was felt by the expedition while camping here on the night of 19 August 1871 (Haines 1977). A photo of the campsite was taken by William H. Jackson (Figure 11).

Figure 11. Photograph of Hayden Earthquake Camp by W.H. Jackson near Sedge Bay and the Windy Bison Site. August, 1871 (Negative Number 106). Courtesy of U.S. Geological Survey.

Figure 12. Map of the Steamboat Point Project Area.



The site is situated in an open meadow with isolated sagebrush. Overstory species include subalpine and Engelmann spruce. Changes in the vegetation since the Hayden expedition indicate an encroachment of overstory species on the meadow, a pattern observed in other portions of the Central Plateau (Jakubos and Romme 1993). They attribute the tree invasion of dry meadows to regional climatic shifts towards warmer and wetter growing seasons since the end of the Little Ice Age (ca. 1870). The modern on-site community is described by Despain (1990) as the Subalpine fir/western meadow rue habitat type.

The geomorphic context of the site consists of Holocene-aged lacustrine deposits of eolian coarse to medium sands (Figure 13). The sands tend to be poorly sorted and have probably undergone mixing by tree throws and rodent burrowing, as suggested by the general lack of internal stratification. However, at the western edge of the site two paleosols were described and dated in 1990. At about 1.9 m below surface a distinct organic layer is present. This clay loam deposit, Stratum VI, is about 10 cm thick and dark grayish brown in color. A bulk soil sample produced an age of 4260 ± 60 BP (Beta-38813). A second paleosol is present from about 1.6 to 1.75 , below surface (Stratum IV). This dark grayish brown clay loam produced a bulk soil age of 1620 ± 50 BP (Beta-38812). Between these two paleosols is a brown sandy clay loam disconformity (Stratum V) that may represent a period of erosion or limited deposition.

Climatic change is usually the mechanism driving landform stability and the development of soils; however, at this site lake level change may be a more

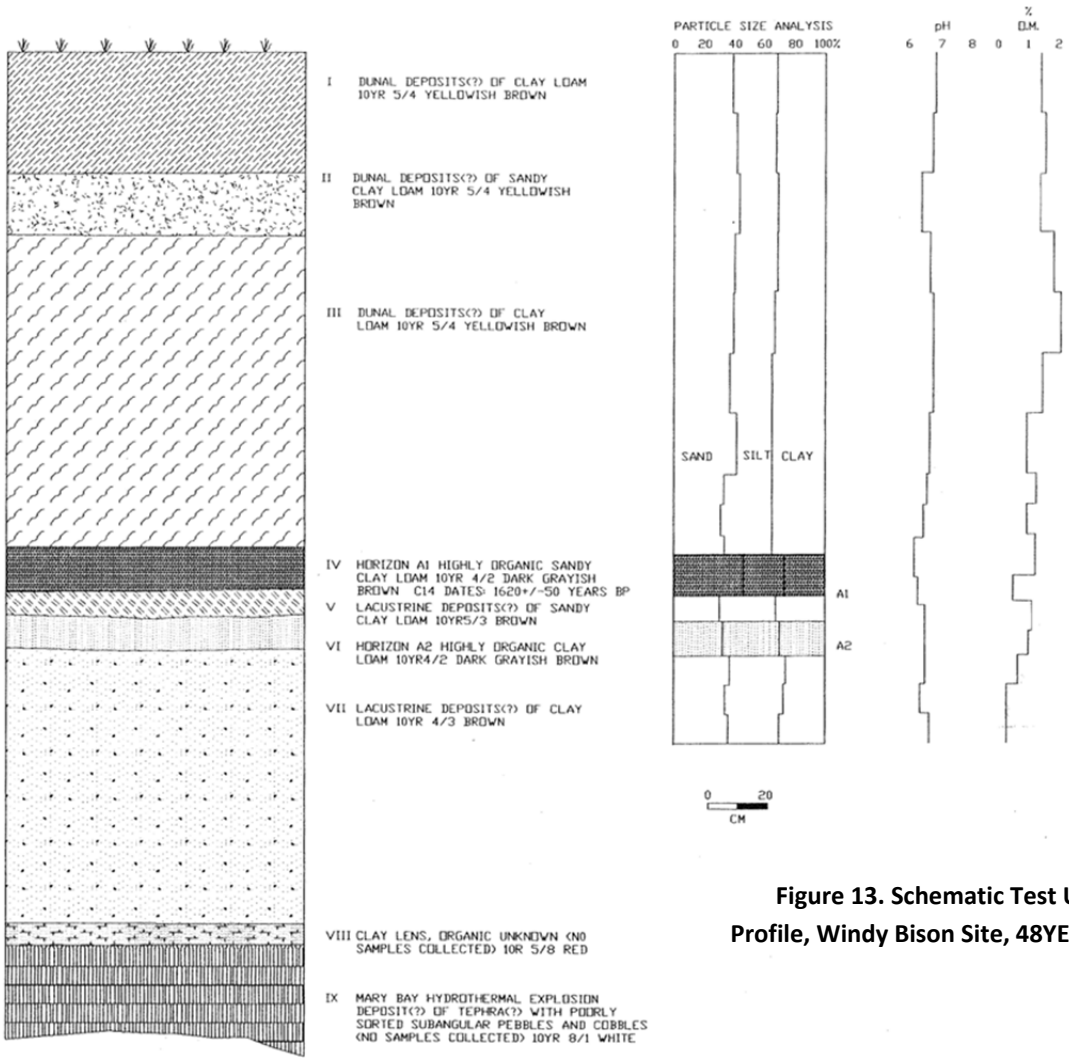


Figure 13. Schematic Test Unit Profile, Windy Bison Site, 48YE697.

important factor driving this system. When the lake is high, constant wave-lapping and periodic storm surges act to maintain an unstable cutbank that cannot support vegetation. As wave action continues to undercut the bankwinds pick up the sediments and redeposit them on the beach surface. This type of lake regime provides a ready source of depositional material that produces rapid buildup. At the opposite extreme, when the lake is at a low stand, wave action is reduced and the bank remains stable. During this time, deposition is limited and soils have an opportunity to form (Kenneth L. Pierce, personal communication 1990).

The role of hydrothermal activity in the geomorphic history of the site has not been fully assessed. Deposits of altered and angular rock, tentatively identified as hydrothermal ejecta, have been mapped and described across the site. A subaqueous vent is present at the western portion of the site and visible during late summer when lake levels are low. Hydrothermal input (e.g., increasing temperature with depth) has also been detected by soil temperature probes placed on the site for obsidian hydration dating (Cannon et al. 1997). Ground heating may have been an attraction for game in the past, as it is today around Steamboat Springs and Beach Springs, and other thermal areas (Meagher 1973).

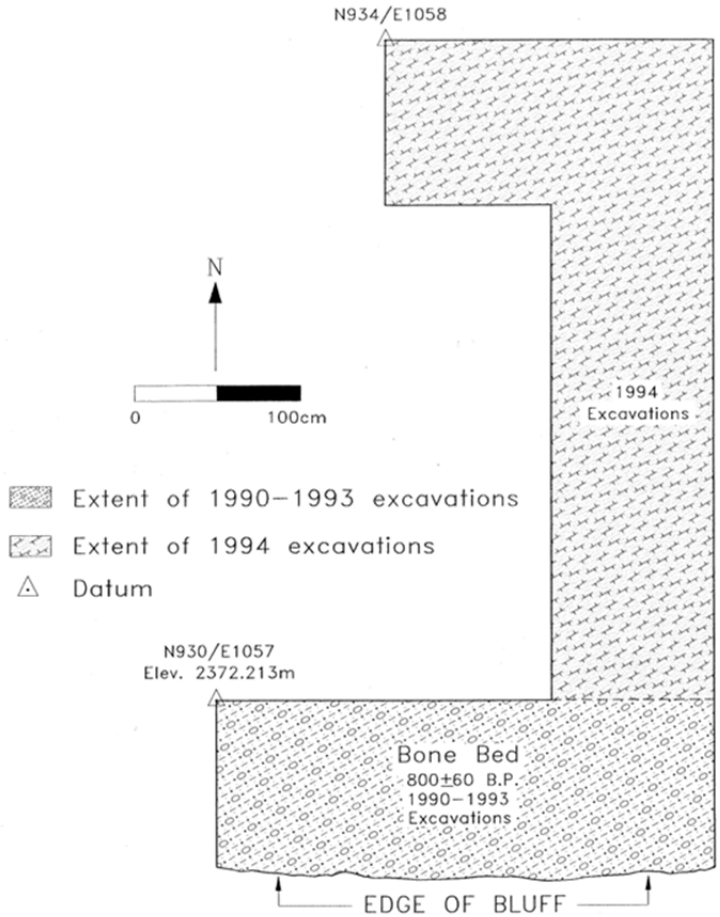


Figure 14. Planview of Excavations, Windy Bison Site, 48YE697.

As previously mentioned, initial investigations at the site in 1989 and 1990 (surface collection and four test units) provided evidence of buried deposits (Figure 14). While the lithic assemblage was limited to the recovery of 17 bison elements, the associated debitage and fired rock provided impetus for returning to the site to conduct data recovery investigations.

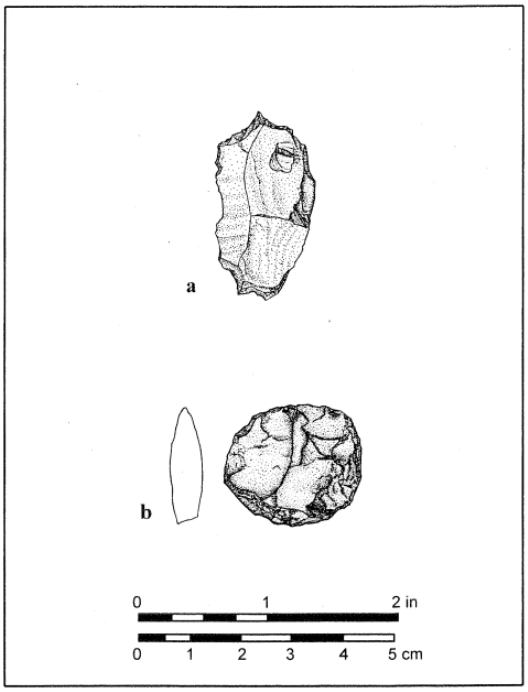


Figure 15. Unifacial Flake Tools from Bone Bed, Windy Bison Site, 48YE697.

The bone bed was the main focus of the 1993-1994 investigations (Figure 14). This block excavation was terminated at a depth of approximately 110 cmbd and produced two stratigraphically consistent radiocarbon ages. The upper age, 360 ± 60 BP (Beta-78906, CAMS-17810), was provided by a charcoal wood fragment from a burn zone exposed in the west wall of N936/E1059 at 22 cmbs. The lower age, 800 ± 60 BP (Beta-38723), was provided by a collagen age from an unburned bison rib.

The lithic assemblage from the site consists of 376 pieces of predominantly tertiary flakes (98.4%), two expedient tools, and two formal tools. Among the debitage, obsidian is dominant (73.14%), followed by chert (24.54%), and then other material types (4.52%). Among the tools, half are obsidian and half are chert. The debitage assemblage indicates resharpening and late-stage bifaces reduction were the main activities.

The tool assemblage from the Windy Bison site is rather limited consisting of two formal tools and expedient flake tools. The formal tools consist of a chert graver and a chert scraper (Figure 15). The employable units identified on the formal and expedient tools indicate they were used for a number of tasks that range from the heavy working of bone or wood, heavy cutting of semi-rigid or rigid materials, and cutting of yielding to semi-rigid materials.

Sixty-one faunal elements were recovered during the 1993-94 excavations. The majority (n=59) were recovered in the bison bone block (Figure 16; Figure 17). Four mammalian species are represented, but only the bison can unequivocally be associated with the human occupation of the site.

In addition to bison, the olecranon portion of the left ulna from an elk (*Cervus elephus*)was recovered from N930/E1058 at a depth of 49 cmbd. This element was recovered in the higher portion of the unit that produced the bison bone. In 1990, two elk elements (an unsided metatarsal and the portion of a right illium) were also recovered from the cutbank below the bone bed, suggesting that a larger deposit of bone (possibly multi-period occupations) may have been present at one time, but has since eroded into the lake.

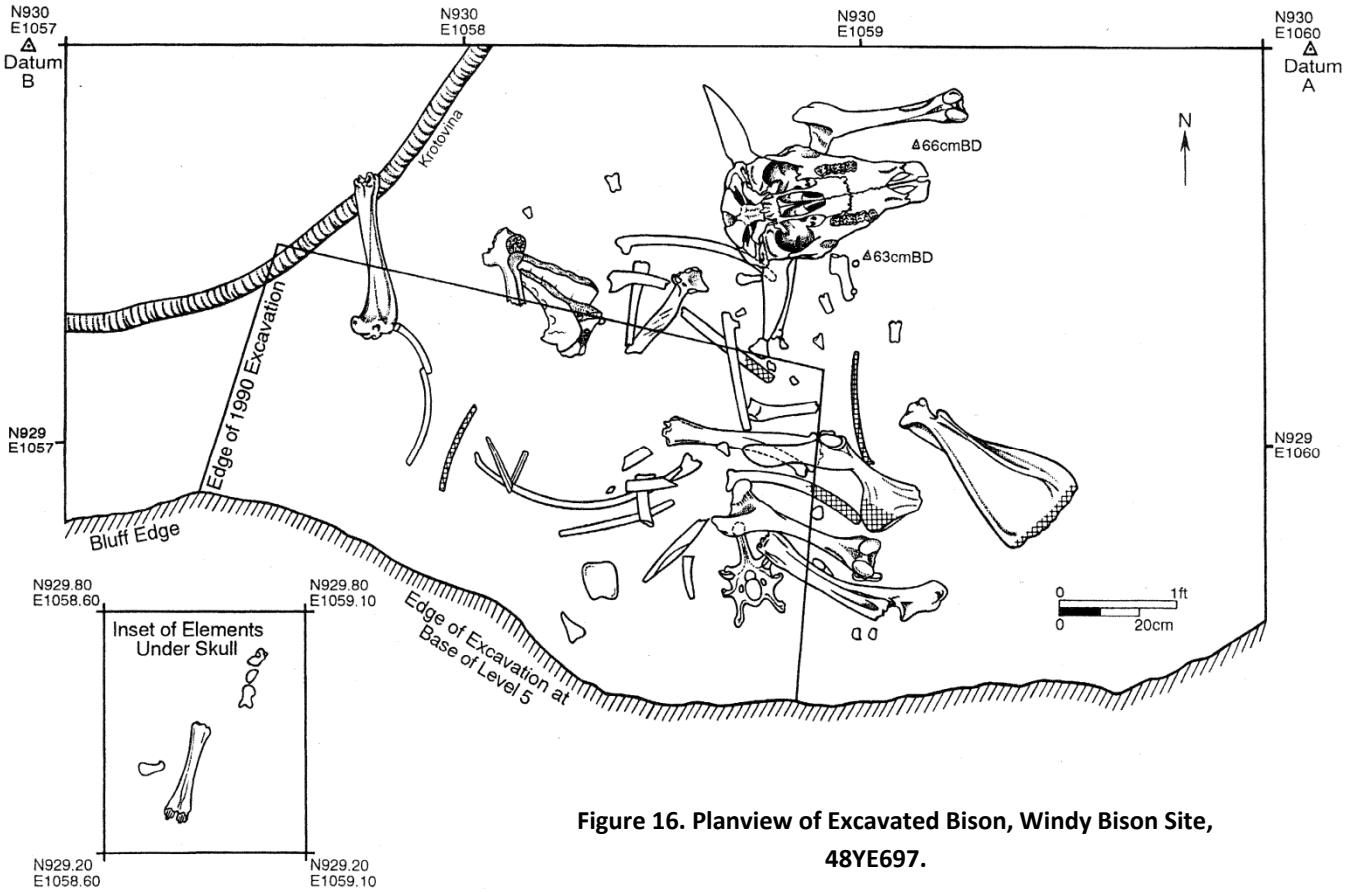


Figure 16. Planview of Excavated Bison, Windy Bison Site, 48YE697.

Fifty-eight bison (*Bison bison*) elements were recovered from excavations at this site, with all but a right tibia (N959/E1025 at 144 cmbd) being recovered from the bone bed. The bone bed extended between depths of 50-70 cmbd within portions of excavation levels 4-7. The elements consist of almost the complete skeleton of a young bull bison in association with obsidian flaking debris. The most notable elements missing are the mandibles, which may have eroded into the lake. Although the bison appears to have been minimally butchered based on the general articulation of the elements, score marks, possibly the result of butchering, are present on the anterior portion of the humerus diaphysis, the hyoid, and the distal-lateral surface of the tibial crest of the left tibia.

Between the 1990, 1993, and 1994 excavations, a total of 49 pieces of debitage were recovered from the six test units within the bone bed. Two peaks in lithic density occur within these test units (Figure 18), one near the surface (n=32 flakes) and one in association with the bone bed (n=17 flakes). The profile of lithic debitage density by level illustrates two density peaks, confirming the likely cultural association between the lithics and the bone in excavation levels 4-6. Flakes on the surface may have derived from the buried bone bed via bioturbation. Alternatively, the surface flakes could mark a more recent site occupation.

Gender of the bull bison was determined by comparing the size of the metapodials with those of known modern bison and characteristics of the skull. Based upon incomplete fusion of the humerus the age of the bison was judged to be approximately four years old at the time of death.

The weathering patterns and the general lack of carnivore gnawing suggest a complicated pattern of deposition. In general, the bone preservation is good,

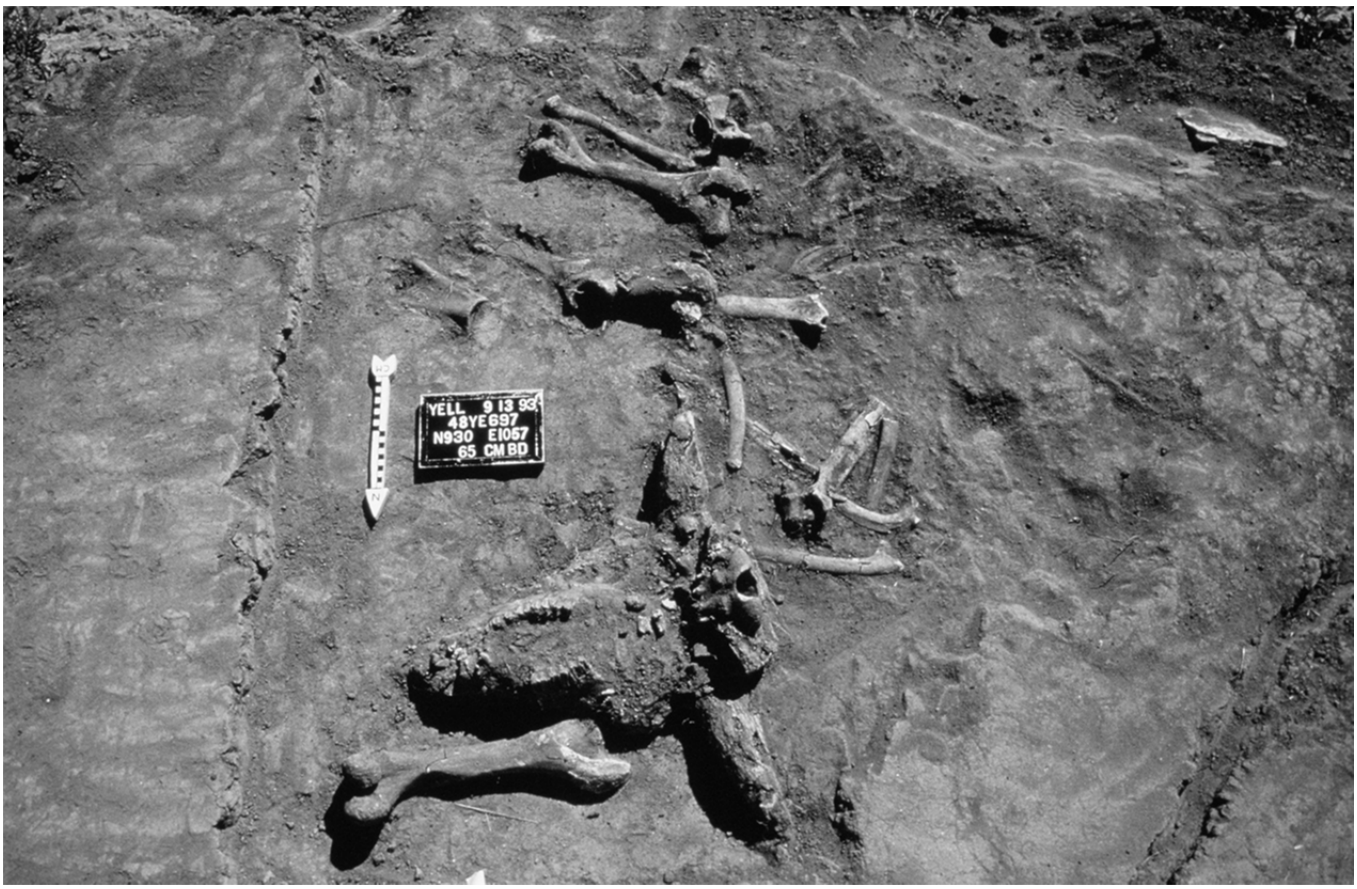


Figure 17. Photograph of Excavated Bison, Windy Bison Site, 48YE697.

although a number of long bones exhibit advanced stages of dry bone cracking that may be attributed to compression or surface exposure. However, if the carcass was exposed on the surface for a long period of time, greater evidence of scavenging would be expected—extensive evidence of gnawing and dispersal of elements. Examination of the elements revealed evidence of only one bone, the right tibia (FS20841), with carnivore gnawing marks. Dry bone cracking may also not be a good indicator of surface exposure, but instead may be the result of geothermal heating of the ground.

In order to assess the possible season of death, as well as how long the carcass was on the surface, a soil sample from within the skull and body cavity of the bison was submitted to Dr. Scott Elias (Royal Holloway, University of London) for extraction of insect remains. Unfortunately, no insect carcasses were recovered that were contemporary with the bison skeleton. The lack of data may suggest that either the animal was killed during a season of cool weather when beetles are not active, or the sediments did not allow for preservation. While preservation was probably a factor, the late-season of death cannot be ruled out.

Examination of the weathering stages on several elements using the taxonomy described by Todd et al. (1987), reveals that non-compact elements, or long bones, have greater evidence of weathering damage than compact elements. This pattern would be expected since long bones have greater surface area and are more susceptible to weathering than smaller, compact bones.

The cf. fifth cervical vertebra of a bighorn sheep (*Ovis canadensis*) was recovered from the same unit (54 cmbd) as produced the bison and elk, possibly providing more credence to the hypothesis that this bone bed was more extensive at one time.

The right portion of the skull, including palate, maxilla, zygomatic arch, and M^2, from a meadow vole (*Microtus montanus*) were recovered from unit N939/E1058 between 30 and 40 cmbd and most likely represent a natural deposit of this common meadow species.

Although the Windy Bison site does not have an extensive record of cultural materials, the recovery of bison from the site was important and represented one of the few recovered in YNP to date in a cultural context. Although somewhat equivocal, the score marks and associated debitage indicate a cultural origin for the bison remains.

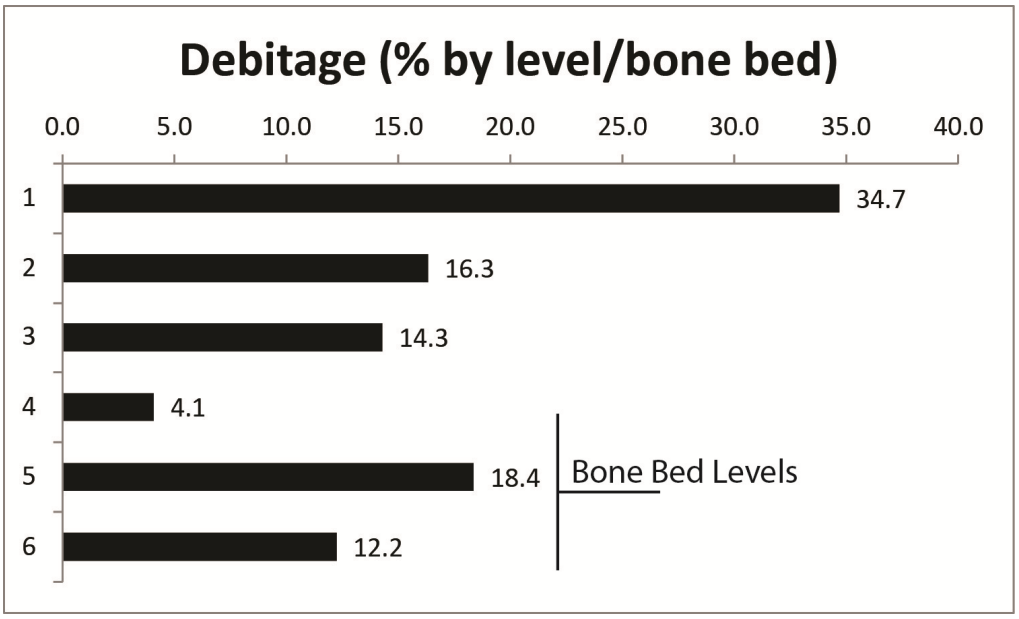


Figure 18. Distribution of Flaking Debris by Excavation Level within Bison Bone Bed, Windy Bison Site.

48YE701—Steamboat Point Site

Initially recorded in 1989 during the first phase of the East Entrance Road survey, the site occupies several landforms between the shore of Yellowstone Lake and the Pleistocene terraces (Cannon 1990). An active geothermal vent that lies on the southern periphery of the site producing steam which attracts both tourists and bison today as it appears to have in the past considering the near-by bison kill site. This site is the first opportunity for a close view of Yellowstone Lake from the current East Entrance Road alignment and remains today an uncommonly beautiful vista. This site lies within at least three terraces on the north east shores of the lake encompassing about 9000 square meters. Previous, 1930s construction of the road and the parking area have likely destroyed a large portion of the site although early investigations indicate that a substantial portion of the site is still intact. The MWAC crew of archaeologist conducted data recovery at the site in 1993 and 1994 prior to the mid-1990s road widening.

The southern portion of the site lies in an open meadow with various grasses of the *Poaceae* family and other herbaceous species. The rest of the site is generally in a mixed-conifer overstory community. Despain (1990) classifies the community as subalpine fir/western meadow rue habitat type. Vegetation recorded on the site includes subalpine fir, Douglas fir, lodgepole pine, silver sage, elderberry, red raspberry, white stem, gooseberry, huckleberry, sticky geranium, balsam root, woodland strawberry, mountain dandelion, wheatgrass, woodland star, bed straw, yellow columbine, cow parsnip, yarrow, western groundsel, wax currant, heartleaf arnica, and wild rose. Sediments are generally of sandy loams of eolian origin that have been mixed by tree throws and rodent burrowing. Larger clasts of cobbles and boulders are present in subsurface deposits.

During the initial 1989 survey of the site surface collections included 83 pieces of debitage, 14 expedient obsidian flaked stone tools, 1 obsidian scraper, one obsidian base point fragment,1 large obsidian eared projectile point/knife, 3 obsidian bifaces, 2 obsidian cores and 1 chert (cryptocrystaline silicate, CCS) core.

In 1990, various subareas of the site were excavated for National Register assessment of the site. These test excavations produced 368 pieces of debitage, the basal portion of a quartzite Lovell Constricted projectile point generally considered to be 8,000 years old, two ground stone slabs (Figure 19), and numerous formal and expedient tools. The eastern portion of the site which lies within the oldest terrace sequence of the lake produced the most interesting ground stone and projectile point artifacts. It was determined that excavation and recovery of significant archaeological data from the site areas to the north of the road alignment where road widening would further impact the site should be conducted.

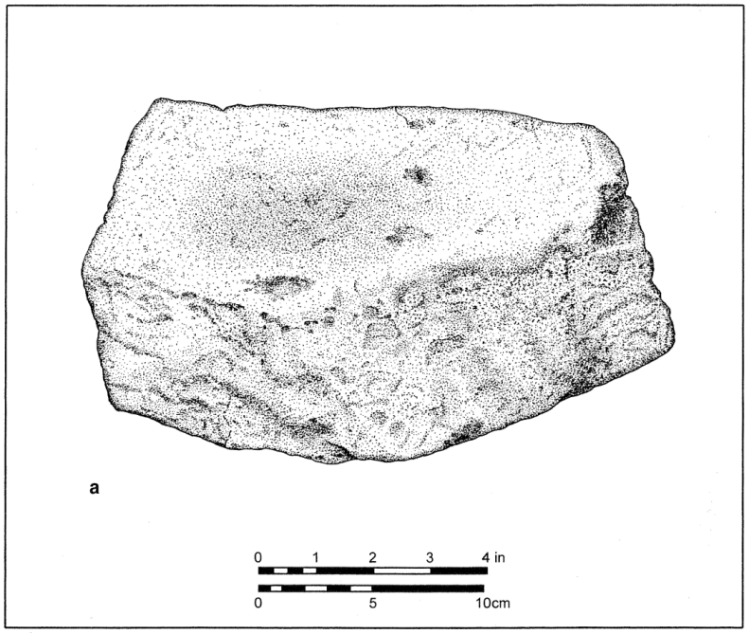
A series of units were excavated in 1993 and 1994 along with additional surface collections and shovel tests at the site. The flaked stone tools recovered from the site included 1,498 pieces of debitage, 70 expedient tools, 14 formal flaked tools, 7 bifaces and 13 cores. Almost 95% of the recovered debitage was between 3.34 mm to 1.27 cm indicating that both tool resharpening and biface reduction activities were taking place.

A total of 11 projectile points and knives were recovered, three of which were from the surface and include an obsidian, basal stem fragment, a large obsidian eared projectile point and a large chert corner-notched projectile point (Figure 20). A large obsidian corner-notched point which tested positive for sheep blood residue was recovered from a shovel test. From the excavation units one projectile point basal fragment of a quartzite Lovell Constricted-Stem with edge grinding evident was recovered; an obsidian base fragment and two large obsidian corner-notched projectile points were recovered although none tested positive for blood residue. One chert straight-based stemmed and hafted knife tested positive for rabbit blood residue while another chert knife with a concave base was negative for blood residue. A chert projectile point base tested positive for cat blood residue.

Other formal tools included an obsidian scraper, a chert end scraper and a chert graver. Of the 70 expedient tools nearly 93 % were obsidian and the rest chert. The expedient tools displayed a variety of edge angles. Low edge angles are suitable for slicing meat and cutting hide. The medium edge angles are suitable for skinning, hide scraping, sinew or plant fiber shredding or cutting of bone, wood or horn. Expedient tools with high edge angles are suitable for heavy working of bone or wood or heavy plant fiber shredding.

The recovery of micro-tools, smaller flakes with signs of retouch and use, from the site is an uncommon occurrence in YNP. They consist of complete tertiary flakes between 0.5 and 1.5 cm in maximum dimension. All ten of the micro-tools from the site are of obsidian and all come from subsurface proveniences between 20 to 50 and 60 to 70 cm below datum. They are found in a variety of shapes from convex to concave, straight, and sigmoid all with steep edge angles. Due to their small size it is likely they were hafted in some manner and possibly involved in detailed scraping or shredding. Such micro-tools have been documented in other sites such as the hafted bipolar flakes at the Hoko River site (Flenniken 1981), the Bootlegger Trail site, although somewhat larger (Roll and Deaver 1980) and were discussed by Irwin-Williams and Irwin (1966) and Black (1991).

Few bifaces were recovered at the site (n=7), all of which are obsidian and none are complete. Edge wear analysis identified low, medium and high edge angles with a variety of suggested uses and several retouched unifacial edges.



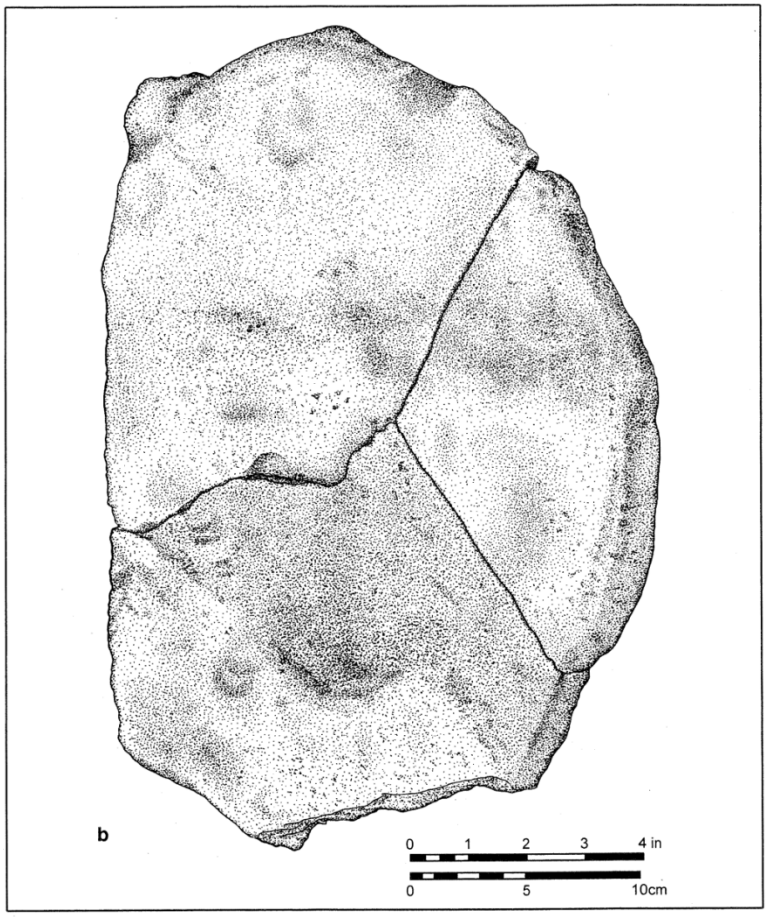


Figure 19. Groundstone Slabs from Steamboat Point Site, 48YE697.

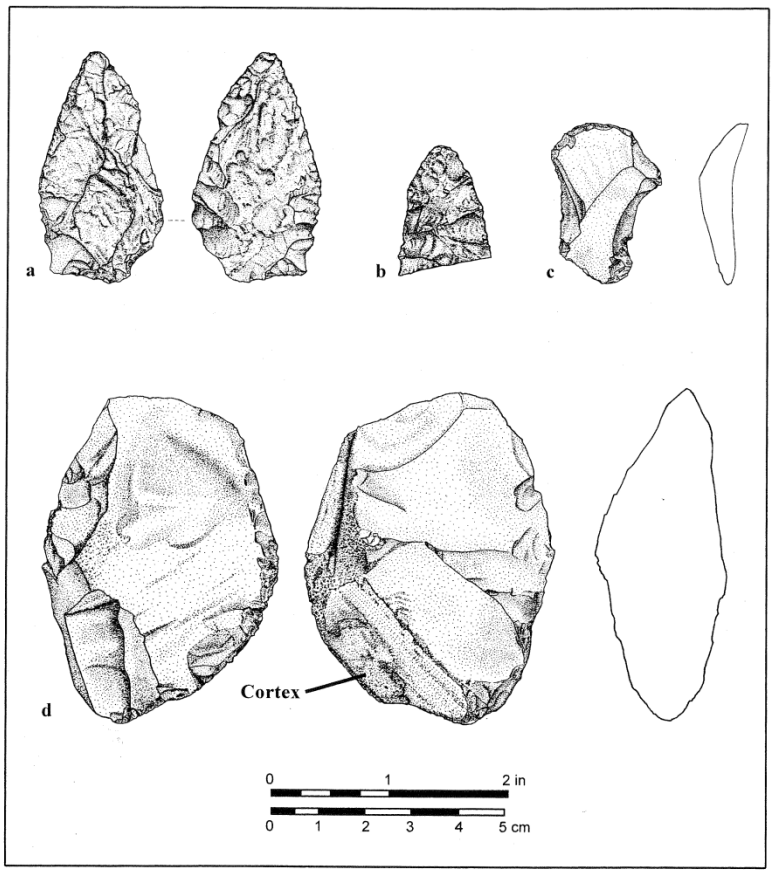


Figure 20. Stone Tools from Steamboat Point Site, 48YE697.

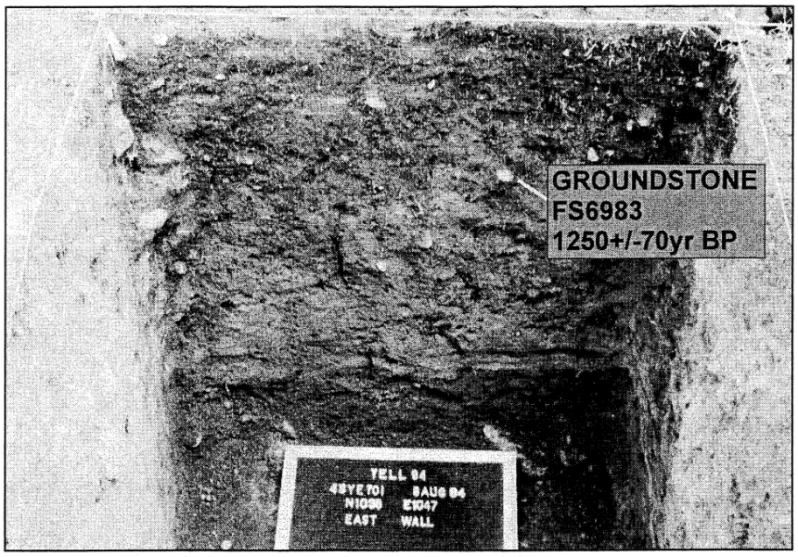
A total of thirteen cores, seven chert, five obsidian, and one basalt were recovered from the site representing an unusually high number of this tool type for sites in Yellowstone. Most of the cores were exhausted and some of the chert cores displayed scalar scars.

Ground stone tools are not commonly recovered in buried archaeological context in the park although three ground stone tools were recovered at Steamboat Point (Figure 21). All three ground stones were recovered from buried context within three horizontal meters of each other and vertically within 25 cm, possibly suggesting a localized activity. Two ground stones were submitted for pollen and blood residue analysis. One tested positive for deer and the other tested positive for both bovine (bison) and dog (coyote, grey wolf or red fox). This result suggests the ground stone tools were used for processing resources other than plant foods. The presence of deer and bison proteins may indicate that the tools were used as a surface for the preparation of pemmican or the splitting of long bones for marrow extraction. The canid protein also suggests food preparation and that ground stone tool also showed evidence of grinding and pounding.

The pollen wash from the surface of the ground stone was disappointing for it did not yield sufficient pollen for analysis. The phytolith record for the ground stone was also limited. The grass phytoliths recovered were dominated by festucoid grasses and may reflect a preference for grinding certain grasses or grass seeds. Festucoid grasses (*Stipa, Poa*) are the most common grasses in the park and indicate cool, moist habitats. Of interest is the large quantity of volcanic ash in relation to the total quantity of grass phytoliths. Approximately four times as many volcanic ash fragments were recovered from the wash as grass phytoliths.

The presence of ground stone, also referred to as milling tools, metate, and grinding slabs, in archaeological sites in Yellowstone National Park and other montane environments of the central and

Figure 21. Profile of Steamboat Point Site Showing Groundstone.



Northern Rocky Mountains and adjacent basins has been interpreted as evidence for the processing of plant resources (Frison 1991; Benedict 1981), although Mulloy (1954) suggested their use for grinding up small animal bones into a paste. Groundstone artifacts have been seen as a hallmark of the archaic lifestyle or subsistence pattern (Mulloy 1954; Husted 1969; Frison and Grey 1980). Ground stone artifacts recovered from the Medicine Lodge Creek and Bighorn Canyon sites has been argued as evidence for extending this pattern back to the terminal Paleoindian times, with increasing use and quality of tools culminating with the Middle Plains Archaic McKean complex (Frison 1991).

For the Grand Teton-Yellowstone area, the presence of these artifacts at sites of various altitudes has been argued as evidence for the procurement of seasonally ripening plant resources. This model assumes the relationship between ground stone artifacts and plant processing, despite the paucity of direct evidence (Wright et al., 1980; Wright 1984; Bender and Wright 1988). More direct evidence from pollen washes of ground stone and macrofossil evidence from features as well as organic residue and macrofloral analysis of both ground stone and fire cracked rock features are now possible and would more clearly demonstrate the range of uses of these artifacts in the diverse economies of hunter-gatherer groups.

Regionally and locally archaeological excavations have recovered fired rock features without ground stone, and ground stone artifacts have been recovered in context other than association with fire cracked rock, suggesting closer scrutiny and additional interpretations of the functions of ground stone tools is needed. This hypothesis is based not only on the positive reaction to animal blood antisera on two ground stone artifacts from the Steamboat Point site (also see Yohe et al., 1991), but also from ethnographic accounts of various tribes combining ground meat with roots, seeds, plants, and berries for enhancing food storage (Walker 1975; Walker 1987; Adams 1988).

Geochemical analysis of selected obsidian artifacts from the Steamboat Point site revealed the majority of obsidian artifacts were made from Obsidian Cliff volcanic glass. Three artifacts were sourced to the Bear Gulch source suggesting movement of people from the west where the Bear Gulch obsidian was obtained eastward to the east shores of Yellowstone Lake where the artifacts were discarded. Another artifact from the Steamboat Point site was sourced to Cougar Creek, again suggesting eastward movement of people. Another obsidian artifact was sourced to Teton Pass, which is south of Yellowstone Lake and may suggest movement of people from south to north. Eight obsidian artifacts were sourced to areas unknown in 1996, but were later confirmed to be from the Park Point obsidian source on the eastern shore of Yellowstone Lake (see McIntyre et al. this volume), approximately 10 miles south of the site.

A single radiocarbon age was obtained from the Steamboat Point site. The age was obtained from a charcoal sample in association with ground stone (FS6983), but may represent a mixture of charcoal from different sources and should be considered a minimum age for the deposit. Bioturbation, in the form of tree throws and rodent burrowing, was commonly identified during excavation and may have mixed younger and older charcoals. Taylor (1987) found that a one-percent addition of modern charcoal to a sample with an age of 5000 BP will result in an apparent age of 4950 BP; a five percent addition would cause a 350 year decrease in age. The effect will increase proportionately with age. The age obtained, 1250 ± 70 BP (Beta-83300), should be considered minimal. Unfortunately, characteristics of the groundstone do not provide any clues to its age and cannot be used as a cross-check of the radiocarbon age.

Projectile points provide the best evidence for understanding the occupational history of the Steamboat Point site and indicate seasonal use from the late Paleoindian era as evidenced by the recovery of the buried Lovell Constricted point (around 8,000 years before present.) Additional projectile points suggest use of the site during the Late Archaic and Late Prehistoric culture periods (3,000 to 1,000 years before present).

The Steamboat Point site (48YE701) provides a unique glimpse of cultural use of the lake shore and evidence of diverse activities and procurement strategies. Although very different than the archaeological record left in the Arnica Creek complex, both sites enhance our understanding of the lifeways of early park visitors.

Conclusion

Between 1989 and 1994 the Midwest Archaeological Center was involved in a series of investigations along the West Thumb and Northeast Shore portions of Yellowstone Lake that provided some of the first detailed and extensive excavations. These excavations provided evidence of seasonal use of the lakeshore for approximately 10,000 years.

Limited testing for National Register assessment at four previously recorded sites at the mouth of Arnica Creek provided evidence of intermittent occupation over the last 4500 years, possibly as early as 7600 years ago. Investigations at 48YE449 indicated continuous surface and subsurface deposits between this site and an upstream site (48YE457) that has led us to incorporate the cultural deposits within a single site complex 48YE449/457.

A buried soil dating to about 1450 B.P. was uncovered with associated artifacts. This soil had been briefly described based on investigations at the site in 1959 (Taylor et al., 1964), but was undated. Ceramics, tentatively identified as Intermountain Ware, were recovered from the surface of the site. Probably the most exciting evidence recovered was the remains of three fired rock hearths dating from 4570 to 1700 B.P. Macrobotanical remains include *Carex, Salvia, Silene vulgaris, Chenopodium, Picea engelmannii, Pinus albicaulis, Pinus contorta, Potamugen, Spergula arvensis,* and *Viola*.

Excavations at 48YE454 produced a lithic assemblage similar to that of 48YE449/457, dating to the last 4000 years, however, no evidence of plant processing was uncovered. Site 48YE395, located on a partly reactivated storm bar, may have originally been constructed during the mid-Holocene. Our current understanding of lake level change suggests at least three major cycles, possibly as many as six, of caldera uplift and subsidence influencing changes in lake levels over the past 10,000 years (Pierce et al. 2007). Currently, the lake is at a culmination as evidenced by backflooding of Arnica Creek and other tributaries in the area.

Geochemical analysis of obsidian artifacts resulted in identification of at least seven geochemically distinct obsidian sources in the assemblages (Table 1). Not surprisingly, almost 80 percent of the aggregate was from Obsidian Cliff, with sources from Jackson Hole and Idaho represented in smaller proportions. At Steamboat, Park Point obsidian represents a significant amount (16%) of the obsidian assemblage. Additional analyses conducted include blood residue analysis of lithic tools which produced evidence of canid, bear, sheep, rabbit, and bovine antisera on various projectile points spanning the Holocene (Table 2).

While the excavations in the Steamboat Springs area were more limited in their results, they did provide important evidence of seasonal occupation of this portion of the lake that likely extends back to the late Paleoindian. These discrete artifact deposits indicate that bifacial thinning and resharpening were the major lithic activities. The number of flaked tools and artifact classes recovered from the Steamboat Point site would suggest that a greater diversity of activities were being accomplished in comparison to the other two sites.

Evidence for evaluating prehistoric subsistence patterns at the Steamboat Point sites was in general limited, owing most likely to factors of preservation. The only faunal remains recovered from an unambiguous cultural context was the 800-year old bison from 48YE697. The evidence from this site suggests a single, male bison was taken and minimally butchered adjacent to the bluff overlooking the lake. The bluff may have aided in the trapping of the bison by the hunters and may have been opportunistic. Other subsistence evidence comes from blood residue analysis on many flaked and non-flaked artifacts. These results produced evidence of six genera: bison, deer, sheep, canid, cat, and rabbit. These protein-residue data are summarized in Table 2.

The lakeshore sites offered an opportunity to investigate subsistence patterns utilizing traditional methods (lithic analysis) and emerging, non-traditional techniques, such as blood residue analysis, that indicate that other avenues of investigation are relevant for addressing these issues. The truly important aspect of these studies was to demonstrate that lithic scatters in the Rocky Mountains, historically viewed as having limited research potential, had more to offer, and management of these resources needed to allow for a more critical investigation using a range of methods and techniques.

Table 1. Summary of XRF Analysis Results for Arnica Creek and Steamboat Point Areas.

Arnica Creek Sites, XRF Results								
Site Number	**Obsidian Cliff**	**Park Point**	**Teton Pass Variety 2**	**Bear Gulch**	**Reas Pass**	**Mud Lake**	**Cougar Creek**	**TOTAL**
48YE395	4	0	0	0	0	0	0	4
48YE410	3	0	1	0	1	0	0	5
48YE449	7	0	0	1	0	0	0	8
48YE449/457	6	0	0	0	0	0	0	6
48YE454	2	0	0	0	0	0	0	2
48YE652	1	0	0	1	0	1	0	3
Arnica Total	23	0	1	2	1	1	0	28
Percentage	82.1%	0.0%	3.6%	7.1%	3.6%	3.6%	0.0%	100.0%
Steamboat Point Sites, XRF Results								
Site Number	**Obsidian Cliff**	**Park Point**	**Teton Pass**	**Bear Gulch**	**Reas Pass**	**Mud Lake**	**Cougar Creek**	**TOTAL**
48YE696	20	14	0	1	0	0	0	35
48YE697	14	0	0	0	0	0	0	14
48YE701	74	8	1	3	0	0	1	87
48YE702	5	0	0	0	0	0	0	5
Steamboat Total	113	22	1	4	0	0	1	141
Percentage	80.1%	15.6%	0.7%	2.8%	0.0%	0.0%	0.7%	100.0%

Table 2. Summary of Protein Residue Analysis Results for Arnica Creek and Steamboat Point Areas.

Protein Residue Results, Arnica Creek Sites									
Site Number	**Dog**	**Bovine**	**Bear**	**Sheep**	**Rabbit**	**Canid**	**Cat**	**Negative**	**TOTAL**
48YE395	0	0	0	0	0	0	0	0	0
48YE410	0	0	0	0	0	0	0	0	0
48YE449	0	0	0	0	0	0	0	0	0
48YE449/457	0	0	0	1	0	2	0	5	8
48YE454	0	0	0	0	0	0	0	3	3
48YE652	0	0	0	0	1	0	0	1	2
Solution Creek	0	1	1	0	0	0	0	1	3
West Thumb	0	0	0	0	1	0	0	0	1
General Surface	0	0	0	0	0	0	0	1	1
Arnica Total	0	1	1	1	2	2		10	18
Protein Residue Results, Steamboat Point Sites									
Site Number	**Dog**	**Bovine**	**Bear**	**Sheep**	**Rabbit**	**Canid**	**Cat**	**Negative**	**TOTAL**
48YE696	0	0	0	0	0	0	0	0	0
48YE697	0	0	0	0	0	0	0	1	1
48YE701	1	0	0	1	2	0	2	4	10
48YE702	0	0	0	0	0	0	0	0	0
Steamboat Total	1	0	0	1	2	0	2	5	11
Protein Residue Results, Summary, Both Areas									
Total	1	1	1	2	4	2	2	15	29
Percent	3.4	3.4	3.4	6.9	13.8	6.9	6.9	51.7	100.0

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