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REPORT

Folsom structures in the Wyoming Basin of southwest Wyoming: The evidence from site 48SW97

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Folsom people are traditionally thought to be highly residentially mobile specialized bison hunters focused on the grasslands of the Great Plains. Recent research has begun to show greater variability in their land-use patterns and mobility in the mountains and intermountain basins of the Rocky Mountains. The excavation at site 48SW97 of the remains of two structures consisting of roughly circular arrangements of cobbles associated with Folsom points adds to this growing evidence of variability. Site 48SW97 is on a juniper-covered ridge on the Rock Springs Uplift portion of the high semi-arid Wyoming Basin of the Middle Rocky Mountains. The superstructures associated with these rock features appear to have lacked an elaborate design and may have been simple windbreaks made from stacked sagebrush and juniper branches or hides. The excavated portion of the site probably represents a single short-term occupation in an area that was repetitively reused and contrasts with other Folsom sites in southwest Wyoming that contain evidence of occupations of longer duration.

KEYWORDS Folsom, Wyoming, structures, stone circles

Folsom people are traditionally thought to be small groups of highly residentially mobile, specialized bison hunters who moved from kill to kill often covering long distances in relatively short periods of time (Hofman 1992). They are often considered to be pioneers following bison with unpredictable behavior into new areas and covering large areas as attested by the use of non-local tool stone far from its source. This model suggests that their land-use patterns were consistent and undifferentiated across its range, that sites represent short-term, single occupations of the same type, and that they were more concerned with hunting situations than the

characteristics of specific places (Kelly and Todd 1988). Campsite remains are often found at kill locations and many of these kills included only one or a few animals (Hofman 2002). These patterns are often considered to be focused on the grasslands of the Great Plains.

Research over the past couple of decades has begun to show greater variability in Folsom land-use patterns and mobility. Some researchers have begun to recognize a dichotomy in Folsom kill sites based on site size, the number of animals killed, carcass processing techniques, and topographic situation of the kill, perhaps indicating seasonal periods of population aggregation and dispersal mobility patterns (Bement 2003). Studies have also noted a wide range in Folsom site and assemblage size with most sites being less than 1 hectare while a few measure over 10 hectares (Andrews et al. 2008). The larger sites appear to have been produced through reuse and reoccupation and are located in favorable areas where predictable stationary resources are accessible, suggesting that at least a portion of Folsom settlement was organized around places with stable rather than highly mobile resources (i.e., bison). Other studies have shown that not all sites contain evidence of use of non-local stone obtained from great distances and that the differences in Folsom lithic raw material procurement depend on the number and occurrence of high-quality toolstone sources in the region (Bamforth 2002; Janetski 2002). In the Northern Plains where knappable material is common, locally available stone was typically exploited in contrast to the Southern Plains, where stone was procured from non-local sources often hundreds of kilometers distant due to the scarcity of high-quality raw material (Ingbar 1992).

In addition to the variation between sites, considerable evidence is accumulating for Folsom occupation and extensive use of the mountains and intermountain basins of the Rocky Mountains and adjacent non-Plains areas of Colorado and New Mexico. Areas with evidence of extensive use include the central Rio Grande Valley of New Mexico (Amick 1996; Judge 1973), the San Luis Valley of Colorado (Jodry 1999; Jodry and Stanford 1992), and Middle Park of Colorado (Kornfield 2002; Kornfeld and Frison 2000; Naze 1986). The high density of sites in these intermountain basins indicates that the Folsom people repeatedly occupied and intensively used these areas, possibly focusing on a variety of resources.

One excavated Folsom site located in the intermountain basins of the Rocky Mountains is the Stewart's Cattle Guard site located in a sand dune area of the San Luis Valley, a broad, high mountain valley of southern Colorado (Jodry 1999; Jodry and Stanford 1992). The site appears to be a processing camp where 49 bison were killed and butchered during a single late summer or early fall short-term occupation. Excavations revealed the remains of the kill and initial butchery area, a special use area about 20 m from the kill area where hide working and other tasks took place, and the residential camp where portions of the carcasses were extensively processed, weaponry repaired and manufactured, and other household activities occurred around hearths and a possible shelter. These camp and processing activities involved an aggregation of groups apparently from the north/northeast and the south/southwest who came together for a few weeks to complete the intensive tasks that required a cooperative effort. Prior to arriving at the site, these groups acquired tool stone from locations approximately 100 to 109 km

northwest of the site and 100 to 350 km southwest of the site, and obtained trace amounts of Alibates and Edwards Plateau cherts 425 and 750 km from the site.

Locality B at the Barger Gulch site is another investigated Folsom locality in the intermountain basins of the Rocky Mountains (Surovell and Waguespack 2007). The site is a residential camp in shallow deposits on a terrace above Barger Gulch, a perennial spring-fed southern tributary of the Colorado River in Middle Park of north-central Colorado. The spatial analysis of flaked stone artifacts indicated the presence of a hearth-centered activity area marked by high artifact densities. The activity area included two artifact clusters approximately 2 m from the hearth center and the segregation of artifact types with projectile points, flake tools, and preforms on the northwest side and debitage and bifaces on the southeast side of the hearth (Surovell and Waguespack 2007:244). Analyses also indicated that the hearth-centered activity area was possibly within a structure (Surovell and Waguespack 2007:250). Most of the artifacts from the site were made from locally available raw material.

Another excavated site providing clues concerning Folsom lifeways in the Rocky Mountains is Mountaineer located on an isolated high mesa above the Gunnison River Valley in the mountains of western Colorado (Andrews 2010; Stiger 2006). Excavations in Area A yielded evidence of a structure consisting of a rock-lined, basin-shaped depression of dark sediment and a cleared area. Analysis of the recovered remains suggested that their distribution was the result of maintenance behavior during relatively long-term occupations perhaps over the winter as a residential camp. In contrast, the distribution of artifacts recovered from Area D at the site indicated segregated activities where the three northern artifact clusters represented core domestic activity areas and the two southern clusters were manufacturing areas suggesting a short-term logistical occupation during warm weather (Andrews 2010:267–68). The Folsom occupants appear to have used the site for different purposes during different times of the year, with their seasonal round probably focused in the Gunnison Basin. Quartzite available locally in the Gunnison Basin was the predominant tool stone used at the site, supporting the interpretation that the Folsom populations occupied the area at least most of the year.

The results of the excavations in Colorado show broad variability in Folsom adaptations, even in the intermountain basins of the Rocky Mountains. Excavations at the Stewart's Cattle Guard site indicate that the site was the result of a single short-term occupation related to the intensive killing and processing of bison where groups from as far as a couple hundred kilometers aggregated for these activities (Jodry 1999). The movement and hunting of bison influenced these groups social and technological organization. This hunting required frequent residential moves over large regions with periods of group aggregation for the large kill and processing events, occurring especially in the late summer and early fall. A similar settlement organization with periods when groups came together for bison kills and processing is suggested for the Southern Plains and Rio Grande Valley of New Mexico (Amick 1996).

In contrast, the presence of primarily local tool stone and evidence for site reoccupations at Locality B of Barger Gulch (Surovell and Waguespack 2007) and the Mountaineer site (Andrews 2010) suggest that groups occupying these sites had much smaller ranges for portions of the year. The range of the Folsom groups

associated with the Mountaineer site may have been limited to a single basin, the Gunnison Basin, for much of the year. They appear to have used the Mountaineer site as a relatively long-term residential camp during the winter months and then reoccupied the site as a short-term logistical camp during other times of the year (Andrews 2010:267–68). The movement of these groups may not have been tied as closely to bison, but to other resources such as smaller animals and plants. How the various land-use and mobility patterns throughout the Folsom geographic range relate to one another is unclear. However, despite differences in ecological settings and mobility patterns, the same projectile point technology appears to have been used throughout.

Another region that appears to have been used is the high, semi-arid Wyoming Basin of southwest Wyoming. Folsom projectile points and other artifacts have been found in excavated contexts and on the surface of many sites within the basins and adjacent uplands (Kornfeld et al. 2003; Smith and McNees 1990; Wimer 2001) indicating that the area was exploited during the Folsom period. Additional evidence for the Folsom use of the Wyoming Basin comes from site 48SW97 in the south-central portion of the Wyoming Basin about 50 km east of Rock Springs, Wyoming. Excavations at site 48SW97 yielded evidence of the remains of two structures consisting of roughly circular arrangements of cobbles associated with Folsom points. These structures add to the growing body of data on the ecological settings used by Folsom peoples and their mobility patterns. This article describes this additional evidence from site 48SW97.

Site 48SW97

Site 48SW97 is on the eastern flank of the Rock Springs Uplift in the south-central Wyoming Basin (Figure 1). The Wyoming Basin consists of a series of broad basins separated by low anticlinal uplifts within the Middle Rocky Mountain province (Fenneman 1931). Climate is semi-arid and includes long, cold, windy winters, cool short summers, and short growing seasons (Martner 1986). Vegetation is primarily sagebrush steppe, with broad areas of mixed desert shrubland (Knight 1994). The Rock Springs Uplift is a large, elliptical north/south-trending anticlinal dome separating the Green River Basin to the west from the Great Divide and Washakie Basins to the east, basins that comprise the southern portion of the Wyoming Basin (Fenneman 1931).

The site is along the top of a juniper-covered interfluvial ridge extending from the southeast corner of Black Buttes, a prominent landmark reaching elevations of 2,468 m that provides commanding views of the surrounding region (Figure 2). The ridge top is capped with sandstone bedrock that slopes slightly to the east. The sandstone bedrock is covered with patches of aeolian sand, as well as areas of deeper sand deposits that occur in pockets in the irregular bedrock surface. Numerous dense concentrations of debitage and other cultural material are scattered along the length of the ridge and onto the flats to the east. The site is sheltered by the higher ridges to the west and juniper. The understory vegetation consists of big sagebrush intermixed with a few spiny hopsage, small perennial grasses, and prickly pear. The drainages flanking the site are intermittent and currently carry water

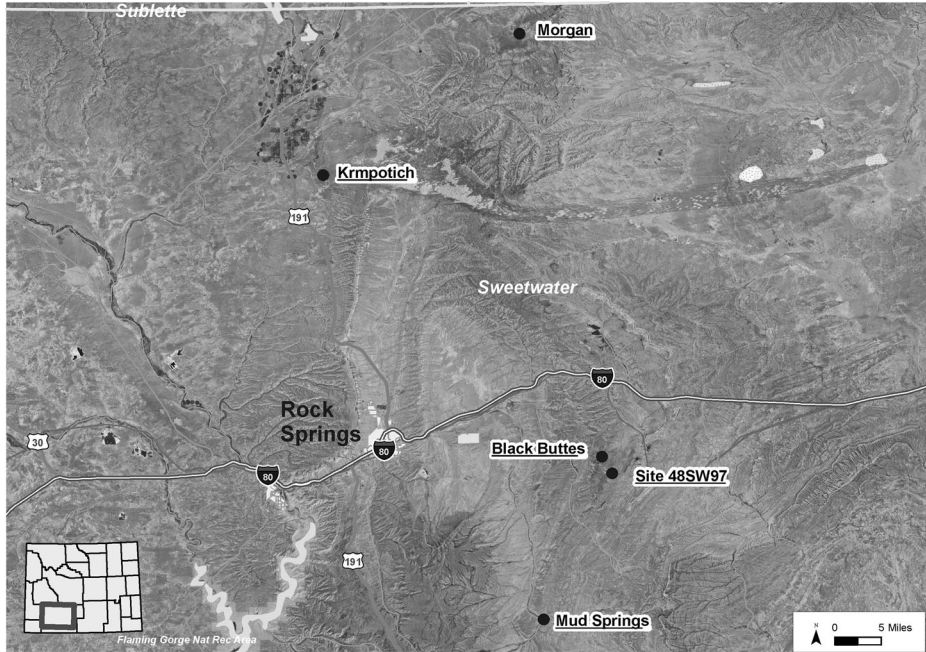


FIGURE 1 Map showing location of site 48SW97 and other nearby sites, southwest Wyoming (created by Zachary Nelson [permission granted]).



FIGURE 2 Overview of site 48SW97 looking southeast during excavation.

only on a seasonal basis. In the past, these drainages may have headed in springs or seeps along the base of Black Buttes. Black Buttes is a primary source location for Black Buttes quartzite, a material type found at site 48SW97. Chert and quartzite cobbles, other material types present at the site, are available from remnant Pleistocene cobble terraces approximately 5 km from the site.

An area of adjoining 121 m² was excavated at the site in 1990 (McNees et al. 1992). The block was placed near the east tip of the ridge top at an elevation of 2,120 m within the east fringe of the juniper zone (Figure 3). The block was excavated in a small area of relatively deep aeolian deposits in a small, southeast-facing depression on the face of the slope. The depression is bounded by a low sandstone outcrop rim along its west and north edges. Site 48SW97 was a favored place on the landscape which was occupied numerous times throughout the prehistory of the area as evidenced by a high density of remains representing many time periods in the prehistory of the region (McNees et al. 1992). The artifacts and features recovered during the block excavation were assigned to four components based on their vertical and horizontal position within the deposits. The lowest component, component I, could not be dated but yielded in situ Folsom point fragments and the remains of two structures.

Stratigraphy

The excavation block at site 48SW97 was situated to encompass aeolian deposits resting on sandstone bedrock. The bedrock sloped to the southeast. The sand deposits were shallowest along the north and west edges of the block and deepest in the southeast portion of the block (Figure 4). The oldest and deepest deposits at the site, which contained the Folsom remains, were limited to the bottom of a depression in the sandstone bedrock. These deepest deposits were approximately 4 × 2 m in extent and about 10 to 20 cm deep and did not extend to the excavation block walls. They consisted of well consolidated silt-clay resting on solid bedrock. The degree of consolidation and the difference in texture suggests that these deposits are considerably older than the remaining deposits at the site, all of which are aeolian in origin and post-date the Folsom period. Because these silt-clay deposits did not extend to the excavation block wall, this stratum is not shown on the wall profile and is considered Stratum A'.

The deposits above the consolidated silt-clay, Strata A to D, consisted of progressively less consolidated and finer-grained deposits (Figure 4). They accumulated in the lee of the bedrock rim that encircles the area containing the excavation block. The deposits ranged in thickness from as little as 15 cm along the north edge of the block to as much as 90 cm deep in the south-central portion of the block. Stratum A was continuous across the block. It consisted of a layer of consolidated medium-grained sand resting disconformably on the older silt-clay deposits across some of the block and directly on bedrock across the north and east edges of the block. Stratum B was defined on the basis of a horizon lightly stained with charcoal that extended across the excavation block. It was otherwise similar in texture to Stratum A. Stratum C occurred across only the southeast portion of the block and



FIGURE 3 Map of site 48SW97 showing location of excavation block.

consisted of moderately consolidated silty sand. Stratum D, the loose fine-grained silty sand, covered the entire block.

Recovered artifacts and features were present more or less continuously throughout the excavated deposits from bedrock to the bottom of Stratum D. The site was excavated in arbitrary 10 cm levels in 1 x 1 m units and material from each of these arbitrary levels was assigned to one of the four components based on vertical and horizontal distributions of artifacts, and feature associations. Because the site was excavated in arbitrary 10 cm levels that at times crossed the transitions between

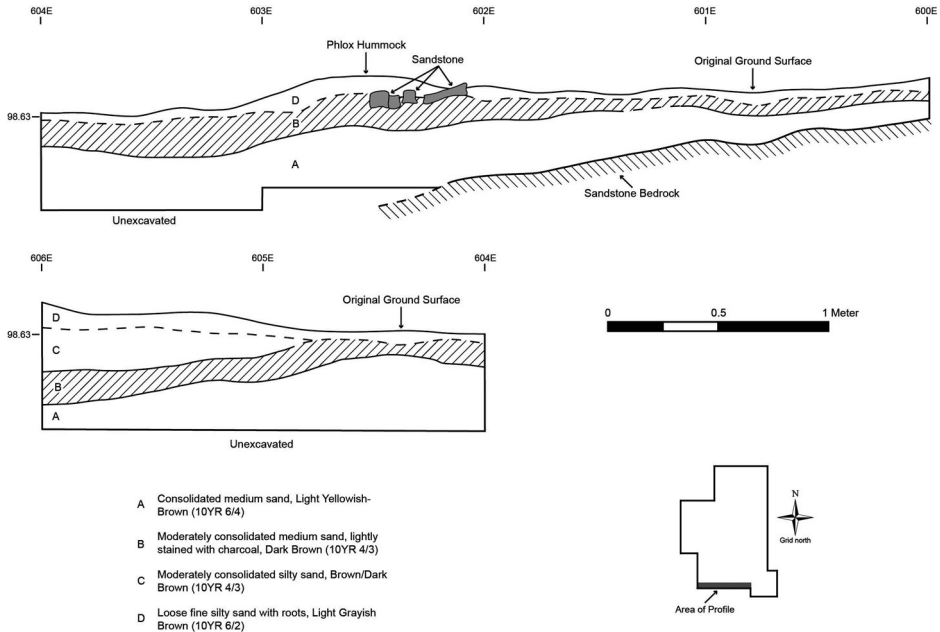


FIGURE 4 South wall profile of excavation block, site 48SW97.

the various site strata, artifacts assigned to component I were recovered from both the silt-clay deposits (Stratum A') containing the remains of the structures and the lowest portion of the overlying Stratum A. The component could not be radiocarbon dated. Features and artifacts included in component I are the two structures, 526 pieces of heat-altered rock, 12 flaked stone tools, 477 pieces of debitage, and 48 bone and tooth fragments. The flaked stone artifacts consisted of six bifaces (including two Folsom projectile point fragments) and six flake tools (including two refitted pieces). In addition to two Folsom point fragments, a large side-notched projectile point probably dating to the Late Archaic period was recovered from deposits assigned to component I.

Artifacts and features assigned to components II to IV occurred in the upper portion of Stratum A through Stratum C (McNees et al. 1992). Component II was radiocarbon dated at 2600 ± 110 years B.P. (Beta 41863) and contained nine features, 751 pieces of heat-altered rock, 55 flaked stone tools, 1,527 pieces of debitage, a grooved stone, a manuport fossil shell, and 343 bone specimens. Component III was radiocarbon dated at 1460 ± 70 years B.P. (Beta 41864) and included five features, 962 pieces of heat-altered rock, nine flaked stone tools, one core, 968 pieces of debitage, and 182 bone and tooth specimens. Component IV was radiocarbon dated at 880 ± 80 years B.P. (Beta 41865) and 610 ± 60 years B.P. (Beta 41862). It contained three features, 1,154 pieces of heat-altered rock, 85 flaked stone tools, three cores, 6,844 pieces of debitage, three ceramic sherds and a small ceramic tube fragment, an incised stone, and 1,889 bone specimens.

Separating the recovered features and artifacts between components was difficult due to the vertical continuity of material throughout the deposits, the sloping

character and irregular thickness of the deposits, and the overall compression of the deposits across much of the block. Most of the artifacts, debitage, bone, and heat-altered rock excavated in the artibutary levels assigned to component I were from Stratum A and probably belong to occupations later than the Folsom occupation. These remains mostly occurred along the east edge and in the southeast corner of the excavation block in areas removed from the two structures. Only a limited number of artifacts were recovered from the silt-clay deposits (Stratum A') within the two structures. Remains from within the structures included the two Folsom point fragments and a refitted flake tool. This paper focuses on the Folsom structures and artifacts recovered from the silt-clay deposits, Stratum A'. Folsom artifacts assigned to other components at the site based on their stratigraphic location are also described.

The Folsom component

The Stratum A' (silt-clay deposits) portion of component I contained the two structures and associated Folsom artifacts (Figure 5). Two Folsom point fragments and a refitted flake tool were recovered in situ from within the silt-clay, directly adjacent to and at the same level as rocks belonging to the structures. The presence of Folsom

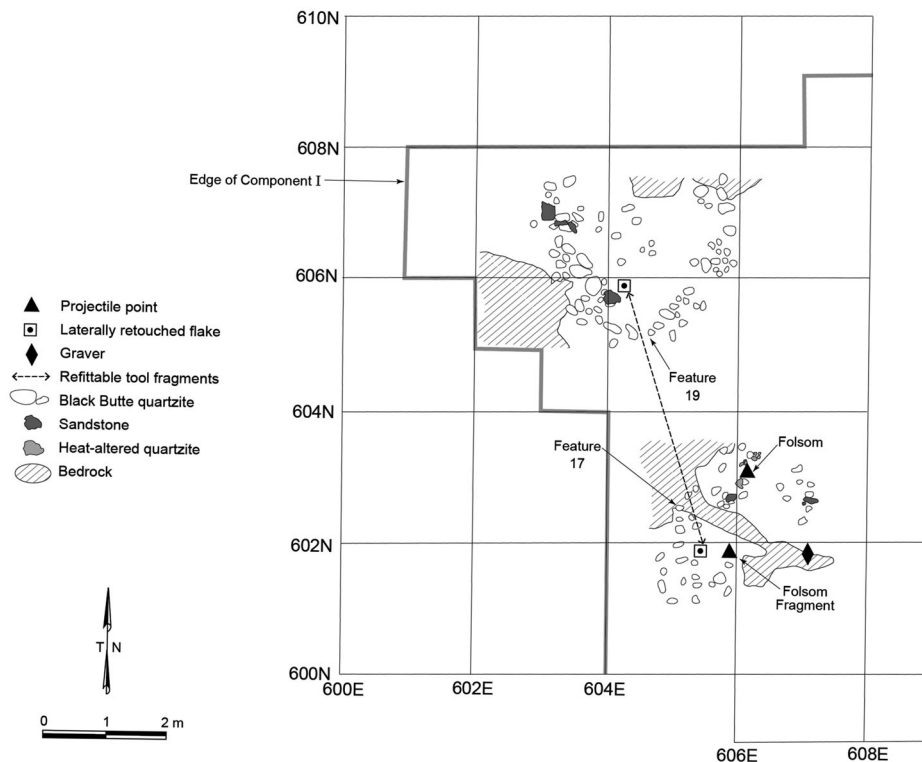


FIGURE 5 Map of excavation block showing component I and associated remains, site 48SW97.

point fragments indicates that at least the earliest occupations at site 48SW97 were Folsom and the clear spatial association of the Folsom material with the structures resting directly on the sandstone bedrock and within the silt-clay deposits suggests that the structures were used during these occupations.

The structures

Two features, Features 17 and 19, were excavated within the silt-clay deposits. Both features appear to be the remains of habitation structures or shelters. Feature 17 is a stone arc and Feature 19 is a stone circle. Post holes or other evidence of a superstructure was not noted during the excavations of the two features. The superstructures associated with these rock features appear to have lacked an elaborate design and may have been simple windbreaks made from stacked sagebrush and juniper branches similar to structures by later occupants of the region. They may also have consisted of hides anchored to the ground using the rocks and held up with juniper branches that were often used on the Plains during later periods. These informal structures provided a work area protected from the wind, with the protection enhanced by their location in low areas of the sandstone bedrock that gave some natural protection. Only limited artifactual remains were recovered from the silt-clay deposits within the structures, suggesting that the associated occupation was short-term.

Feature 17 consists of approximately 50 Black Buttes quartzite cobbles and two sandstone cobbles forming an arc. The arc interior was approximately 2.5×2.2 m diameter with an opening to the southeast, away from the prevailing winds and toward the rising sun. The cobbles were embedded in the shallow veneer of silt-clay resting on bedrock. Little or no staining was evident among the cobbles. Twelve pieces of heat-altered rock weighing 0.70 kg were present near the north edge of the arc. A proximal fragment of a Folsom point and a fragment of a laterally retouched flake were recovered from within the stone arc. A possible ear from a Folsom point was also recovered from Feature 17. The retouched flake fragment refits a fragment recovered from Feature 19, suggesting that the two features are contemporary.

Feature 19 consisted of a dense, roughly circular arrangement of Black Buttes quartzite cobbles and a few sandstone cobbles. It was in a shallow, southeast-facing trough in the sandstone bedrock, and abutted a sandstone bedrock outcrop along its north edge. It was approximately 2.2×2.3 m in interior diameter. Overall, the stone circle contained about 100 cobbles and pebbles ranging in size from approximately $40 \times 30 \times 30$ cm to as small as $5 \times 5 \times 4$ cm. A few cobbles were also present within the circle. The rocks comprising the feature were embedded in the silt-clay overlying the bedrock. No heat-altered rock was present within the feature. A fragment of a laterally retouched flake that refits the fragment from Feature 17 and nine pieces of debitage were recovered within the feature. The debitage consists of large Black Buttes quartzite flakes.

Folsom artifacts

A Folsom point fragment (specimen SW97-925) was recovered from the silt-clay deposits adjacent to and at the same level as rocks belonging to Feature 17

(Figure 6(a) and (b)). The point is a proximal portion that apparently fractured during finishing or resharpening. The specimen is fluted on one face, and has a deeply concave base that produced long, sharp ears. It is made on a flake and retains some of the curvature of the original piece. The point fragment has a perverse fracture oriented diagonally across its blade, and it is missing one ear. It is made of a faintly mottled pearly tan opaque chert.

A possible ear from a Folsom point (specimen SW97-956) was also recovered from within and adjacent to rocks belonging to Feature 17. The specimen is a small fragment that is unifacially retouched along both extant lateral margins. The point fragment is made of a faintly mottled pearly tan opaque chert identical to the Folsom point fragment (specimen SW97-925).



FIGURE 6 Folsom artifacts, site 48SW97. (a) and (b) Folsom point fragment (specimen SW97-925), (c) and (d) conjoinable fragment of laterally retouch flake/graver, Feature 17 (specimen SW97-719), (e) and (f) conjoinable fragment of laterally retouch flake/graver, Feature 19 (specimen SW97-1031), (g) graver (specimen SW97-1032), (h) Folsom point fragment (specimen SW97-100), (i) Folsom point fragment (specimen SW97-460), and (j) Folsom point fragment (specimen SW97-1040).

Two conjoinable fragments of a laterally retouched flake/graver (specimens SW97-719 and -1031) were also recovered from within the two structures (Figure 6(c) and (f)). One fragment was recovered from Feature 17 and the other from Feature 19. The tool exhibits fine, regular steep unifacial retouch along its broken lateral margin. The opposite margin has been mostly snapped off. The retouched lateral margin includes a broad, slightly concave segment and a slightly convex segment. The two lateral margins were flaked to produce an incurvate form at their distal ends, resulting in a needle-like tip probably for use as a graver or a very small drill. The tool is of pinkish red opaque chert.

Also recovered from silt-clay deposits and just outside the opening of structure Feature 17 was a graver (specimen SW97-1032) that appears to have been made on a Folsom flute flake fragment (Figure 6(g)). The graver has a small sharp tip produced by fine flaking of the lateral flake margins adjacent to the bulb of percussion. This specimen is made of light brown semitranslucent to opaque chert.

Other artifacts that can be identified as Folsom were recovered from the site deposits, but were assigned to other components based on their stratigraphic location. Three Folsom point fragments (specimens SW97-100, SW97-460, and SW97-1040) were found in the stratigraphically upper deposits assigned to component IV (Figure 6(h) to (j)). They appear to all have derived from the same heat-shattered Folsom point. The three specimens are made of dark brown semitranslucent chert. These specimens are fluted on both faces. One specimen (SW97-100) is a medial fragment that was completely fluted along one face, while the flute on the other face apparently terminated prematurely. Another specimen (SW97-460) is a small proximal/lateral corner fragment. It has a relatively small ear. The final specimen (specimen SW97-1040) is apparently a medial fragment that could possibly be from a second Folsom point of semitranslucent chert.

A probable Folsom point preform (specimen SW97-470) was recovered from deposits assigned to component II overlying component I (Figure 7(a)). The point is the proximal portion of a moderately thick, but well-formed biface with a biconvex cross section and a rounded base. It is transversely fractured and is made of a pink opaque chert. The center of the preform appears to contain flute ruminants and the hinged spot in the middle of the base appears to be a failed fluting platform.

Four end scrapers and one side scraper or composite tool were assigned to component II and two end scrapers were also assigned to component IV, some of which may have been associated with the Folsom occupation. In particular, one specimen assigned to component II (specimen SW97-904) is a spurred end scraper with a spokeshave notch along one margin (Figure 7(b)). It is similar to spurred end scrapers often found in Folsom components. Another end scraper from component II (specimen SW97-587) also exhibits characteristics of tools that are often part of Folsom toolkits (Figure 7(c)). Both of these end scrapers are of algalitic chert.

Another flake tool that may have originally derived from the Folsom occupation is a side scraper or composite tool from component II (specimen SW97-676). The specimen exhibits regular retouch on all margins and its lateral margin has been steeply retouched to produce a steep angle-working margin (Figure 7(d)). The opposite lateral margins and distal margin have both been retouched to produce working margins with acute edge angles. The tool is of semitranslucent chert.

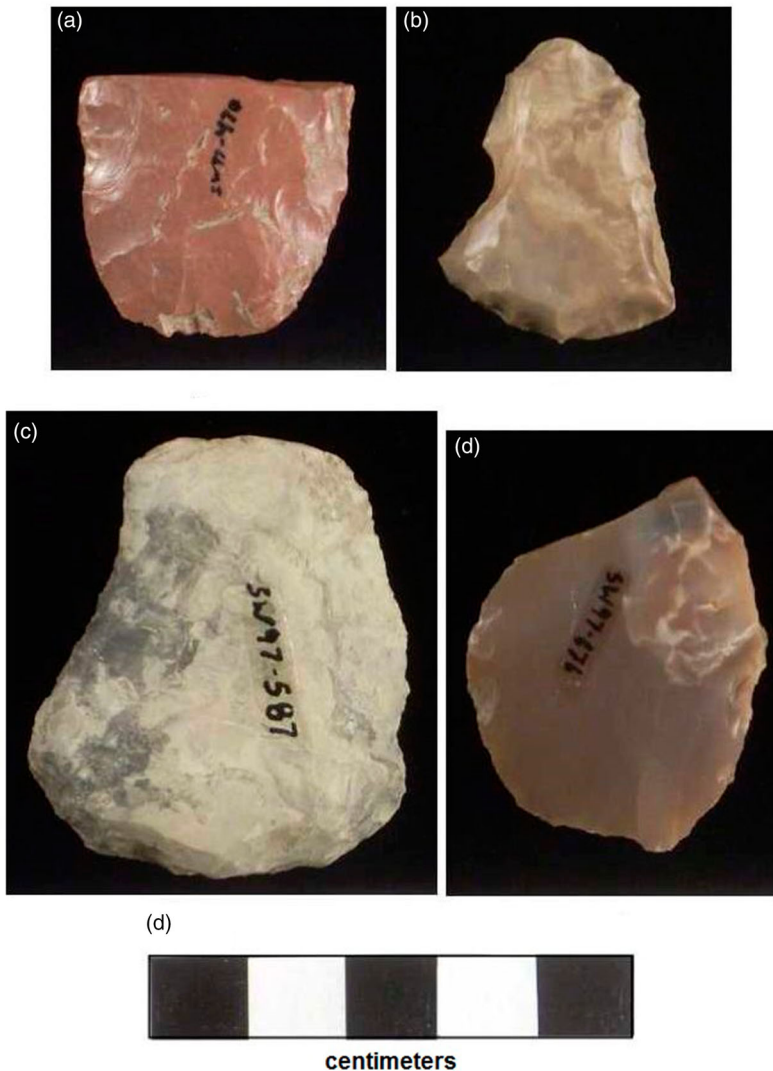


FIGURE 7 Selected probable Folsom artifacts from component II, site 48SW97. (a) preform (specimen SW97-470), (b) end scraper (specimen SW97-904), (c) end scraper (specimen SW97-587), and (d) sidescraper/composite tool (specimen SW97-676).

Folsom association?

The first question is whether the location was actually used by Folsom people. The presence of a number of Folsom projectile points and other diagnostic artifacts indicates a Folsom period occupation, while a single diagnostic Folsom artifact may be explained by activity of later occupants. The recovery of several Folsom artifacts most likely represents the use of the location during this early Paleoindian period.

The next question concerning the Folsom occupation is whether the stone features described above were built and used during that period. The remains of these

structures were found at the base of the excavations in the consolidated silt-clay below the less compacted aeolian deposits on or just above bedrock in a low depression of the bedrock. The majority of the recovered artifacts and other remains at the site were from the less compacted aeolian deposits that were radiocarbon dated to the last 3000 years. The remains from the base of the consolidated silt-clay were relatively more intact as attested by the well preserved nature of the two stone features. The Folsom point fragments were found in situ between and at the base of the rocks in different portions of the arc constituting Feature 17 in the relatively undisturbed consolidated deposits indicating that the stone arc and the projectile point belong to the same occupation. In addition to the Folsom points, two fragments of a laterally retouched flake probably of Folsom age were found in the silt-clay deposits within the stone features, with one of the fragments found in each of the structures.

Other Folsom evidence in the area

Folsom projectile points and tools have also been recorded from the surface and excavated in mixed contexts in the immediate vicinity of site 48SW97 (McNees et al. 1992). A Folsom point was collected from the surface of site 48SW3756, which includes a portion of site 48SW97 (Pastor and Metcalf 1982). A Folsom preform fragment resulting from an *outrépassé* fracture that occurred during channel flake removal was recovered from the deepest component at site 48SW211 (McNees et al. 1992). A possible retouched flake Folsom tool was recovered from the surface at site 48SW7993 (McNees et al. 1992). McKibbin et al. (1989) reported a possible Folsom point from a Uinta phase component at the Little Ridge site.

Site 48SW97 is just one locality of several in the Rock Springs Uplift and surrounding area that contains evidence of Folsom occupation. One nearby Folsom site is the Black Buttes site (48SW13624) located on a northeastern bench of Black Buttes near site 48SW97 (Wimer 2001). Artifacts collected from the surface of Black Buttes include 24 Folsom projectile point fragments and preforms, five channel flakes, three graters, 11 retouched flakes, 45 end scrapers, a drill fragment, and three biface fragments. Similar to site 48SW97, the artifacts are of local materials that include Black Buttes quartzite and local cherts.

An important Folsom locality that has been excavated is the Krmpotich site (48SW9826) located on the western edge of the Killpecker dune field north of site 48SW97 (Kornfeld et al. 1999, 2003, 2010). Excavations at the site revealed the presence of a buried Folsom component resting on a deflated surface below a paleosol that consists of bone and flaked stone artifacts. The patterning of the artifacts and other remains was found to be the result of deflation (Mayer 2002). The excavated assemblage includes nine projectile points, 47 channel flakes, six scrapers, 11 retouched flakes, three utilized flakes, one graver, 30 bifaces, and three cores. All recovered diagnostic artifacts from the site are Folsom and the site appears to have functioned as a campsite and workshop. The majority of the projectile points and preforms are of oolitic chert.

The Morgan site (48SW773/48SW3420) also has Folsom artifacts collected from the surface along with others dating to later periods (Wimer 2001). The Morgan site

is in an area of high rolling hills cut by deep eroded gullies and canyons in the Jack Morrow Hills north of site 48SW97. The Folsom collection consists of two Folsom projectile point fragments, one preform, four end scrapers, one drill, and 16 bifaces. The artifacts are made from locally available cherts and quartzites. Another nearby site with Folsom artifacts is the Mud Springs site (48SW774). However, little information is available for this site except for its location south of site 48SW97 (Frison 1978:114).

Evidence for other Folsom structures

Evidence for Folsom structures comes from the Mountaineer site in Colorado and the Agate Basin and Hanson sites in Wyoming (Frison and Bradley 1980; Frison and Stanford 1982; Stiger 2006). Other Folsom sites with possible structures are the Stewart's Cattle Guard site and Locality B at the Barger Gulch site (Jodry 1999; Surovell and Waguespack 2007). Excavations at the Mountaineer site in western Colorado near Gunnison yielded the remains of a structure attributed to the Folsom period (Stiger 2006). The site occurs atop an isolated mesa top above the Gunnison Basin where over 61 clusters of artifacts in the shallow soils have been recorded, many with diagnostic Folsom material. Excavations of one cluster yielded a cleared area interpreted as a structure, and an assemblage of 35,000 stone artifacts mostly of quartzite including hundreds of stone tools.

A 4 to 5 m in diameter, dark sediment filled basin-shaped depression with charcoal and artifacts overlying bedrock constituted the structure. The deepest part of the floor was approximately 40 to 50 cm below the modern ground surface. A few large immovable rocks and bedrock formed part of the structure's exterior. Large slabs of the local welded tuff surrounded the basin. The fill contained harden lumps of a material resembling a yellow/green kaolinite and hundreds of pieces of burned daub suggesting the structure had burned and collapsed. Most of the Folsom points from the excavation block were from inside of the feature or cleared area. The Mountaineer basin-shaped depression with rocks lining the basin is similar to the structural remains from site 48SW97.

Another Folsom site with structures is Agate Basin, located in the shortgrass plains of extreme eastern Wyoming on a usually dry tributary of the Cheyenne River (Frison and Stanford 1982). The Folsom occupation in Area 2 yielded evidence for one and possibly two structures, the best preserved one in the higher, northern portion of the site and the other in the lower, southern portion of the site. The presence of these structures is suggested by the distribution of flakes and tools combined with a barely perceptible change in the color and texture of the deposits. A well-defined hearth about 30 cm in diameter occurred in the shallow basin of the structure in the northern portion of the site and a concentration of stone tools and debitage was present in the northern portion of this structure. A bison rib stuck in the ground and rocks of various sizes associated with the structure may have been used to hold down a hide cover. The structure area measured about 3.5 m in diameter.

The Hanson site located in the northern Big Horn Basin of central Wyoming is the third site with possible evidence for structures belonging to the Folsom period (Frison 1978; Frison and Bradley 1980). Three hard-packed loci in Area 2 of the

site are thought to represent roughly circular lodge structures though they lack post holes or a surrounding circle of stone. The completely excavated locus produced evidence of two well-defined, hard-packed floors separated by a 1 to 3 cm layer of pure sand that appeared to have been spread evenly over the lodge floor. The sand source is located within 100 m of the site. The two superimposed lodge floors suggested more than one period of use. The results of additional investigations at the site in 1987 indicated that the sand may have been brought into the site by fluvial processes and not by human action (Ingbar and Frison 1989). They concluded that the lodge structure hypothesis is still an open question.

Another site with a possible Folsom structure is the Stewart's Cattle Guard site (Jodry 1999; Jodry and Stanford 1992). Concentrations of flaking debris, bison bone, burned flaked stone artifacts and bone, pieces of red pigment, flake tools, and remains of weaponry repair and replacement were interpreted as a residential camp consisting of at least five hearth-centered activity areas (Jodry and Stanford 1992:154; Jodry 1999:294). These activity areas were approximately 4.5 m apart from center to center of each area. The bone and flaked stone tools associated with one of the activity areas consisted of spatially constricted concentrations indicating that the activities occurred in a confined space of a structure measuring approximately 3 m in diameter. Analysis of artifact distributions at Locality B at the Barger Gulch site also suggests hearth-centered activities within a structure measuring about 3 × 4 m (Surovell and Waguespack 2007:250). The northwest portion of the possible sheltered activity area contained mostly flake tools, projectile points, and preforms while the southeast side had mostly debitage and bifaces indicating that activities were segregated within the internal space.

The size and spacing of the cobble ringed structures at site 48SW97 measuring about 2.3 to 2.5 m in diameter and spaced about 4.5 m apart center to center appears to be consistent with the other excavated Folsom structures. These structures ranged in size from approximately 3 to 5 m in diameter with the largest structure measuring 4 to 5 m in diameter from the Mountaineer site. The larger size of the structure from the Mountaineer site may be result of its possible longer term and repeated winter occupations (Andrews 2010). The two structures at site 48SW97 may have been constructed for a relatively short-term occupation during a different season of the year. The size and spacing of the two cobble ringed structures are similar to the five contemporaneous hearth-centered activity areas identified in the residential camp area at the Stewart's Cattle Guard site that was interpreted as a late summer/early fall short-term camp for the processing of bison (Jodry 1999:330). One of the activities areas appears to have been in a structure measuring approximately 3 m in diameter (Jodry 1999:320).

Conclusion

The documentation of Folsom structures from site 48SW97 provides an additional case to the growing number of Folsom period structures. This case extends known examples into the Wyoming Basin of southwest Wyoming, an area with a number of known Folsom period sites (Frison et al. 2014). The relatively small size of the structures and their informal nature, the small quantity of recovered artifacts, and the

close spacing of the two structures suggest that the site was a short-term residential camp probably representing a single occupation.

The structures at site 48SW97 lacked post holes and other evidence for a substantial superstructure suggesting that they did not have an elaborate formal design and were fairly ephemeral in nature, most likely consisting of stacked sagebrush or hides. The level of residential mobility and duration of site occupation is generally related to the amount of investment in houses with temporary houses being constructed at locations with anticipated short-duration occupations (Smith 2003). The small size of the structures is similar to the structure at the Stewart's Cattle Guard site, a short-term camp for the processing of a bison kill (Jodry 1999:321). The limited amount of remains recovered from the two structures provides additional evidence for the short-term nature of the site as has been shown by a number of ethnoarchaeological and archaeological studies of the relationship between the number of artifacts and duration of occupation (Bamforth 1997; Hitchcock 1987; Yellen 1977). The close spacing of the structures also indicates an occupation of short duration. Houses at camps representing short-term occupations are usually more closely spaced and irregularly laid out than at longer occupied camps (Whitelaw 1991). The spacing is also similar to the close spacing of the hearth-centered activity areas at Stewart's Cattle Guard, a short-term camp site (Jodry 1999:294).

Although the excavated portion of site 48SW97 appears to represent a short-term single occupation, other portions were probably repetitively reused during the Folsom period. Numerous dense concentrations of debitage and other artifacts representing all periods of occupation are present throughout the ridge that is encompassed by site 48SW97. A large Folsom site containing at least 24 Folsom points and other surface remains is on a northeast bench of Black Buttes, northwest of site 48SW97 (Wimer 2001:36–42). Folsom material has been recovered from the surface or during excavations at several sites in the immediate vicinity of site 48SW97 including sites 48SW3756 (Pastor and Metcalf 1982), 48SW211 (McNees et al. 1992), and 48SW7993 (McNees et al. 1992). The area in the vicinity of Black Buttes appears to have been favored during their seasonal round, if not annually, at least periodically.

What part of the seasonal round these sites represent or the size of their annual range is unclear. The Folsom occupants may have traveled hundreds of kilometers over their range similar to the mobility represented at the Stewart's Cattle Guard site, where groups from as far as a couple hundred kilometers aggregated for the killing and processing of bison during the late summer/early fall (Jodry 1999:30). Alternatively their range may have been limited to the immediate local basins similar to the mobility patterns proposed for the Mountaineer site, where the occupants focused their seasonal round within the Gunnison Basin and reused the Mountaineer site during different times of the year (Andrews 2010:267–68). As with the Mountaineer site and contrasting with the Stewart's Cattle Guard, the occupants of site 48SW97 and the nearby Folsom sites used mostly locally available tool stone suggesting that their range may have been of a more limited nature similar to the patterns proposed for the Gunnison Basin (Andrews 2010:290).

In contrast to the probable short-term nature of the occupation at site 48SW97, other known Folsom sites in southwest Wyoming appear to have occupations of

longer duration. Using the point to preform ratios as calculated by Amick (1996:393) for his comparisons of sites in the Southern Plains and the Rio Grande basins of New Mexico, Wimer (2001:132) showed that sites in the Wyoming Basin have point to preform ratios indicating reduced residential mobility patterns compared with sites in the Southern Plains. These patterns are similar to those delineated by Amick (1996) for the Rio Grande basins of New Mexico and contrast with those of the Southern Plains. The sites in southwest Wyoming with apparent occupations of longer duration and those with short-term occupations such as site 48SW97 may represent different functions and seasons of use within the overall Folsom period seasonal round. The possible use of sites during different seasons suggests that the Folsom occupants moved within a fairly limited range at least for some seasons of the year, again indicating mobility patterns similar to those proposed for the Gunnison Basin.

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