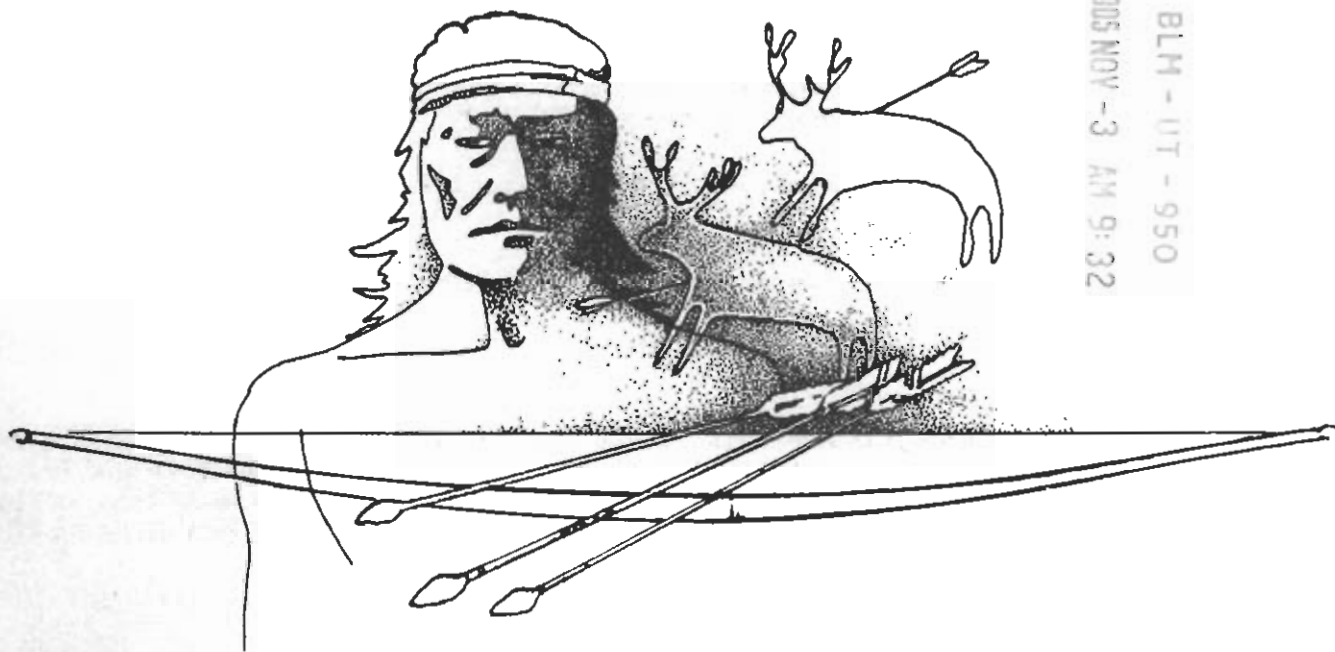


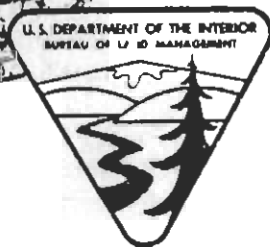
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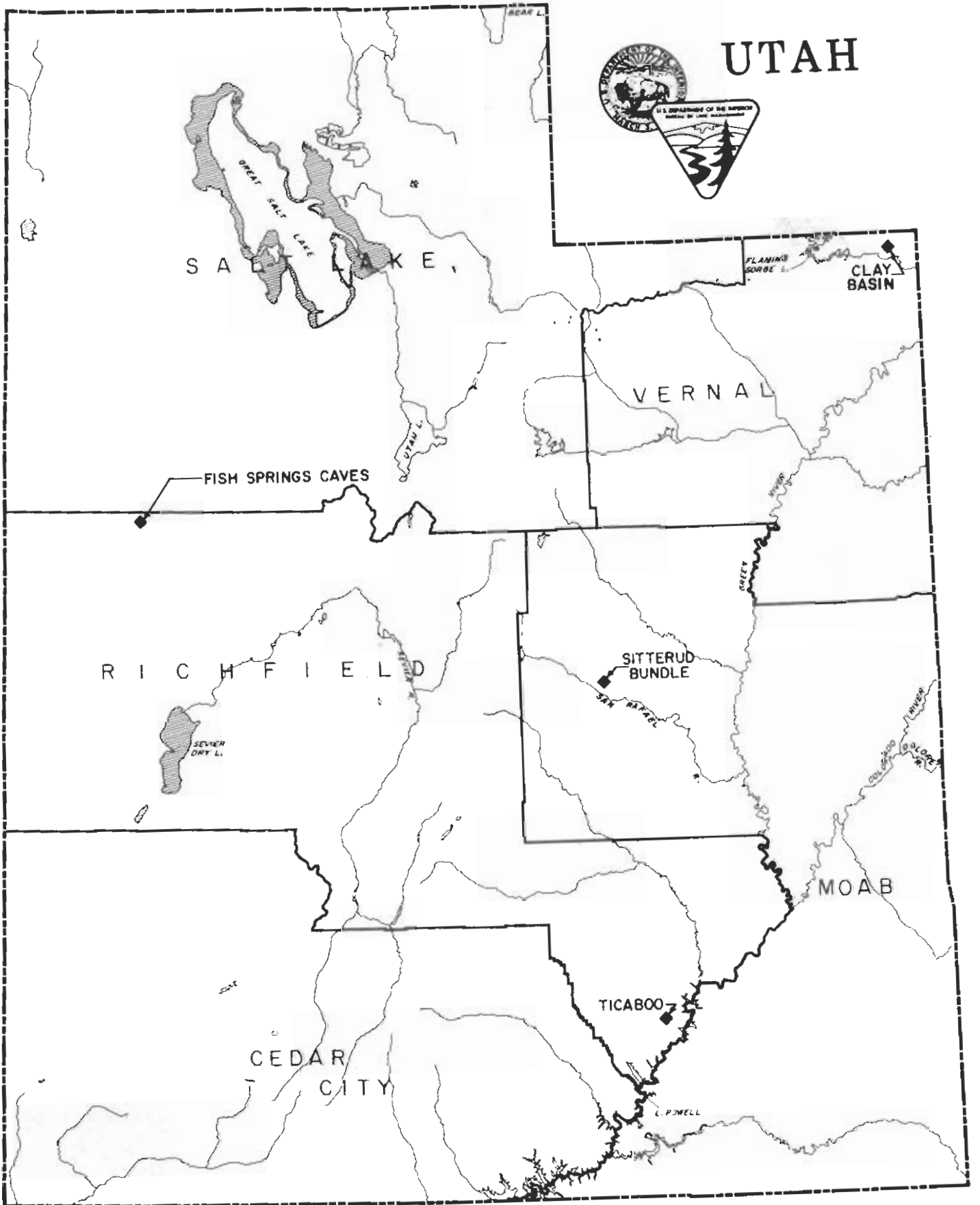
**ARCHAEOLOGICAL INVESTIGATIONS IN UTAH
AT FISH SPRINGS
CLAY BASIN
NORTHERN SAN RAFAEL SWELL
SOUTHERN HENRY MOUNTAINS**



**CULTURAL RESOURCE SERIES
No. 12**



UTAH



**ARCHAEOLOGICAL INVESTIGATIONS IN UTAH
AT FISH SPRINGS
CLAY BASIN
NORTHERN SAN RAFAEL SWELL
SOUTHERN HENRY MOUNTAINS**

**PREHISTORIC OCCUPATION PATTERNS,
SUBSISTENCE ADAPTATIONS, AND
CHRONOLOGY IN THE FISH SPRINGS
AREA, UTAH
by
David B. Madsen**

**AN ARCHAEOLOGICAL SURVEY
OF CLAY BASIN, DAGGETT
COUNTY, UTAH
by
La Mar W. Lindsay**

**THE SITTERUD BUNDLE:
A PREHISTORIC CACHE FROM
CENTRAL UTAH
by
Michael P. Benson**

**SALVAGE EXCAVATIONS AT
TICABOO TOWN RUIN
by
David B. Madsen**

**Assembled
by
David B. Madsen
and
Richard E. Fike**

**1982
Utah State Office
Bureau of Land Management**

In cooperation with the Utah Division of State History

PREHISTORIC OCCUPATION PATTERNS,
SUBSISTENCE ADAPTATIONS, AND CHRONOLOGY
IN THE FISH SPRINGS AREA, UTAH

By

David B. Madsen

Division of Utah State History
Antiquities Section
Salt Lake City, Utah

June 1979

PREFACE

Test excavations in the Fish Springs area were undertaken as a cooperative program involving the U. S. Fish and Wildlife Service, the U. S. Bureau of Land Management, and the Antiquities Section, Utah Division of State History. Since the construction of the Fish Springs Wildlife Refuge in 1958, the refuge has become increasingly popular as a recreation area. This increased traffic has led to an associated increase in vandalism and relic hunting in archeological sites in and adjacent to the refuge. Several large cave sites, which are readily visible from the road, have particularly suffered from this increased traffic and have been severely damaged in recent years. As a result of this increased vandalism (and because of federal legislation that gives both federal agencies the mandate to protect cultural resources), both the Bureau of Land Management and the Fish and Wildlife Service contracted with the Antiquities Section to provide an examination of the sites' potential for inclusion on the National Register of Historic Places, and to make recommendations concerning their future protection.

The contribution of the Antiquities Section went beyond the minimal contract requirements because of the potential these sites have for providing answers to several major unsolved problems in Utah's prehistory. Since one of the Section's major responsibility is to conduct research which will more fully explicate Utah's cultural heritage, it was felt that an effort conducted in cooperation with the Bureau of Land Management and U. S. Fish and Wildlife Service would produce more information than would a unilateral program.

Due to the cooperative nature of the project, it involved a number of people who contributed to its success to a greater or lesser degree. W. G. "Red" Sheldon, Rolf Kraft, Glenn Elison, and Kim Forrest of the U. S. Fish and Wildlife Service provided logistic support and other services too numerable to mention. Richard Fike and Shelley Smith of the Bureau of Land Management provided administrative assistance and helped with some of the preliminary mapping. Actual fieldwork included La Mar Lindsay, Kay Sargent, Tom Zeidler, Asa Nielson, Greg Seward, James Dykman, and David Madsen. Special mention should be made of Kay Sargent, who produced both the field and laboratory photography; Frank DeCourten who assisted with the identification of stone types; and Jan Andrews, who provided an osteological examination of the burial. Amy Pringle and Renae Hendry both typed the manuscript and helped to make it at least vaguely intelligible.

INTRODUCTION

The publication of these four papers represents a continuing program by both the Bureau of Land Management and the Antiquities Section, Division of State History to provide interested scientists and the general public access to many of the important cultural resource management reports that often languish, unavailable and unread, in agency files. The current dearth of public and private funding for the publication of basically descriptive reports, such as those included here, makes the continuing production of publication series such as this BLM Cultural Resource Series even more valuable and important. Descriptive data from reports like these remain the basis of archaeological interpretations and changing archaeological theories, yet those data are often the most difficult to have published in scientific journals. It is also true that these data, as well as the artifacts and sites from which they are derived, are the very reason that Federal and state laws have been formulated to protect cultural resources. It is the cultural information contained within sites that is of immediate importance; unfortunately these data remain generally unavailable even after completion of the project. For these two reasons alone the BLM Cultural Resource Series makes an extremely worthwhile contribution to the archaeological literature.

The four papers in this monograph exemplify the wide range of Cultural Resource Management projects conducted on public lands within the state of Utah. These include: planned test excavations to determine the nature and significance of sites (Fish Springs), salvage excavations conducted to help mitigate vandalism and relic hunting activities at a site (Ticaboo), sample surveys to determine the impact of development projects on cultural resources (Clay Basin), and the analysis and detailed discussion of known but unreported or poorly reported data (Sitterud Bundle).

The papers within this volume also exemplify a continuing attempt by the Bureau of Land Management, Utah and the Antiquities Section, Utah Division of State History to get the most results for the least amount of time and money. This has been done by combining efforts of the two agencies to accomplish projects that are beyond the reach of either group. The excavations at Crab Cave, reported here in the Fish Springs report, is an excellent example of this cooperative effort producing much more than would otherwise have been achieved. Funding available to the BLM at that site was sufficient for analysis work but insufficient to cover personnel costs and equipment. The Antiquities Section had the necessary personnel and equipment, but insufficient funding to cover the cost of analysis. By combining their efforts the two agencies were able to test Crab Cave and to provide a preliminary analysis of this very important Great Basin site.

The report on the excavations at Fish Springs in the northeastern Great Basin section of Utah provides important data on the use of pinyon by Fremont/Sevier and possible Archaic peoples as well as on the timing of seasonal rounds by hunting and gathering groups in the area. The Clay Basin survey report provides additional data on the use of the Plains area of the state by pre- and protohistoric Numic-speaking groups. The Sitterud Bundle constitutes one of the only complete "tool-kits" ever found and its analysis provides important data on the use and manufacture of prehistoric tools. The salvage excavation at Ticaboo on the southwestern flank of the Henry Mountains provides valuable new data on the interaction of Fremont and Anasazi peoples.

David B. Madsen
Richard E. Fike

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ABSTRACT

Test excavations at a series of cave and open sites near Fish Springs, Utah, generally corroborate, with some modifications, accepted placement of Late Archaic and Fremont (Sevier) groups in space and time in the Eastern Great Basin. The study provides some evidence suggesting in situ development of the Sevier/Fremont from a local Archaic base. This contrasts with earlier findings in the area and suggests that the occupational hiatus apparent in earlier tests probably results from flooding of sites below the level of Neoglacial Lake Bonneville. Subsistence data from the dry Sevier/Fremont levels of the caves suggests they were occupied in the early winter months. An extremely high abundance of pinyon nut hulls suggests that this occupation followed a pinyon harvest in the Deep Creek Mountains. The presence of numerous marsh plants such as scirpus, whose rhizomes are most generally available in the spring and early summer, suggest occupation may have continued into the spring. Together these data indicate that the Sevier/Fremont groups who occupied the sites were involved in mobile collecting activities for at least a third to half of the year and that the role of cultigens in their subsistence system and the notion that they were settled horticulturalists must be seriously re-examined.

INTRODUCTION

Test excavations in the Fish Springs area were undertaken through cooperative agreements between the Antiquities Section, Division of State History, and the U. S. Fish and Wildlife Service, and between the Section and the U. S. Bureau of Land Management.

In addition to the cultural resource management requirements, the Antiquities Section sought to address several major problems in the prehistory of the eastern Great Basin. The first of these was the question of cultural continuity between Archaic and Sevier/Fremont culture groups (e.g., Madsen and Berry 1975; Aikens 1976). It had been hypothesized that Neoglacial flooding of marsh and lake periphery resources around the Great Salt Lake contributed to an occupational hiatus between Archaic and Sevier groups. But the nature of this hiatus whether it was merely a local phenomenon associated with lake level fluctuations, or a more widespread and distinct break -- remained unknown. Since the Fish Springs area constitutes a relatively large marsh and lake margin resource base located above the level of Neoglacial lake flooding and since both Archaic and Sevier/Fremont traits have been identified in the area, testing of caves and open sites in the area was undertaken. A second major concern was the subsistence of the Sevier/Fremont including settlement pattern, timing of site occupation, activity scheduling, etc. There is some controversy over whether the Sevier/Fremont peoples were primarily dependent on corn agriculture, or whether corn was one of many elements in a subsistence system based primarily on the collection of wild foodstuffs (e.g., Madsen and Lindsay 1977; Marwitt 1979). Since marsh resources are believed to have been a major component of this subsistence system, and since the Fish Springs area is located well away from major areas of Sevier agricultural sites, investigations here could provide insight into these questions as well strategy and timing of site occupation.

Fieldwork was carried out in the spring and the late fall of 1978. Initially the salvage excavation of a burial and an associated artifact cache weathering out of open dune deposits near the Fish Springs refuge headquarters was undertaken under the direction of La Mar Lindsay. Subsequent work, under the direction of David B. Madsen, consisted of the reconnaissance of Fish Springs (42Jb24) and Hot Springs (42Jb7) caves and test excavation of Barn Owl (42Jb25) and Crab (42Jb8) caves. Test excavations at the latter two sites were intended to determine the depth and nature of the deposits, to obtain diagnostic artifacts in occupational sequence, to obtain samples for radiocarbon dating, and finally, to evaluate the caves in terms of the research questions posed above.

SETTING AND GENERAL SITE DESCRIPTIONS

SETTING

The Fish Springs marsh area (Figs. 1, 2) is on the extreme southern end of the Great Salt Lake Desert in western Juab County, Utah. (E1/2 T11S, R14W; 39° 48' to 54' north latitude, 113° 20'-25' west longitude.) The marsh is on the northeastern end of the Fish Springs Range and consists of 14 springs feeding approximately 31km² of marsh habitat. This area has been extensively modified by development of the Fish Springs Wildlife Refuge. Early photographic evidence suggests it was as large if not larger prior to this disturbance, but contained smaller areas of open water. The marsh is at an elevation of 1306m (4285ft) to 1311m (4300ft) and is bordered by interfingering dunes on the west and desert playa on the north and east.

Several studies of Fish Springs area geology have been conducted, but unfortunately they are either too general (e.g., Stokes 1963) or too incomplete (e.g., Hintze 1951; Kepper 1960; Oliveira 1975) to provide specific description of the formation(s) in which the caves are located. Generally, however, the Fish Springs Range, which reaches an elevation of 2598m (8523ft), consists of dolomites and limestones deposited from the Silurian through the Ordovician. The caves appear to have been formed in this dolomite--which might be the Lost Sheep dolomite of Oliveira (1975) and/or the Laketown Dolomite of Stokes (1963)--through solution and wave action associated with high levels of Lake Bonneville. Massive tufa deposits are found at the level of the two largest caves (+1465m-4800ft) and these tufa deposits were probably formed when the lake was at the Provo level about 12,500 to 13,500 years ago (Broecker and Kaufman 1965; Currey, 1980). Quaternary alluvium borders the hardrock outcrops and reaches to the margin of the marsh areas. Spring siphons occur at the juncture of this alluvium and the lacustrine and eolian deposits found within the marsh itself. These springs appear to be controlled by faulting in the Fish Springs Range, but were apparently active throughout the Late Quaternary and possibly earlier (Joseph Gates, 1979 personal communication) and provided water and marsh habitat throughout the span of human occupation in the area. One of the unique features of these springs is the warm water temperature. Temperatures range from 17.5°C (63°F) to 75.5°C (168°F) and provide for the "the year round residence of a variety of marsh birds not normally found in Utah in winter" (Refuge Leaflet 206-R, 1968).

Checklists of the flora and fauna of the Fish Springs area are available through the Fish and Wildlife Service and need not be repeated here. A general description of marsh flora prior to the development of the refuge was provided to the Service by Gueswel (1958):

"The submerged-vegetation consists primarily of wigeongrass (Ruppia maritima), muskgrass (Chara spp.), and coontail (Ceratophyllum demersum) with wigeongrass predominating. The coontail is more abundant in the freshwater areas near the springs. Olney's three-square bulrush (Scirpus olneyi) is by far the dominating emergent species. It forms a band along nearly all shallow water areas and, in many cases, has completely covered the waterways. It is usually found in "dog

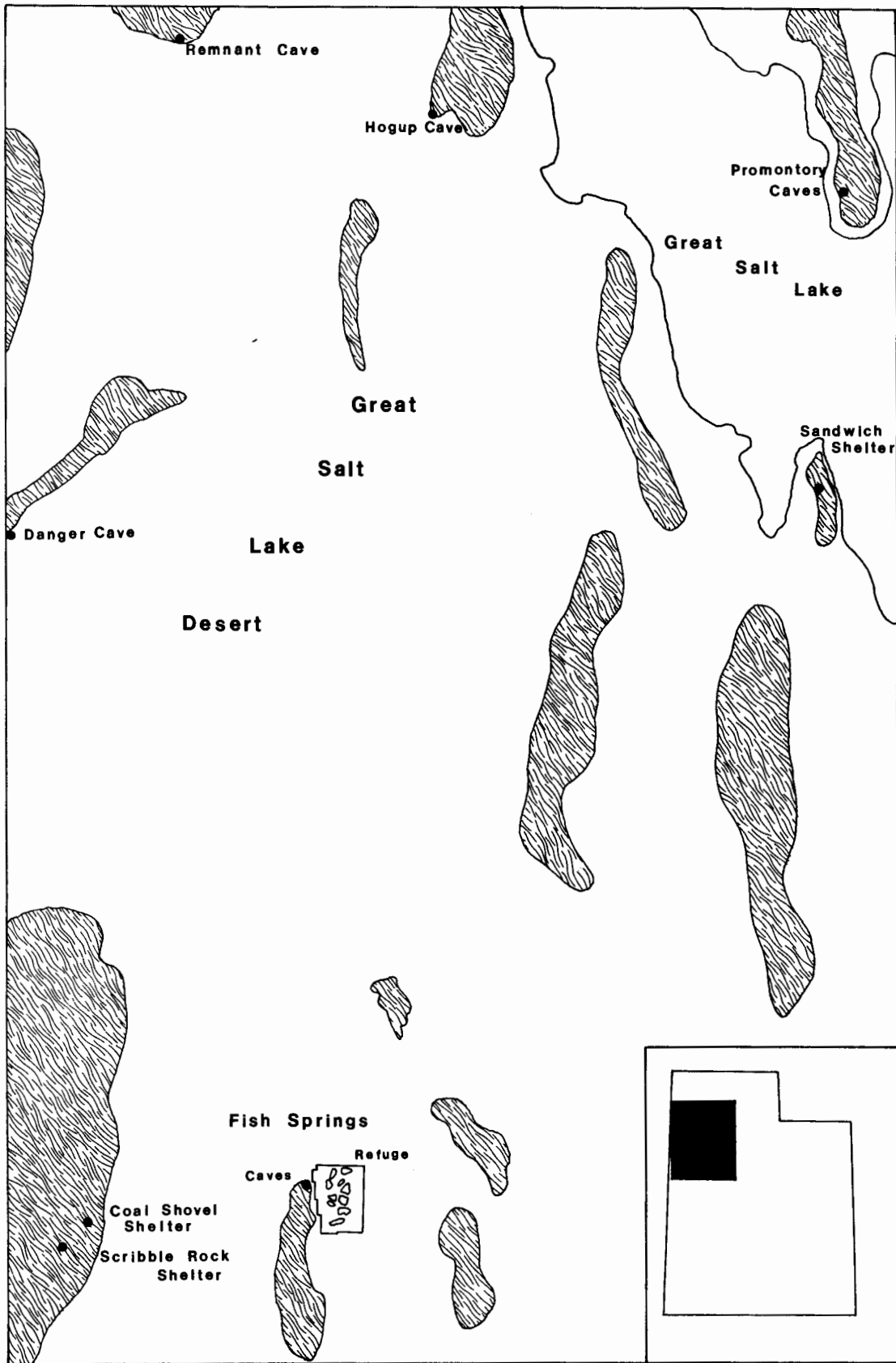


Figure 1. Location of Fish Springs area in relation to other important archaeological sites in the region.

hair" stands and averages above five feet in height. There are a few patches of hardstem bulrush (Scirpus acutus) and cattail (Typha) but these species are in the minority. Spikerush (Eleocharis spp) is usually found on moist sites near the water. Cane (Phragmites) is present in patches along the channels and also in sparse stands on the drier sites. Saltwort (Salicornia) is scattered from the water's edge to and into the near-barren salt flats. Saltgrass (Distichlis spicata) is the predominate species from water to dry slopes. Sacaton (Sporobolus airoides) is found throughout the saltgrass type and is dominant on the higher areas which had been plowed. The slopes and drier flats bordering the marsh and saltgrass types are, in most cases, greasewood (Sarcobatus vermiculatus) type. This gives way to shadscale (Atriplex canescens) and snakeweed (Gutierrezia spp) on the high, dry slopes to the west. Saltcedar (Tamarix gallica) is present in 12 few spots but is not a serious problem as yet."

The rocky slopes of the Fish Springs Range are relatively barren and are sparsely covered with low ground-cover/herbaceous plants such as housegrass (Tetradymia glabrata) and Mormon tea (Ephedra nevadensis). Sagebrush (Artemisia sp) dominates on the alluvial fans and small patches of stunted junipers (Juniperus osteosperma) are found along water courses and at higher elevations. No pinyon was observed on the range.

The checklist of birds found in the refuge includes 166 species of which the majority are marsh birds (Anonymous 1968). Thirty-four species are listed as common or abundant and 26 species are resident throughout the year. Species which fall in both these categories (that is both abundant and available year-round) include the black-crowned night heron, canada goose, mallard, gadwall, pintail, green-winged teal, blue-winged teal, shoveler, ring-necked duck, virginia rail, sora, american coot, and horned lark. Other, transitory species are most abundant in the spring and fall. Table I indicates relative abundance of waterfowl at the refuge during 1976-1977. It consists of a compilation of peak populations of each species and is not necessarily indicative of the total population since the population peak of each species is often different from season to season. It should also be used with caution in interpreting prehistoric waterfowl availability since the marsh has been modified to create substantially larger areas of open water.

The marsh also provides habitat for a variety of small mammals, of which several species, primarily microtine rodents (Anonymous 1978) are very abundant. Unfortunately, the only objective data on relative abundance are for muskrat (12,000 in 1976-77), black-tailed jack rabbit (700), and desert cottontail (140). This figures represent only those on the refuge itself and these species, particularly the rabbits, were available to prehistoric occupants in areas peripheral to the marsh. Deer and antelope are the only large mammals identified in the vicinity of the marsh, but no accurate data on relative abundance are available. Hunting pressure has reduced the local abundance of both species, but as late as 1930s a herd of 60 antelope were found in and around the marsh (data on file, U.S. Fish and Wildlife Service). The general area falls within Durrant's (1952) Great Basin Faunal Area, but due to the relatively harsh local environmental setting (other than the marsh) most



Figure 2. View of the northern portion of the Fish Springs marsh area looking east from the mouth of Barn Owl Cave.

of the larger mammals are found only at some distance from the area in areas such as the Deep Creek Mountains.

Outside the marsh area, lack of precipitation is a major environmental constraint on flora, fauna, and human occupation. The station at Fish Springs recorded an average of 189.2mm (7.37in) per year during the period 1970-76. Except for a slight peak in the spring, precipitation is relatively consistent throughout the year, the monthly precipitation averages vary from a January low of 7mm (0.28in) to an April high of 26mm (1.04in) (all climatic data are from Bolke and Sumsion 1978). The higher elevations in the Fish Springs Range receive correspondingly more precipitation, with up to 410mm (16in) falling in the highest areas. Monthly temperatures averages vary from -1.5C (29°F) 26.5°C (80°F). The relatively low precipitation levels and warm temperatures result in an evaporation rate equivalent to 1949mm (76.75in) per year, so that the rate of spring flow is probably the "result of regional precipitation and flow systems rather than of local effects" (Bolke and Sumsion 1978). If this were true in the past, the amount of spring discharge and hence the size of the marsh and its resources would have fluctuated along with regional Late Quaternary climatic changes. This means that there were two periods during the last 11,000 years (Madsen and Currey 1979, Lindsay and Sargent 1979) in which climatic change would have had a significant impact on the carrying capacity of the marsh. The first (about 5000 to 7500 years ago) involved a mid-Holocene period of warmer and dryer conditions when the rate of spring flow would have been reduced, through, it is doubtful that the

Table I.
Comparative Populations of Selected Waterfowl Species
at Fish Springs 1976-77.*

Whistling Swan	18	Pintail	16,056
Snow Goose	20	Redhead	2,129
Canada Goose	568	Canvasback	135
Common Merganser	76	Lesser Scaup	49
Red-breasted Merganser	137	Ring-necked Duck	10
Mallard	3817	Common Goldeneye	42
Gadwall	3033	Bufflehead	102
American Wigeon	7435	Ruddy Duck	239
Green-winged Teal	7730	American coot	3,136
Blue-winged Teal	8371	Northern Shoveler	78

*(from data on file, Fish Springs National Wildlife Refuge)

change was severe enough to cause the marsh to completely dry up (Madsen and Currey 1979). During stades of the Neoglacial period (ca 5000 B.P., 3200 B.P., and 600 B.P.), on the other hand, conditions were cooler and/or wetter and the marsh would have been correspondingly larger. During the middle stade the lake rose to an elevation approaching that of the marsh (Currey and Madsen 1974) but the marsh was never flooded and it appears to have been available throughout the period of human occupation.

Cave and Open Sites

Two kinds of archeological sites were recorded in the survey -- open sites within the marsh itself, and cave sites overlooking the marsh in the adjacent Fish Springs Range. Eleven open sites were identified and recorded in or immediately adjacent to the marsh. However, this gives no real indication prehistoric use, because virtually every area within the marsh that is above the water table is covered with a veneer of lithic debris and other scattered artifact types. Where there were concentrations of debris, sites were described and recorded. Even these, however, varied in size and density, and all of them feathered out into the general artifact cover of the marsh surface. As a result, the designation of sites within the marsh is somewhat arbitrary. A cursory examination of the marsh indicated that the eleven identified artifact concentrations constitute only a minor portion of those that exist within the marsh and that a full scale survey of the area, preferably conducted during the winter when vegetative cover is reduced, is necessary to delineate site occupation patterns.

The open marsh sites are confined to dunes which surround the marsh and interfinger along spring siphons and water courses. Occupation appears to have been scattered throughout these dunal areas and the concentrations of cultural debris appear to be due as much to weathering and deflation in exposed areas as to cultural factors. The sites consist primarily of flaking debris with obsidian the dominant stone type. Sevier Culture ceramics were recovered from several sites; probable

atlatl dart points have been recorded from blowouts in the marsh; and historical records (Anderson 1962) indicate occupation by Gosiutes. As a result, it appears that use of open sites within the marsh has been a part of the occupation pattern at Fish Springs throughout the prehistoric sequence.

Four cave sites are above and adjacent to the marsh proper on the extreme northern end of the Fish Springs Range. They are at elevations varying from ca 30 to 110m above the marsh and range from relatively small (max. depth of 10m) to relatively large (max. depth of 47m). The two larger caves are deep enough that stable temperatures are maintained throughout the year and even at -20°C, outside, the rear of the caves are comfortable in shirt sleeves conditions. The caves are all solution caverns which have been modified by wave action during high periods of Lake Bonneville. They are probably cut into the Lost Sheep Dolomite (Oliveira 1975). All four are coated with varying amounts of calcium carbonate deposited when the caves were at the lake's surface. These deposits are particularly heavy at the two higher caves, which are at or near the Provo level of Lake Bonneville.

All four cave sites contain cultural deposits that have been disturbed by relic hunters. The lowest, most readily accessible cave contains only a small amount of undisturbed material, while the largest, most inaccessible cave has had less than 20 percent of the cultural fill disturbed. The upper portion of the deposits in all four sites are dry and perishable materials are very well preserved. However, ground water seeping along the sides of the caves has infiltrated the lower deposits in each cave and these contain only imperishable materials. Recovered artifacts range from Archaic through Paiute-Shoshoni and appear to be related to the occupations of the open marsh sites.

Previous Archeological Research and Background

Archeological interpretation in the eastern Great Basin has been dominated for the last 30 years by an ethno-archeological model generated by Steward (1938) and Jennings (1957). Briefly, this model suggests that throughout the span of human occupation in the area, inhabitants consisted of relatively small groups of nomadic hunters and gathers who moved from site to site, from one environmental zone to another, as various types of flora and fauna became seasonally available. This "archaic" type of subsistence mode was (according to the model) specifically adapted to desert conditions, hence the name "Desert Archaic" (Jennings and Norbeck 1955) was applied to these groups. A major aspect of this model was that little, if any, change in either settlement patterns or subsistence adaptations occurred throughout the period.

More recent work suggests that this model must be substantially modified. One of the major problems is that the ethnographic model on which the archeological model is based is misleading. Steward's model of the Paiute-Shoshoni groups in the Great Basin appears to have been much too general (Thomas 1981). Variation in subsistence, settlement patterns, group size, length of site occupancy, etc. were much greater from group to group than he implied. Many Numic speaking groups in the Great Basin were virtually sedentary around lacustrine/riverine marsh systems (e.g., Owens Valley, Ruby Valley, Utah Valley) with movement to

other resource zones being rather limited (Stewart 1978). A second major problem is that the archeological record suggests much more variation in subsistence adaptation and settlement pattern through time and space than was allowed for in the model (e.g., Aikens 1970, Simms 1977; Bettinger 1978). Contrary to the model, many of these changes appear to have been climatically induced (e.g., Madsen 1979a) and several lines of evidence (e.g., Parmelee 1980; Madsen 1979a) suggest virtual sedentary marsh adaptations during much of the Archaic period. In sum, the term "Desert Archaic" is almost entirely a misnomer since these people were not 'Archaic' (in the subsistence/settlement sense of the term) and they were not adapted to desert environments.

A recent review of the prehistory of the Great Salt Lake area (based on work by Aikens 1970; Simms 1977; Madsen and Berry 1975; Dalley 1976; Lindsay and Sargent 1979 and others) has resulted in a somewhat different model of the prehistory of the area. Madsen (1979a) has suggested the following sequence:

1. Brief Paleo-Indian occupation (ca 11-10,000 B.P.); evidence of subsistence limited, but probably combination of hunting Pleistocene megafauna and collecting lake periphery resources.
2. Early Archaic (ca 8500-5500 B.P.); basically sedentary on lake periphery with subsistence focused on marsh and lake-edge resources; growth of population.
3. Mid-Archaic (ca 5500-3500 B.P.); migratory hunting and gathering based on both upland and lake-edge resources; population reduction.
4. Late Archaic (3500-2500 B.P.); upland hunting and gathering subsistence and occupation; little evidence of lake margin habitations or use; population markedly reduced or regional abandonment.
5. Sevier (1500-600 B.P.); sedentary village life based on collecting of marsh resources and agriculture; supplemented by seasonal procurement of animals.
6. Proto-Shoshoni (550 B.P.-Present); varying degrees of sedentarism based on hunting and gathering of a variety of resources.



Figure 3. View of the Interior of Barn Owl Cave from the cave mouth.

BARN OWL CAVE

Cave Description and Excavation Procedures

Barn Owl Cave (42Jb25) is the larger and higher of two cave sites on the Fish Springs Refuge at the north end of the Fish Springs Range (SE1/4, NW1/4, S1/2, SE1/4, Sec. 3, T11S, R14W; U.S.G.S. 7.5' Quadrangle Fish Springs NW, Utah). The cave is about 165m above the valley floor at an elevation of roughly 1475m (4840ft) (Fig. 1). It faces northeast and overlooks a marsh area associated with North Spring. The cave is a maximum of 47m deep and 18m wide and is quite spacious throughout with a ceiling height of 3 to 4m (Figs. 3, 4, and 5). Cultural deposits are found throughout the cave and are only slightly shallower at the back than at the front of the cave. This is an unusual feature since in most Great Basin cave sites the majority of deposits are located near the mouth of the cave and are much reduced in the interior (e.g., Danger and Hogup Caves). This occupational pattern may be the result of winter

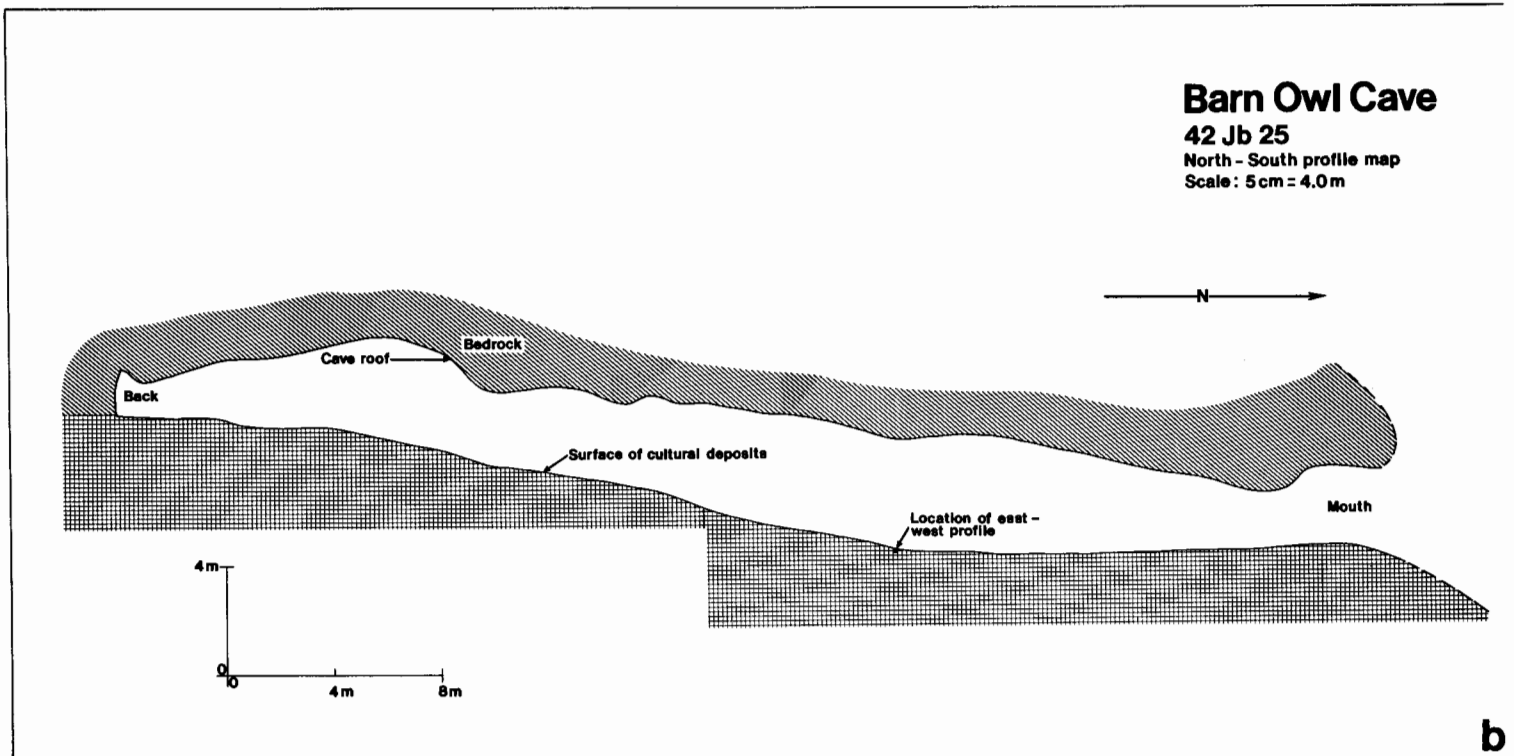
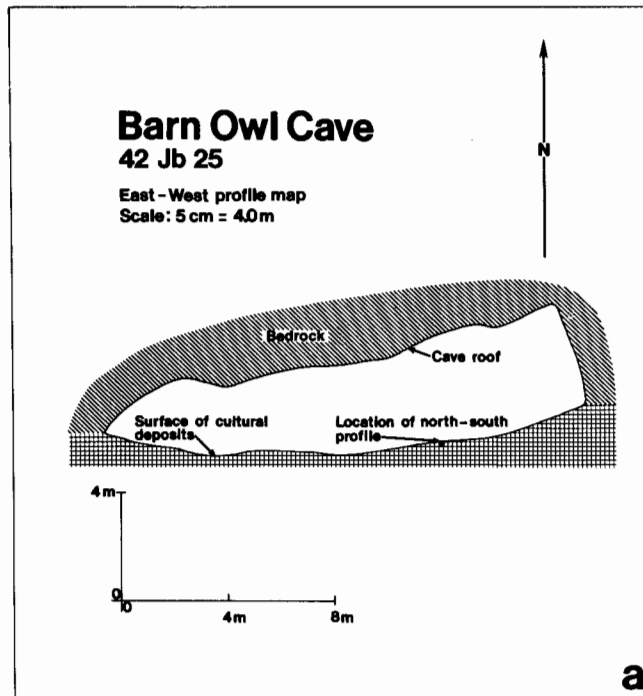


Figure 4. East-west (a) and north-south (b) profiles of Barn Owl Cave.

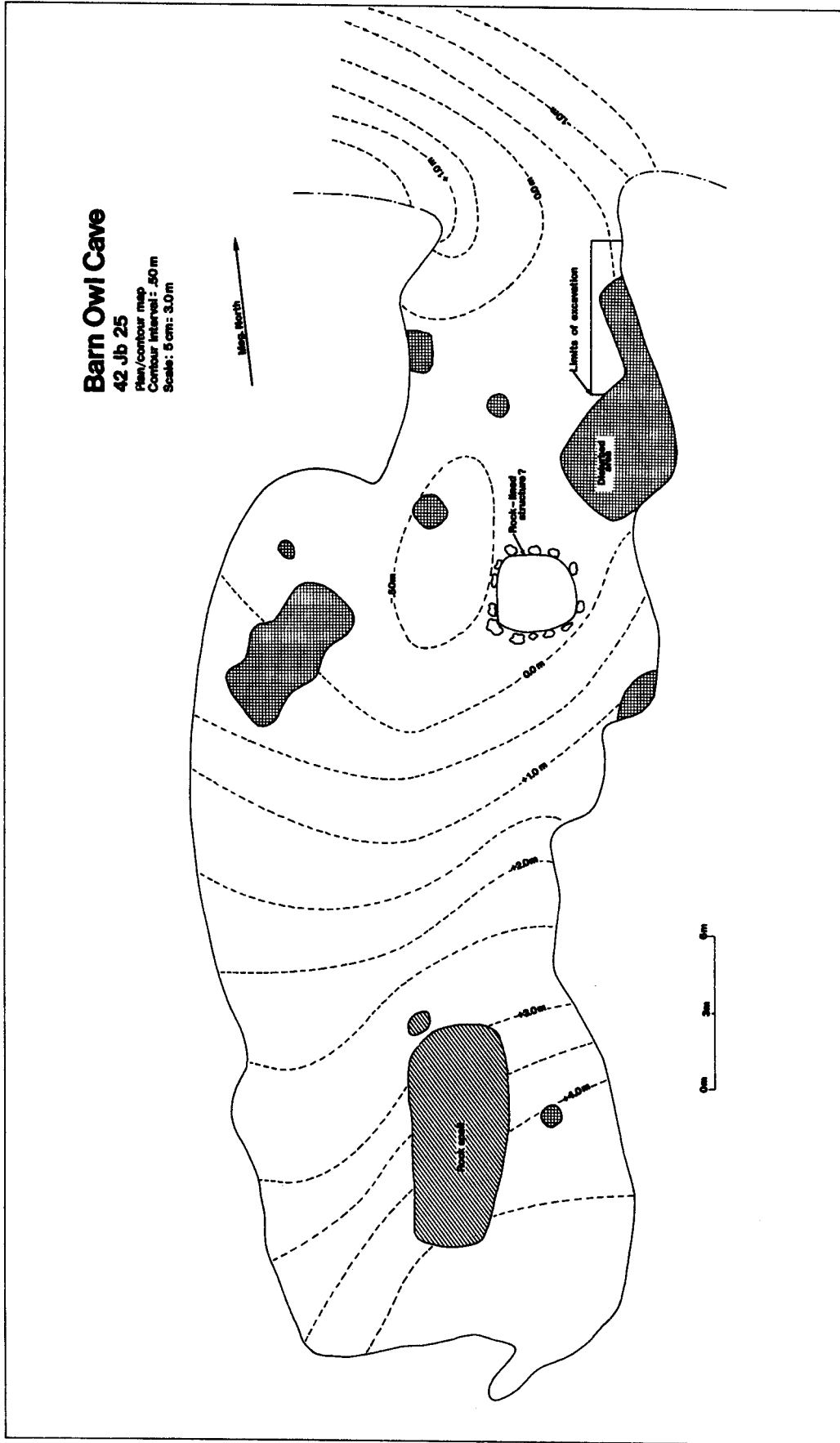


Figure 5. Plan and Contour map of Barn Owl Cave.

occupancy of the cave since comfortable temperatures occur at the rear of the cave during even the coldest periods. For the most part, the upper surface of the cultural deposits is dry, but in localized areas percolation from the roof and walls has destroyed all perishables. The lower deposits are completely wet.

Excavations of limited scope were conducted at the site in order to determine the depth and nature of the cultural deposits and to assess the degree of damage caused by relic hunters. As a result of these limited goals, work at Barn Owl Cave was restricted to mapping of the cave, clearing of a large relic-hunters hole down to sterile fill, the description, mapping, and photography of the stratigraphy, and the excavation and screening of a limited amount of undisturbed fill. Horizontal controls were maintained by the establishment of a grid system oriented along the long axis of the cave. Since the natural stratigraphy could be readily discerned in the wall of the looter's pit, vertical controls were related to natural stratigraphic units.

Excavation was initiated by cleaning a disturbed area just inside the cave mouth along the east wall (Fig. 5). This large (9 by 4m) pit had been taken down to the sterile spall overlying bedrock and provided a complete exposure of the cultural deposits once the disturbed material was removed. These units of cultural deposits could be defined stratigraphically and, for the most part, were readily discernible from each other. After the stratigraphy had been mapped and described, approximately 14 cubic meters of undisturbed fill was removed and passed through 1/4" mesh screen. Large soil samples were taken from each stratigraphic unit to detect artifacts and flora material missed in the screening process.

Stratigraphy and Cultural Features

Cultural deposits in most dry Great Basin cave sites consist of lenses of deposits which interfinger horizontally and vertically and it is often difficult to discern single consistent stratigraphic units. This is true at Barn Owl Cave, and the stratigraphic units used were simply those that could be traced along the entire exposed area. Within, these major units, however, depositional lenses were identified and removed individually. Since the major stratigraphic units (Figs. 6-7) do not necessarily bear a direct relationship to the depositional sequence, but are a product of their utility in description and excavation they are reported here as Cultural Units based on a subsequent analysis of their artifact content.

STRATUM 1

This is a naturally occurring layer of yellowish brown rock spall and water deposited materials that directly overlies bedrock. The depth varies with the undulation in underlying bedrock from 0 to 35cm.

STRATUM 2

This is a layer of dark gray ash, dust, and charcoal that overlies the sterile naturally deposited fill. It contains some small rock spall and a few scattered ash lenses, but is wet and contains no organic

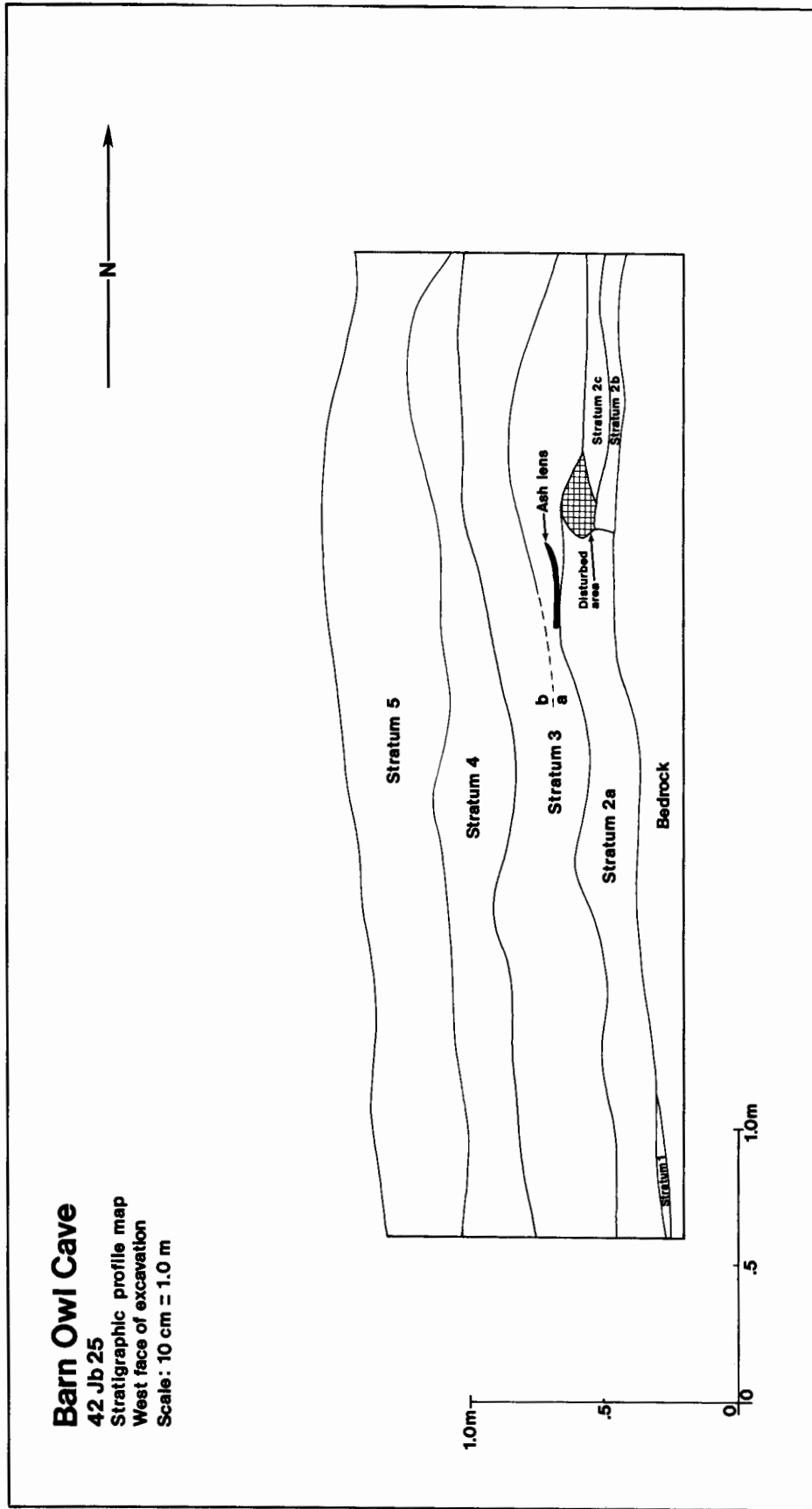


Figure 6. Stratigraphic profile of deposits in west wall of excavation area.

material. The stratum, which comprised three separable layers, averaged 20cm thick, with a maximum of 24cm and a minimum of 14cm. It contained three ash and charcoal filled basins that were intrusive into the underlying sterile fill (Fig. 7), and one that was wholly contained within the excavation unit. The fire hearths averaging 40 cm in diameter and 10 cm deep, were relatively small and contained little other than ash and charcoal.

STRATUM 3

This layer of wet grayish-brown dust and charcoal overlies Stratum 2. It is relatively uniform with few rock spalls, few, if any, recognizable ash lenses, and no vegetation. It can be readily distinguished from Stratum 2, but is difficult to recognize from Stratum 4 in places. The depth varies from 16 to 34cm thick.

STRATUM 4

This layer of dark greyish brown dust, ash and charcoal contains small rock spall (5-15)cm dia.), but little, if any, vegetation. Lenses of ash and charcoal are evident throughout but do not appear to be horizontally contiguous. It can be distinguished from other stratigraphic units by white flecks of what appears to be disintegrated tufa from the sides and roof of the cave. These white flecks, the spall, and the ash lenses distinguish it from Stratum 3 in most areas. The unit varies from 10 to 28cm in thickness.

STRATUM 5

This is the uppermost unit and overlies Stratum 4. It too consists of an upper and lower portion separated by an amorphous and ill-defined surface. Both portions contain well-preserved vegetation and the upper portion is completely dry. This upper layer consists primarily of vegetation such as Atriplex (saltbush), Artemisia (sagebrush), Scirpus (bulrush), a variety of grasses, and small amounts of dust and ash. Large chunks of well-preserved spall varying from a few centimeter to a meter or more in diameter are found scattered throughout the fill. This layer varies from 21 to 43cm thick, while the lower consolidated portion varies from 6 to 31cm thick.

The upper portion of Stratum 5 has been badly disturbed historically; it appears to have been used as a sheep camp. Centered in the cave roughly a third of the distance from the portal to the rear, is an alignment of stones that may have been a structure. It consists of a roughly square arrangement of large rock spalls surrounding a shallow (25 cm maximum depth) depression. Charcoal and historic debris occur in the center of the depression suggest the alignment may be historic.

The lower portion of Stratum 5 consists of similar vegetation and dust, but it is cemented in a calcium carbonate matrix. That results from percolation of moisture along the cave roof and sides. Calcium carbonate on these surfaces apparently dissolved and recrystallized in the lower portion of Stratum 5 where the water collects and evaporates.

The modest amount of artifactual material recovered from undisturbed contexts necessitated a rather general description of cultural units.



Figure 7. View of Barn Owl Cave Deposits.

Only two are defined here, but the occupational sequence at the cave is undoubtedly more complex. Cultural Unit I, composed of Strata 2a, 2b, 2c and 3, is defined on the basis of probable atlatl dart points such as Elko Split-stemmed and Gypsum. Cultural Unit II, composed of Strata 4, 5a, and 5a, is defined on the basis of probable arrowpoints such as Rose Springs Corner-notched and other post-Archaic artifacts such as Promontory Pegs.

Dating

The periods when Barn Owl Cave was occupied were estimated from chronologically significant artifacts and a single radiocarbon sample from the lowest cultural deposition. Elko-eared, Elko Corner-notched, and Gypsum points in the lower cultural unit (Stratum 2) suggest an occupation by Archaic groups between about 2500 and 4000 years ago (e.g., Holmer 1978). Charcoal from a hearth that was intrusive into the sterile deposits of Stratum 1 from Stratum 2 was radiocarbon dated to 3935±155 B.P. (2553 B.C. Ralph et al. 1973 (GX6341). Both suggest a relatively late Archaic occupation of the cave.

The arrowpoints in Stratum 4 indicate the cave was also occupied by post-Archaic peoples some time after 1800 B.P. (e.g., Holmer and Weder 1979). The lack of pottery from this unit suggests that it may represent occupation by groups that were transitional between Archaic and later, pottery making, Fremont/Sevier groups, though the small artifact sample makes this conclusion decidedly tentative.

More recent use is documented by Promontory Pegs recovered from the surface (Pendergast 1962) associated with Fremont/Paiute-Shoshoni peoples (Wylie 1974), and historical post contact artifacts.

Artifacts

Because of the lack of perishables in the lower deposits and the disturbed nature of the dry upper deposits the artifacts recovered in were primarily chipped stone and bone. The collection totals 419 items.

Chipped Stone

Of the 225 pieces of chipped stone identified from the test excavations, 24 can be classified as tools; the remainder are unmodified flakes. Hafted bifaces have been classified in accordance to named types that have implied functions as atlatl dart points or arrowpoints. While there is some support for these assumption (e.g., Thomas 1978), other studies (i.e., Wylie 1973) indicate that several types such as Elko Corner-notched points may have served as multipurpose tools. Also, morphologically similar artifacts may have served different functions from one period to another. An obvious example is the Elko Side-notched point, which has been found hafted on atlatl dart shafts in Archaic contexts and hafted as a knife in Paiute-Shoshoni contexts (Fowler, Madsen, and Hattori 1973). In any case, it is clear that assumptions about tool use ought to be considered tentative.

POINTS

Nine points were recovered from undisturbed contexts and are described as follows:

Elko Corner-notched

This projectile point type was first described by Heizer and Baumhoff (1961), but the points described here conform to a more recent description by Holmer (1978):

"triangular blade forms with straight to slightly convex edges. The corner notches form tangs and an expanding stem that is narrower at the base than the maximum blade width. The base ranges from slightly concave to slightly convex" (Holmer 1978). They range in maximum length from 33 to 36 mm and in maximum width from 21 to 24 mm. Weights of whole specimens range from 3-2 to 4-1 g.

Five points (Fig. 8a) were recovered and provenience is given in Table II.

Elko-eared

A single Elko-eared point was recovered (Fig. 8b; Table II). These points are similar to Elko Corner-notched, but "the maximum stem width is approximately equal to the maximum blade width,.....and a central basal notch or 'concavity' is also present" (Holmer 1978). The specimen has a maximum length of 33mm and a maximum width of 24mm. It weighs 3.3g.

Gypsum

Gypsum points are common in late Archaic contexts in the southern Great Basin and Colorado Plateau, but are occasionally found in northern Basin sites. They are described as "triangular blade forms with convex edges." Wide corner notches form roughly square shoulders and a contracting, "convex-based stem" (Holmer 1978). A single Gypsum point was recovered (Fig. 8c; Table II) and has a maximum length of 34mm and a maximum of 21mm. Weight is 2.7g.

Rose Springs Corner-notched

These point types are generally considered to be post-Archaic and occur only after ca A.D. 300 (Holmer and Weder 1979; Hester and Heizer 1973). They "are slender points with stems that are either paralleled-sided or expand slightly toward their bases. They are typically produced by pressure retouching thin flakes" (Holmer and Weder 1979). A single Rose Springs corner-notched point (Fig. 8d; Table II) was recovered from Barn Owl Cave and is maximum of 21mm long and 12mm wide. Weight is 0.8g.

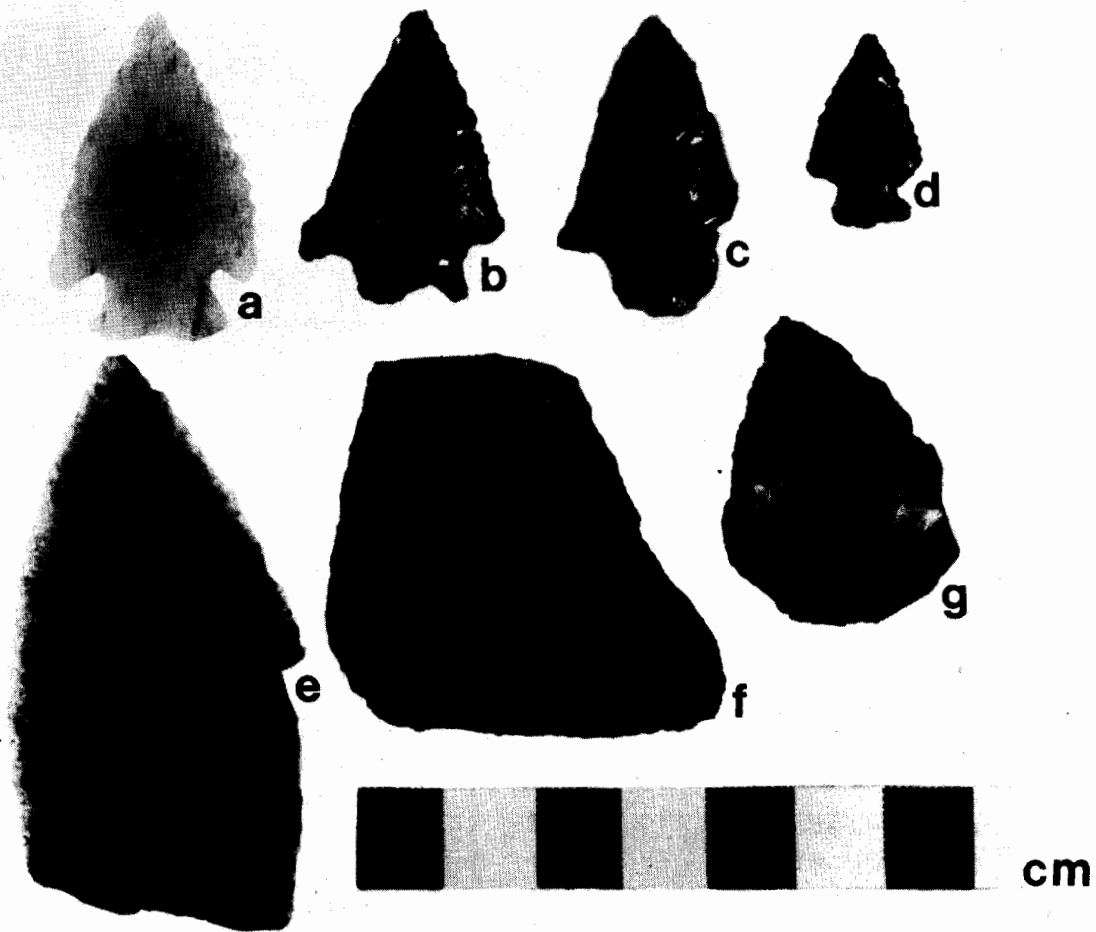


Figure 8. Chipped stone artifacts from Barn Owl Cave: a-Elko Corner-notched point, b-Elko Eared point, c-Gypsum point, d-Rose Springs Corner-notched point, e-Biface blade, f-Shale scraper, and g-Utilized/retouched flake.

Cottonwood Triangular

This point type is a catch-all for a variety of preforms and tool types. They are found in post-archaic contexts and their size suggests that the finished form would probably be arrowpoints such as Rose Springs Corner-notched or Eastgate Expanding-stem. The single recovered point (Table II) is a maximum of 21mm long and 13mm wide. Weight is 1.1g.

BIFACE BLADES

One partial biface blade (Fig. 8e) and two tip fragments were recovered. The partial specimen is manufactured from chalcedony and is an elongated

Table II.
Provenience of Chipped Stone Artifacts from Barn Owl Cave.

	Elko Corner-notched	Elko Eared	Gypsum	Rose Springs Corner-notched	Cottonwood Triangular	Biface Blades	Drill	State Scraper	Hammerstones	Decoritification Flakes	Primary Flakes	Secondary/finishing Flakes	Utilized/retouched Flakes
Provenience Unknown						1				2	2	1	1
Stratum 5	1								1	14	10	16	1
Stratum 4	1			1	1	2	1			20	17	22	1
Stratum 3	3	1							1	7	9	43	4
Stratum 2			1					1		7	13	17	1
TOTALS	5	1	1	1	1	3	1	1	2	50	51	99	8

triangle with markedly excurvate sides. The basal portion of the blade has been broken off. Its maximum width is 32mm. The two tip fragments are both of obsidian and are sufficiently large to suggest they were not used as atlatl dart points.

DRILL

A single drill manufactured by crude bifacial retouch of a quartzite flake, was recovered from the cave. The shaft of the drill is the only portion of the flake that is retouched and is 12mm long and 4mm in diameter.

UNIFACE BLADE

A single shale flake has been unifacially retouched along one margin (Fig. 8f). The retouching is extremely fine and the flakes were removed at a high angle to create a steeply beveled edge.

UTILIZED/RETOUCHED FLAKES

Twelve flakes (8 obsidian and 4 chert/chalcedony) have been modified either through use or by intentional retouch (Fig. 8g). The original shapes of the flakes are unmodified and evidence of use is limited to small flaking removed from a portion of the flake's margin. None of the flakes are worked around more than half their circumference.

UNWORKED FLAKES

Unmodified chipped stone detritus has been catalogued into the following categories: decortification flakes--primary flakes with a portion of the original weathered surface of the source material; primary flakes--large unworked flakes derived from cores following the removal of decortification flakes; secondary/finishing flakes--small unworked flakes derived from the thinning of decortification and primary flakes. These categories (derived from Lindsay 1979) are somewhat arbitrary and are provided only for descriptive utility. The chipped stone detritus from Barn Owl Cave consists entirely of flaking debris. No cores or core fragments were recovered. Fifty of the 200 recovered flakes are decortification flakes. Of these 42 are obsidian, 3 are chert/chalcedony, and 5 are quartzite. Fifty-one flakes are defined as primary flakes. Of these, 25 are obsidian, 13 are chert/chalcedony, and 13 are quartzite. The remaining 99 specimens are defined as secondary/finishing flakes. Of these 67 are obsidian, 24 are chert/chalcedony, and 8 are quartzite.

HAMMERSTONES/CHOPPERS

Two limestone/dolomite cobbles, apparently derived from local parent material were used as hammerstones. One is the broken end of a loaf shaped cobble and has been battered on the end. The other is a flat circular cobble that has been battered completely around its circumference (Fig. 9a). Several large flakes have been removed

bifacially along one margin, creating a chopper-like effect. This appears to have been intentional rather than a by-product of battering since the resulting edge shows evidence of use.

DISCUSSION

Although the chipped stone from Barn Owl Cave is limited, it does provide some data on cultural chronology, cultural affiliation of cave occupants, and utilization of raw materials. The Gypsum, Elko-eared and Elko Corner-notched projectile points from the lower strata suggest an initial occupation by late Archaic groups about 4000 to 2500 years ago (Madsen and Berry 1975; Holmer 1978). The presence of Elko Corner-notched and Cottonwood Triangular biface implements and a Rose Springs Corner-notched projectile point in the upper strata suggest a post-Archaic occupation postdating 1600 years ago (Madsen and Berry 1975; Holmer and Weder 1979). Whether or not an occupational break occurs between these two depositions cannot be determined from the limited amount of data recovered. However, the lack of pottery in the upper strata suggest that the early portion of the upper strata may represent a transition from late Archaic to Fremont/Sevier groups similar to that postulated for the near-by Deep Creek Mountain area (Lindsay and Sargent 1979).

The nature of the chipped stone detritus suggests procurement of raw materials from areas a relatively short distance from the caves. No cores or preforms were recovered and the large percentage of obsidian decortification flakes, indicates that obsidian in the form of small weathered nodules was transported to Barn Owl Cave for tool manufacturing. The larger tools were apparently manufactured by flake reduction of the small nodules themselves. Smaller implements, such as the Rose Springs Corner-notched points were manufactured from flakes derived from these small nodules.

Ground Stone

Two ground stone specimens were recovered from disturbed fill in the cave. One is a broken slab of slate with a ground surface. It is 11mm thick and the presently 26cm long, though the the conformation of the ground area suggests the original dimensions were much larger. The other specimen is a small trapezoidal slabbed quartzite sandstone that is both ground and pecked on one side (Fig. 9b). The amount of grinding is minimal and the slab appears to have been used primarily as a base where materials were broken or fractured with a heavy hammerstone.

Bone

This was the most common artifact type recovered from Barn Owl Cave. It reflects a wide variety of animals and represented is including a high proportion of larger species. The number of large species relatively high. The fauna from the cave is relatively large for the size of the sample and a wide variety of animals were apparently collected by cave occupants.

WORKED BONE

Four pieces of bone have been worked. Two are splinter awls manufactured from long bones of large ungulates. One of these consists only of the broken tip. On the other, a point has been worked along 23mm at one end of the 109mm long splinter (Fig. 9c). The broken edges and other surfaces along the shaft of the splinter have been smoothed through use. A third specimen is manufactured from a long bone of a bird the size of a goose or swan. All articulating surfaces have been ground off and the working end of the shaft is broken. It may have been used as an awl. The remaining specimen (Fig. 9d), made from the scapula of a deer or mountain sheep, has been worn down through use on all three blades and resembles the scapula "saws" described by Dalley (1970).

UNWORKED BONE

Next to chipped stone, unworked bone constitutes the most well-preserved category of artifacts. Unfortunately, only 50 of the 180 specimens recovered could be identified. There are several reasons for this. First, nearly 45 percent of the unworked bone consists of bird elements that could not be identified because of an inadequate reference collection. Second, another 28 percent of the bone consisted of nondiagnostic fragments of broken bone which could not be identified. A large percentage of this scrap bone is derived from large mammal long bones and it appears that breaking of bone, possibly to obtain the marrow, was a common practice.

The largest category of bone is bird. Two of the specimens could be identified to gadwall duck (Anas strepera) and to goose/heron, and it is probable that the large majority of the remaining elements are also from marsh birds. In a recent study of bird remains from similarly situated sites from around the Bonneville Lake basin, Parmalee (1980) noted that marsh species overwhelmingly dominated the collections and this is undoubtedly the case here.

The second most numerous category is the lagomorphs, primarily jackrabbit (Lepus californicus). This may be slightly misleading, however, in that most of the unidentified bone is clearly from large mammals, most probably deer or mountain sheep, and the breaking of bones for marrow (or whatever), has undoubtedly biased the sample. Birds, rabbits, and deer dominate the collection with other species represented only by one or two specimens. These include muskrat, ground squirrel, and coyote. All of the species represented in the collection presently occur in close proximity to the cave and it appears that the procurement of game occurred locally.

There is some evidence that Barn Owl cave was occupied during the late fall and early winter. The two muskrats were juveniles probably from spring and summer litters that were collected in the fall prior to their reaching maturity. Also, the gadwall occupies Fish Springs primarily in the late fall though it also appears in the spring and there are presently some year-round residents. These along with the evidence that the cave was used after the fall pinyon harvest, support a late fall or early winter occupation.

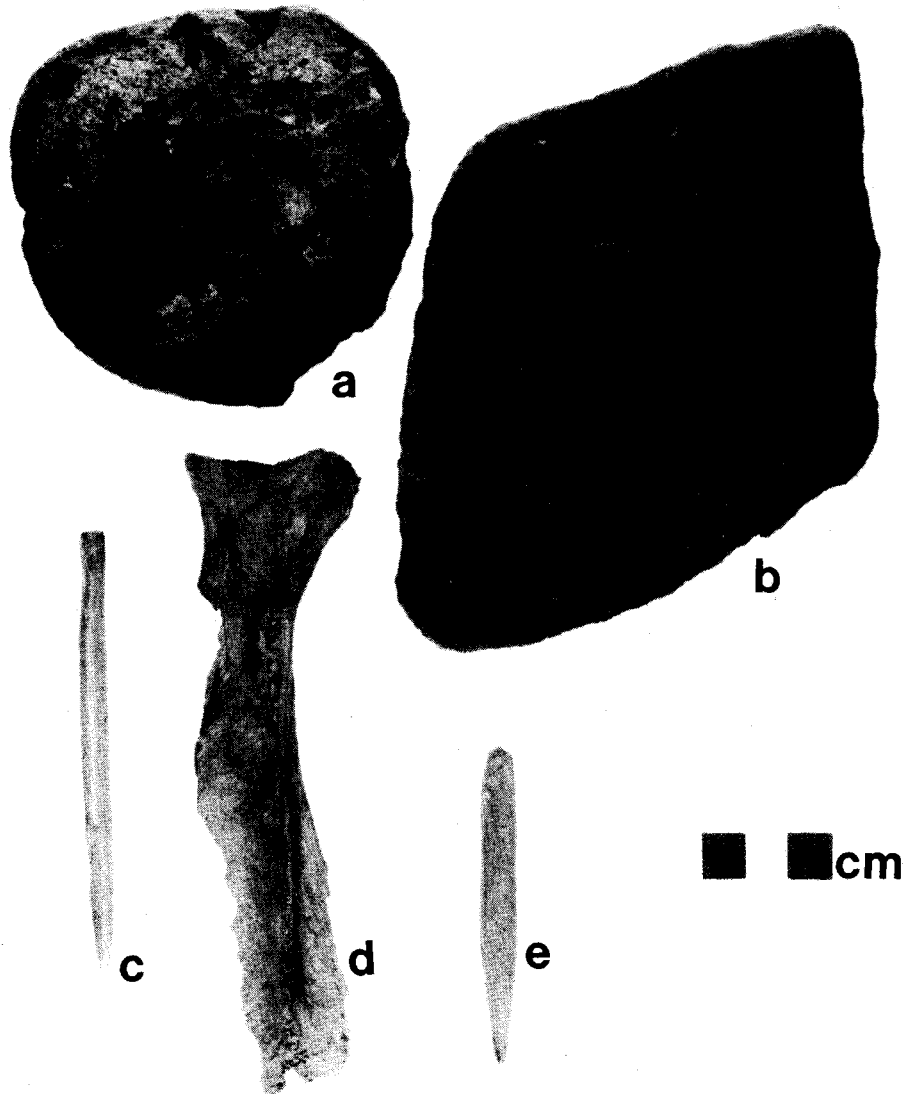


Figure 9. Miscellaneous artifacts from Barn Owl Cave: a-chopper/hammerstone, b-anvil/grinding slab, c-splinter awl, d-scapula say, and e-wooden peg.

Miscellaneous

Three wooden pegs were recovered either from the surface of the cave by Pendergast (1962) or from the test excavations. Only one of the pegs falls within the "Promontory Peg" category defined originally by Steward (1937) and discussed by Pavesic (1966) and Wylie (1974). A second peg is notched, but not in the fashion of promontory pegs and the remaining specimen is unnotched. The unnotched specimen (Fig. 9e) is completely worked to a blunt tip on one end and to a tapered point on the other. It

Table III.
Provenience of Miscellaneous Artifacts from Barn Owl Cave.

	Bone Awls	Scapula Saw	Slate Grinding Slab	Anvil/grinding Slab	Worked Wood	Cordage	Feathers	Pinyon Hull	Historic Artifact
Provenience Unknown			1	1	2				
Stratum 5					1	1	1		1
Stratum 4		1					1	1	
Stratum 3	2								
Stratum 2	1								
TOTALS	3	1	1	1	3	1	2	1	1

is 73mm long and 8mm in diameter. For the most part promontory pegs have been attributed to Paiute-Shoshoni occupations, but they could be associated with earlier depositions. They may have been used as skewers for juniper berries (Pavesic 1966) or for roasting cactus pads (Wylie 1974).

Also recovered were two feathers from Strata 4 and 5 that were too deteriorated to be identified; and an iron ring, one of several historical artifacts noted during the excavation of Stratum was collected to confirm historical disturbance of the layer.

Summary and Discussion

Barn Owl Cave is a multicomponent site spanning the last 3000 to 4000 years. The earliest cultural layers are characteristic of late Archaic peoples, and were probably deposited about 2500 to 4000 years ago, though they contain no perishables and reveal little about subsistence orientation. In the subsequent period, either post-Archaic Fremont/Sevier peoples, or groups representing a transitional phase between them and the earlier Archaic groups occupied the cave. Though there is not enough evidence from the test excavation to make that determination, the possibility that a transitional phase can be identified at Barn Owl Cave makes it an extremely important site. This is primarily because a controversy currently surrounds the question of cultural continuity between Archaic and Fremont/Sevier groups (Madsen and Berry 1975; Aikens 1976) and because studies conducted after the question

Table IV. Provenience of Unworked Bone from Barn Owl Cave.

	<u>Ovis canadensis</u>	<u>Odocoileus hemionus</u>	<u>Lepus californicus</u>	<u>Sylvilagus auduboni</u>	<u>Ondatra zebithicus</u>	<u>Thomomys bottae</u>	SCIURIDAE	<u>Canis latrans</u>	<u>Anas strepera</u>	Goose/heron	Unidentified Bird	Unidentified Large Mammal	Unidentified Scrap
Provenience Unknown	1	2	4						1				
Stratum 5		1	14		1						11	5	7
Stratum 4		4	9	2	1	1		1		1	36	5	7
Stratum 3		1	2								18	4	6
Stratum 2		1	2				1				15	2	12
TOTALS	1	9	31	2	2	1	1	1	1	1	80	18	32

was raised have not yet adequately resolved the issue (Madsen 1978; Lindsay and Sargent 1979). A probable occupation by Paiute-Shoshoni peoples occurred after ca 600 B.P. However, this conclusion is based solely on the presence of "Promontory Pegs" and the possibility that they occurred in earlier contexts makes this conclusion tentative. The presence of historic artifacts is the result of considerable modern disturbance of the cave.

Raw materials, such as obsidian and ground stone, were apparently procured from a source within 15 miles (24km) of the site and fit the pattern of movement to or contact with areas outside the region bordered by the Thomas Range and the Deep Creek Mountains.

CRAB CAVE

Cave Description and Excavation Procedures

Crab Cave (42Jb8) is the higher of two caves on Bureau of Land Management property on the extreme northern end of the Fish Springs Range (SE1/4, SEP, N1/2, SW1/4, Sec. 3, T11S, R14W, U.S.G.S. Fish Springs NW Quadrangle). The cave is within 10 m of the western boundary of the Fish Springs Wildlife Refuge at an elevation of about 1360m (4478ft) (Fig. 10). The cave is about 65 m above the playa of the Great Salt Lake Desert and faces north. The cave overlooks several hot springs, none of which support any vegetation. However, the relatively lush marsh found in the refuge proper is just over a ridge to the east less than 300 m away.

The cave consists of a large, roughly circular chamber with two smaller arms or "pincers" running southeast and southwest (Figures 11, 12, and 13). In plan, it vaguely resembles a crab, hence the name. The main chamber area is a maximum of 15m north-south by 15m east-west. The present floor of the chamber is relatively level (other than potholes and backdirt piles) and consists of fine dust and vegetation. The main chamber is rather spacious with relatively steep walls and a roof which extends to 5m overhead. The opening to the cave is 7m wide, but is only .5-1.5m in height. However, it is presently chocked both by cultural deposits and by disturbed fill deposited by looters and was undoubtedly more open at one time. The easternmost pincer is relatively narrow (1-2 m wide). Both the roof and bedrock floor are extremely uneven and there is very little cultural debris deposited in this area. The western pincer extends south of the main chamber 12.3m (Fig. 14). The opening is less than 1.5m high by 1 m wide, but leads to a high ceilinged chamber (6m) up to 5.3m wide. This arm of the cave was not tested, but pothole profiles indicate that cultural deposits exceed 1.2m.

Limited testing of the cave was designed simply to evaluate the depth and nature of the deposits, especially in terms of National Historic Register significance. Work consisted of mapping the cave and the deposits, cleaning the profile of a large relic hunter's hole in the west front portion, and excavating a small amount of undisturbed fill. Excavation was initiated by cleaning out an enormous (4 X 6m) pothole which provided a relatively long profile of the natural stratigraphic sequence. The strata were described and recorded and approximately 10cu m of fill from an adjacent area was removed and passed through 1/4" screen. Pollen and flotation samples were collected separately.

Stratigraphy and Cultural Features

Three stratigraphic units were defined during the test excavations (Figs. 15 and 16). However, this is a simplification of the depositional sequence and is the arbitrary result of limited time. Lenses within the defined stratigraphic units may well be continuous across the deposits and a refinement of the stratigraphic sequence will undoubtedly be necessary when more comprehensive excavations are undertaken. Three culturally deposited strata (Figs. 15,16) were removed as units during excavation. Other naturally occurring strata and several, possibly continuous, charcoal lenses were not considered separately in the testing and

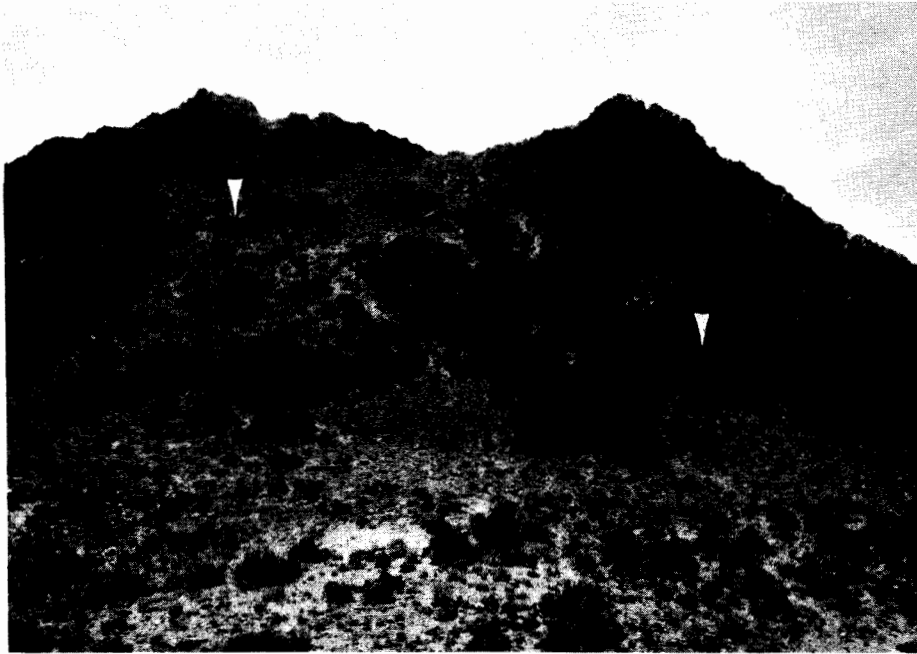


Figure 10. View of Crab and Hot Springs #1 caves (note arrows) looking south. Crab Cave is on the left.

analysis. Beneath the cave, bedrock slopes down gradually from the sides to a rough, uneven floor. It is covered by pea-gravel size rock spall that varies from a thin scuff to more than 60cm thick in depth. The surface of this sterile, naturally deposited unit is relatively level and uniform.

Stratum 1

This thin layer of heavily charcoal-stained dust and cultural material constitutes the earliest cultural deposition. It is found only in the southern portion between two layers of sterile naturally deposited spall and feathers out into the spall toward the mouth of the cave where it averages 7 to 9cm thick. The sterile spall which overlies the unit averages 10cm thick and is continuous across the excavation area.

Stratum 2

Stratum 2 is a culturally deposited layer of dark grayish brown dust and scattered rock spall that is continuous across the excavation area. It contains numerous amorphous charcoal-stained lenses that cannot be readily separated from intervening deposits. Two of these charcoal lenses, however can be defined and may possibly be removed as units in any future excavation. One, at the base of Stratum 2, is thin but continuous and averages 10cm thick. It has a uniform texture and color. The other is at the top of Stratum 2 towards the front of the cave. It reaches 20cm thick and feathers out 2.2m south of the northern margin of the excavation area. Overall Stratum 2 averages 40cm thick, but it



Figure 11. View of the main chamber of Crab Cave looking into the cave from just outside the mouth.

ranges from a maximum of 70cm to less than 10cm in the western portion of the cave where it directly overlies bedrock. The unit contains little detectable vegetation.

Stratum 3

Stratum 3 is the uppermost cultural deposition and directly overlies Stratum 2. It consists primarily of lenses of various type of vegetation such as pickleweed (Allenrolfia sp) and bulrush (Scirpus sp), as well as dust and occasional small rock spall. Several of these vegetation lenses may be continuous and may possibly be defined as separate stratigraphic units with further excavation. Calcium carbonate has crystallized around the vegetation at the base of the unit. Apparently water seeping along the cave walls, dissolved the lake deposited tufa, and then followed the compact surface of the underlying unit, crystallizing around the vegetation. This calcium carbonate layer averages 1-15cm in thickness.

Stratum 3 thins out towards the mouth of the cave, where there is little headroom. The unit is 20cm thick at the front of the cave and reaches a maximum of 75cm thick along the southern profile of the excavation area.

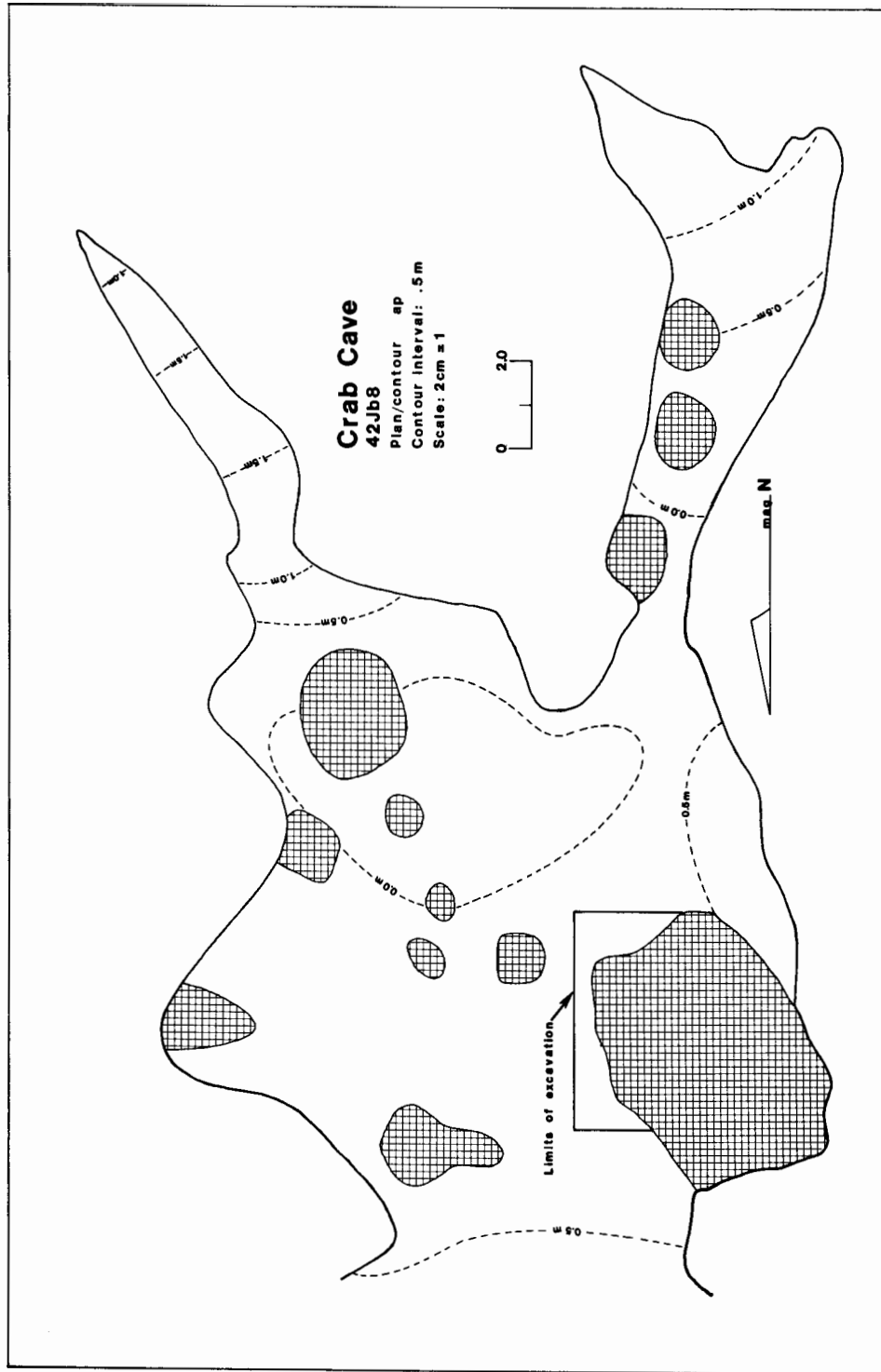


Figure 12. Plan map of Crab Cave. Hatching represents "potted" areas.

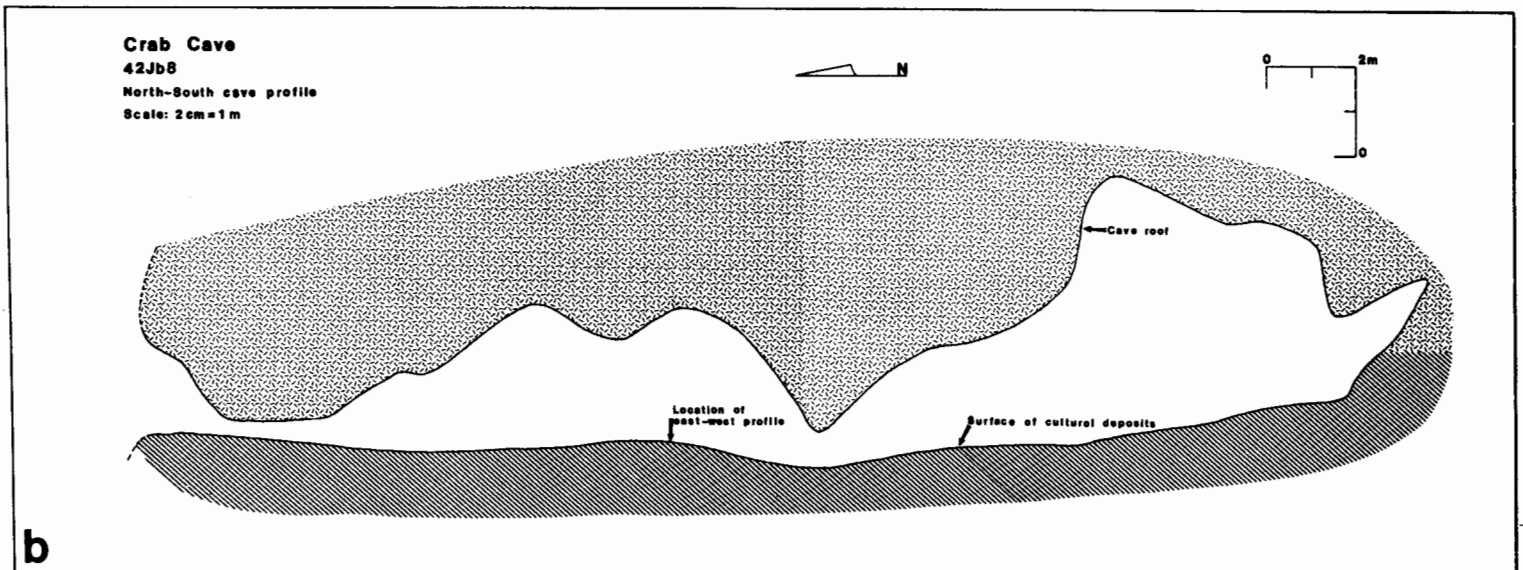
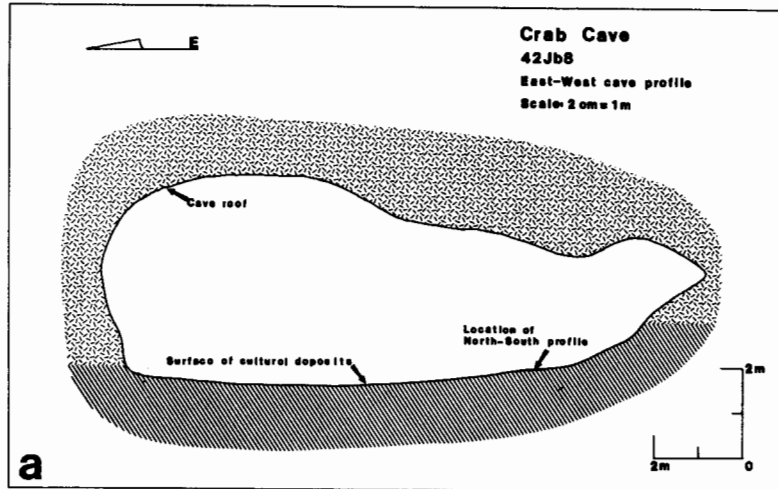


Figure 13. East-west (a) and north-south (b) profiles of Crab Cave.

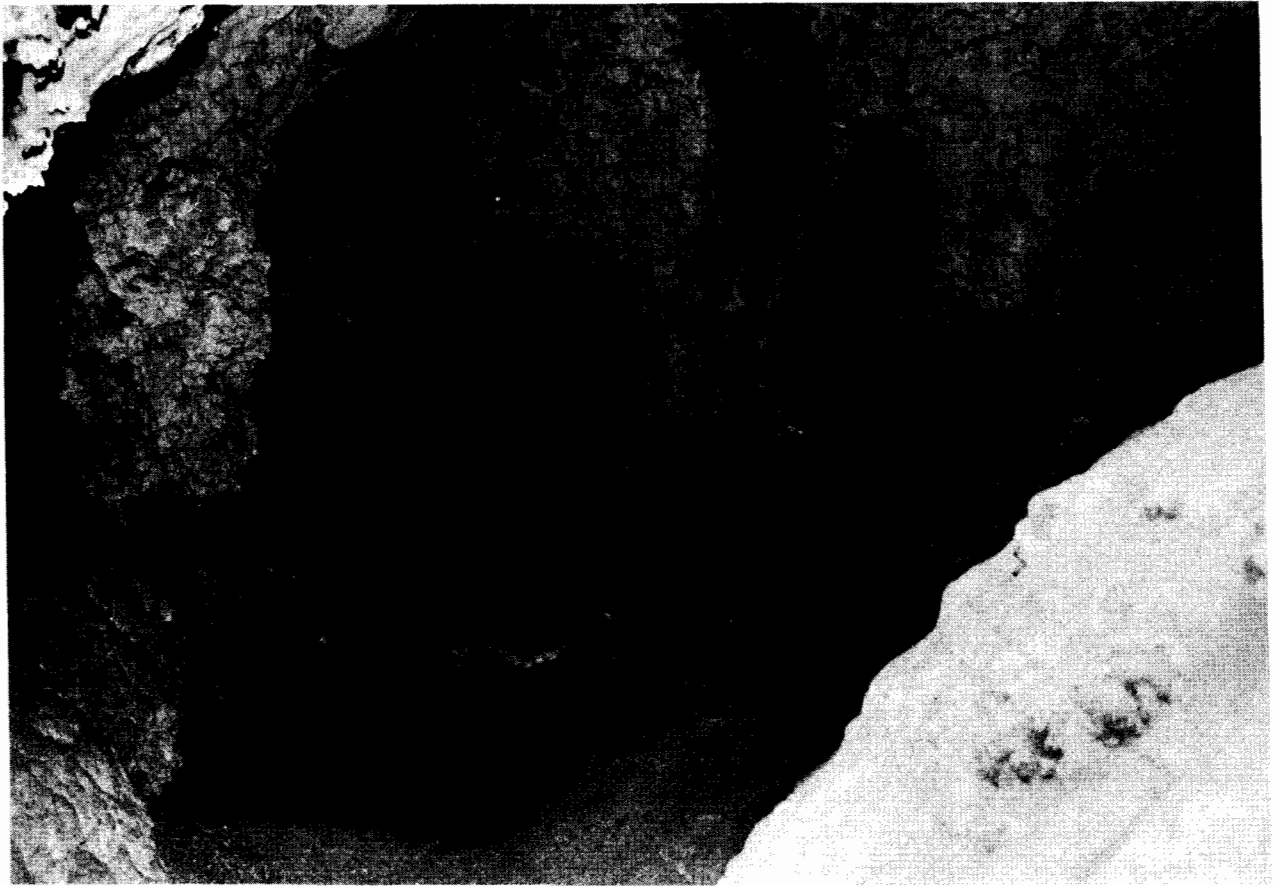


Figure 14. View of the southern "pincer" of Crab Cave.

Fire Hearths

Two small charcoal and ash filled basins were intrusive into the basal sterile spall deposit. The basins were virtually identical and were 40cm in diameter and at least 30cm deep. One originated from Stratum 1 while the other probably originated from Stratum 2, although this was not altogether clear because of vandal disturbance. Charcoal from the latter hearth was dated to 4445 \pm 160 B.P.

Dating

Preliminary dating of Crab Cave is controlled primarily by two radiocarbon dates and secondarily by diagnostic artifacts. No chronologically diagnostic artifacts were recovered from the lower cultural deposits, but charcoal from a hearth intrusive into the underlying sterile fill was radiocarbon dated to 4445 \pm 160 B.P. (3190-3210 B.C. Ralph et al 1973). As mentioned, the Stratum 2 origin of the hearth is not certain because the area was disturbed and the date may not represent the earliest occupation of the cave. However, the modest nature of the underlying Stratum 1 deposition suggests that the possibility of markedly greater antiquity is limited, and that the cave was initially occupied during mid-Archaic times.

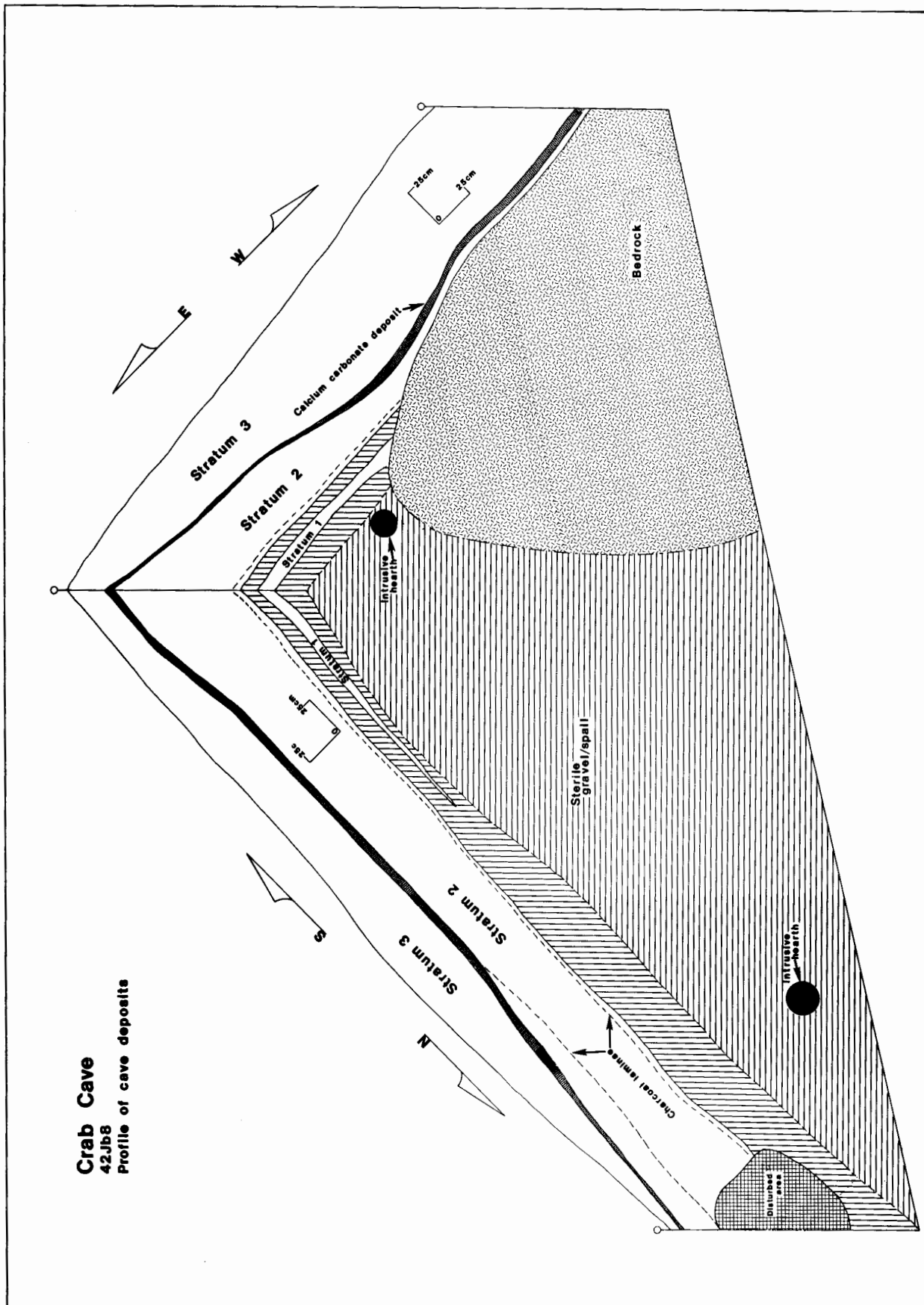


Figure 15. Perspective profile map of Crab Cave deposits.



Figure 16. View of Crab Cave deposits (north-south profile to the left, east-west profile to the right).

As noted, Stratum 3 consists of layers of vegetation which were removed as a unit, but which could undoubtedly be separated during full scale excavations. As a result, the chronology of the unit represents an average and does not necessarily represent a specific time of deposition. Stratum 3 contained Great Salt Lake pottery and Rose Springs Corner-notched projectile points that together suggest an occupation sometime after 1500 B.P. A radiocarbon sample on the other hand, obtained by collecting Atiplex sp. twigs from a macrofossil sample taken from the unit as a whole dated to 2010±135 B.P. (A.D. 10-60 B.C. Ralph et al 1973), (GX 6339). This is somewhat earlier than expected for a Fremont/Sevier deposition, but, at two standard deviations, is comparable to other early Fremont dates (e.g., Lindsay and Lund 1976; Lindsay and Sargent 1979) and may confirm the early occupation of the eastern Great Basin by Fremont groups. Or it may indicate occupation by a transitional group between the Archaic and later full-blown Fremont-Sevier occupation.

Artifacts

A wide range of artifacts similar to those from other dry eastern Great Basin cave sites, was recovered from Crab Cave. Perishables were obtained from the dry upper component of Stratum 3, but the lower layers were wet and yielded only chipped stone and bone. Although only 369 artifacts were recovered because of the limited scope of the excavation, 31 categories were represented; full scale excavation would evidently provide substantial data on subsistence, technology, and developmental sequences in the eastern Great Basin.

Chipped Stone

The collection of chipped stone artifacts from Crab Cave consists of a few finished tools (10) and a large percentage of flaking debris (186 flakes) (Table V). Two tools were recognizable projectile point types.

Elko Corner-notched

The single diagnostic projectile point from Stratum 2 is an Elko Corner-notched point manufactured from a white chalcedony (Fig. 17a). It is 38mm long by 21mm wide and weighs 2.9gm.

Rose Springs Corner-notched

A Rose Springs Corner-notched point manufactured from obsidian (Fig. 17b) came from Stratum 3. It is 28 mm long, 18 mm wide and is incomplete.

LARGE HAFTED BIFACE

A large biface implement, probably hafted and used as a knife, was recovered from Stratum 2. It is manufactured from a brown mottled chalcedony and measures 79mm long by 48 mm wide (Fig. 17c). It was apparently hafted by means of two basal notches removed from the corners of the convex base.

SMALL CRUDE BIFACES

Four biface implements, two from Stratum 2 and two from Stratum 3, were recovered. They are all crudely worked, but appear to have been used as finished tools and were not simply preforms. Two are of obsidian, one is chalcedony (Fig. 17d), and the other is quartzite. The two complete specimens are 49 by 28mm and 37 by 20 mm.

DRILL

A stone drill manufactured from a heat treated rhyolite, has a shaft 40 mm long and a broad high base 21mm wide by 10mm (Fig. 17e). The shaft is diamond shaped in cross section and tapers gradually from a maximum width of 10mm.

HAMMERSTONE

A quartzite cobble is heavily battered on one end and two adjacent sides and appears to have been used as a hammerstone.

UTILIZED/RETOUCHED FLAKES

Two of the 186 flakes recovered showed some evidence of use. One of these is obsidian and the other is chalcedony.

FLAKING DETRITUS

Chipped stone flakes were classified into three categories following Lindsay (1979). There are 34 decortification flakes, 20 primary flakes and 132 secondary/finishing flakes. Only three material types are represented; obsidian - 79, chert/chalcedony - 75, and a light brown banded siliceous tuff or siltstone - 24. The only noteworthy factor in the distribution of these material types is that the siliceous tuff was utilized only during the occupation which deposited Stratum 3 and represents a source not previously used by earlier cave occupants.

DISCUSSION

The absence of cores and the prevalence of numerous decortification flakes derived from small nodules suggest the most tools manufactured at the site were made by direct reduction of imported materials. The obsidian is most probably from the Thomas Range to the east and the manufacturing matter is similar to that at Barn Owl Cave. Although limited, the types of finished tools are stratigraphically consistent, with the probable Rose Springs Corner-notched arrowpoint overlying the probable Elko Corner-notched atlatl dart point.

Ceramics

Four sherds of Great Salt Lake gray pottery were recovered from Crab Cave (Table V). Two of these were derived from Stratum 3, while the others were unprovenienced. These sherds are representative of the Great Salt Lake variant of the Sevier (Fremont) as defined by Marwitt (1970).

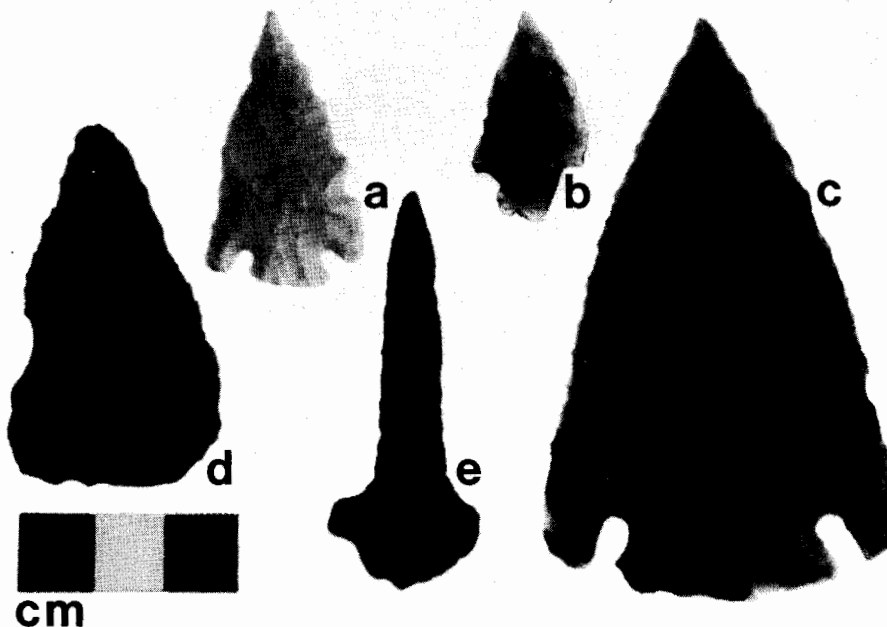


Figure 17. Chipped stone artifacts from Crab Cave: (a) Elko Corner-notched, (b) Rose Springs Corner-notched point, (c) large hafted biface, (d) small crude biface, (e) drill.

The presence of pottery in Stratum 3 is consistent with the Rose Springs Point from the unit.

Ground Stone

One complete shaped mano and one broken cobble mano constitute the only ground stone recovered from Crab Cave (Table VI). The complete mano (Fig. 18) was found wrapped inside a woven juniper bark mat (described below). It is a two-handed model of coarse-grained brownish-yellow quartzite, shaped and ground on all surfaces. It measures 26.1cm long by 6.8cm wide by 3.5cm high. The broken cobble mano is ground on one surface only.

Textiles

Included in this category were a mat, an identifiable basketry fragment, and three odd fibrous plant parts (Table VI). The mat (Fig. 19a) was manufactured from juniper bark using a simple twining technique with a Z-twist weft. Individual strands of the bunched juniper bark are 1.5 to 2.0cm in diameter. The mat is 58cm wide; its original length cannot be determined since the ends have been destroyed, but the present length is 56cm. The selvage or edge of the mat was formed by simply returning the running end as the next weft.

Table V. Provenience of Pottery and Chipped Stone from Crab Cave.

Provenience	Great Salt Lake Gray Pottery	Elko Corner-notched	Rose Springs Corner-notched	Large hafted Biface Blade	Crude Biface Blades	Drill	Hammerstone	Decorification Flakes	Primary Flakes	Secondary/finishing Flakes	Utilized/retouched Flakes
Provenience Unknown	2	-	-	-	-	-	1	2	-	1	-
Stratum 3	2	-	1	-	2	-	-	16	18	106	2
Stratum 2	-	1	-	1	2	1	-	16	2	25	-
Stratum 1	-	-	-	-	-	-	-	-	-	-	-
TOTAL	4	1	1	1	4	1	1	34	20	132	2

The basketry fragment (Fig. 19b) is from a coiled basket with a whole rod foundation and a noninterlocking stitch. The stitch is from right to left and the weft material appears to be bulrush (Scirpus sp). The foundation material could not be determined but is not willow. Both the materials and the construction techniques used are relatively rare in the eastern Great Basin. For example, at Hogup Cave (Adovasio 1970) none of the 124 specimens exhibit this combination of weaving techniques, and Scirpus is used in only eight of 161 woven specimens.

The three fragments may not be from basketry at all. Two are simply twisted pieces of Scirpus whose function is unknown. The remaining specimen consists of a piece of Phragmites bound with an unidentified filrous plant; unknown it may be a portion of an arrow shaft.

Worked Bone

Five pieces of worked bone or antler were recovered from Crab Cave (Table VI). Three were awls. One (Fig. 20, a) was manufactured by splitting the metapodial of a mule deer longitudinally and leaving half the dorsal end intact. The bone was then worked to a point about the midpoint of the element. The overall length is 13.7cm. The second awl (Fig. 20b) was made from the midsection of a large mammal long bone. One end has been worked into a point 2.1cm long. The awl is polished over the remainder of its surface through use; it is 9.8cm long overall. The remaining awl (Figure 20c) is a splinter from a large mammal long bone. This broken fragment of a larger awl is 7.4cm long and has been worked the entire length. A portion of what appears to have been a bone bead was also recovered (Fig. 20d). The 2.8cm long bead is highly polished and has been split longitudinally. The remaining specimen is the tip of a mule deer antler that has numerous cuts and scratches on the tip (Fig. 20e). It may well have been used in the manufacture of chipped stone.

Unworked Bone

The faunal collection from Crab Cave is characterized by mule deer (Odocoileus hemionus), jack rabbit (Lepus californicus), and birds (probably marsh birds). An unusual feature of the collection is the presence of fish bones, most probably the Utah chub (Gila atraria) (Table VI). Small rodents such as woodrats (Neotoma sp.) and field mice (Microtus sp.) were also identified. A single specimen from a canid was recovered and is large enough to suggest it is from a wolf. Only one element, from a goose, was identified from the 31 recovered bird bones. However, the majority of these are probably from marsh birds (e.g. Parmalee 1980). A single antelope element was also recovered. All the animals collected prehistorically are presently found in and around the marsh and the hunting focus appears to have been restricted to a limited area around the cave.

Skin/leather

Four pieces of rabbit skin twine and five pieces of leather were recovered from Crab Cave (Table VI). All nine came from Stratum 3 and all are too fragmentary to allow determination of use. The rabbit skin twine may well have been used in rabbit skin robes such as those found at

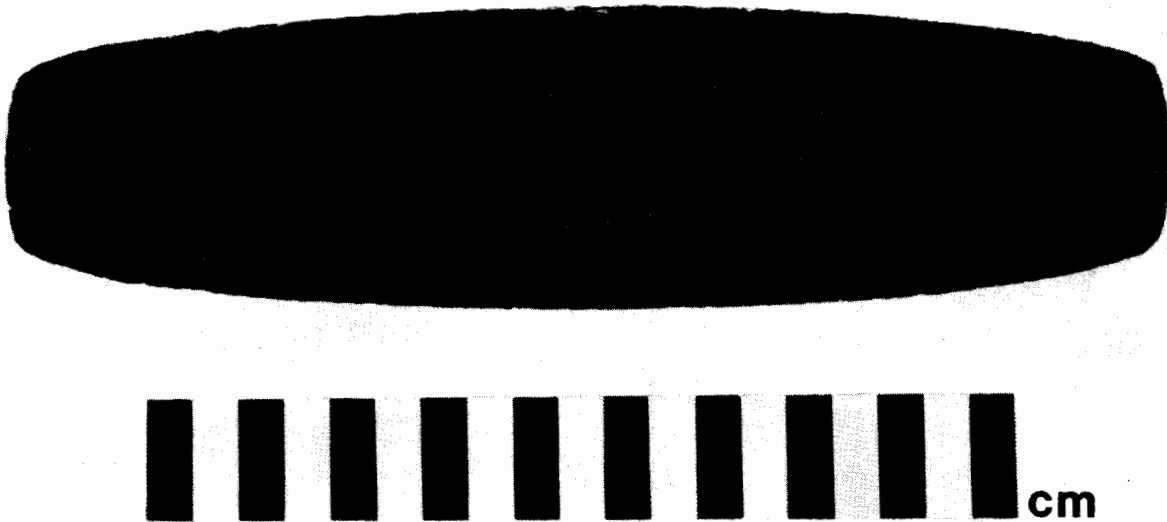


Figure 18. Formed mano from Crab Cave.

Hogup Cave (Aikens 1970). The leather scraps show no evidence of what they were used for, but the most likely use of leather was for moccasins (e.g., Aikens 1970).

Quids

Thirty-four wads of chewed vegetation were recovered from Stratum 3 (Table VI). They consist primarily of the roots and lower stem portion of Scirpus sp., although other plant types may be present. They undoubtedly provided nutrients or dietary supplements of some kind; Chamberlin (1911) indicates these parts of Scirpus sp. were used as food by the Goshiutes who inhabited the region.

Coprolites

Three coprolites from Stratum 3 were recovered during the test excavations. They are as yet unanalyzed.



Figure 19. Textiles from Crab Cave: (a) twined mat, (b) coiled basketry fragment.

Plant Macrofossils

Plant macrofossils were collected during the screening of the cultural deposits and in bulk form each unit. They were collected primarily to help determine the nature of the deposits and the type of materials present; the relative frequency of plant types cannot be objectively determined. The following plant types were identified from the samples: Atriplex canescens (four wing saltbush), Artemisia sp. (sagebrush), Sarcobatus sp. (greasewood), Phragmites sp. (cane grass), Scirpus olneyi (bulrush), Eriogonum sp. (buckwheat), Pinus monophylla (pinyon), and a variety of grasses. With the exception of several pinyon nut hulls from Stratum 2 which might have been intrusive, all vegetation originated from Stratum 3. The roots and stems of Scirpus appear to be the dominant vegetation type. Pinyon nut hulls were common throughout Stratum 3.

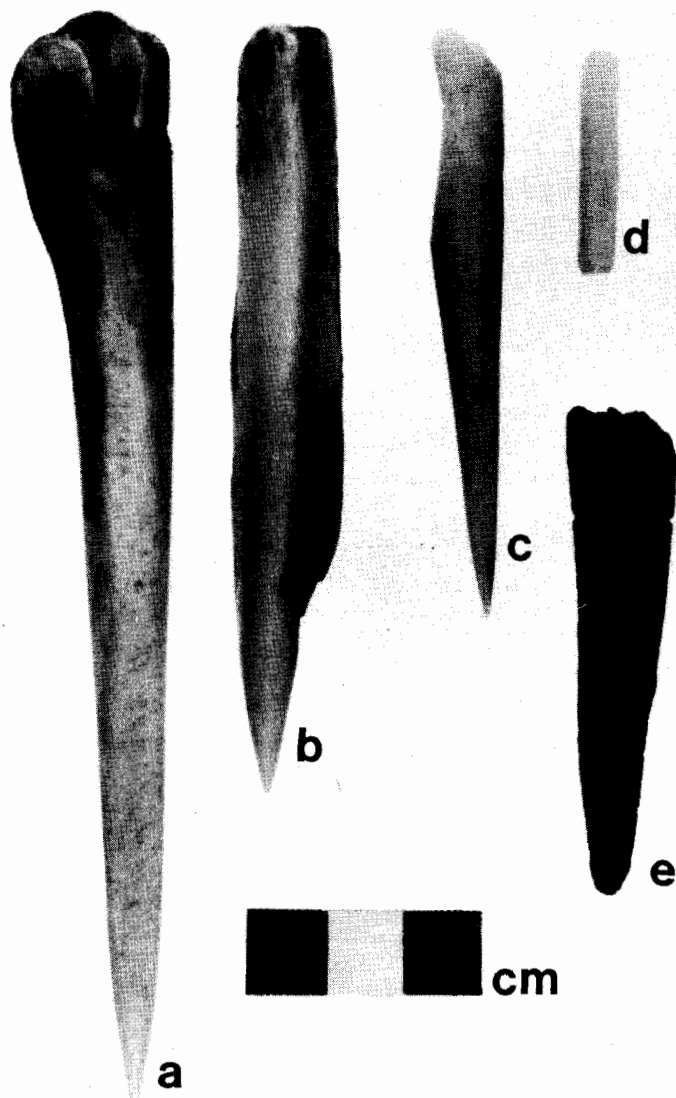


Figure 20. Bone artifacts from Crab Cave: (a-c) bone awls, (d) bone bead, (e) antler flaker.

Table VI. Provenience of Unworked Bone and
Miscellaneous Artifacts from Crab Cave.

Provenience of unworked bone	<u>Odocoileus</u> <u>hemionus</u>	<u>Antilocapra</u> sp.	<u>Lepus</u> <u>californicus</u>	<u>Neotoma</u> sp.	<u>Microtus</u>	<u>Canis</u> sp. (wolf?)	Large Mammal	<u>Gila</u> <u>atraria</u>	Bird	Goose	Unknown Scrap	Manos	Mat	Basketry Fragment	<u>Scirpus</u> Twists	Possible Arrowshaft	Rabbit skin twine	Leather	Quids	Coprolites
Provenience Unknown	2	-	3	-	-	1	1	-	3	-	3	-	-	1	-	-	-	-	-	-
Stratum 3	3	1	5	1	2	-	11	1	14	1	16	2	1	-	2	1	4	5	34	3
Stratum 2	2	-	4	2	-	-	1	-	13	-	25	-	-	-	-	-	-	-	-	-
Stratum 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	7	1	12	3	2	1	13	1	30	1	44	2	1	1	2	1	4	5	34	3

The dominance of marsh plant macrofossils and the Scirpus quids, indicate heavy reliance on the Fish Springs marshes as a subsistence resource. These marsh plant types were supplemented by marsh animals and birds and it appears that, for the most part, food was procured locally. One exception was pinyon nuts, which probably came from the Deep Creek Mountains; the only reliable source of pinyon nuts within 100 km of Fish Springs.

Since the pinyon nuts were gathered in the fall, occupation at Fish Springs Caves most likely took place in late fall and early winter. According to Lindsay and Sargent (1979) the cave/rockshelters on the eastern slope of the Deep Creek were probably occupied in the fall and would appear that in the Deep Creek and Fish Springs were integral bases in the seasonal round followed by both Archaic and Fremont/Sevier groups. Indeed, it is likely that the same groups occupied both areas permitting us, for the first time, to demonstrate group movement and subsistence change in the eastern Great Basin.

Summary and Discussion

Crab Cave is a multicomponent site that was intermittently occupied from about 5000 years ago until historic times. The cave was used as a base while marsh resources were procured, most likely in the late fall and early winter. Pinyon nut hulls in post-Archaic and possibly Archaic deposits suggest that occupation of the cave followed an occupation in the Deep Creek Mountain area.

We cannot say whether the cave was occupied regularly throughout the 5000 year span, but there is no evidence of a major occupational hiatus. The only pottery was in the upper portion of Stratum 3, which, given the early date of ca 2000 B.P., suggests that the cave was probably occupied by groups transitional between the Archaic and the Fremont/Sevier. Transitional occupations have also been postulated at other sites in the Fish Springs and Deep Creek Mountain area, so it would appear that the hiatus suggested by Madsen and Berry (1975) is a localized phenomenon associated with flooding of lake edge and marsh resources at lower elevations. Since both the Fish Springs and Deep Creek Mountains sites are above the level of Neoglacial lake flooding, resources were continually available and were apparently utilized. At sites such as Hogup Cave, these resources were covered by higher water levels, resulting in localized abandonment.

Crab Cave has the potential of answering some of the questions concerning Fremont/Sevier subsistence, activity scheduling, site occupation patterns, etc., that have recently been raised by Berry (1974), Madsen and Lindsay (1977), and Madsen (1979). Berry (1974) has suggested that pinyon nuts were procured seasonally, with the timing dependent on the production of more important resources such as domesticated crops. Madsen (1979) has argued that Fremont/Sevier groups may have been relatively sedentary around marsh areas which provided their primary resources. Certainly the pinyon nut hulls and a late fall/early winter occupation pattern do support Berry's concept of a post-growing season procurement of and dependence on pinyon nuts. On the other hand, there is ample evidence that marsh resources were important at the cave and they may have been exploited year-round. Full scale excavations of Crab Cave would probably supply answers to these questions.

FISH SPRINGS MAN

Site Description, Excavation Procedures, and Cultural Features

A burial and two associated preform caches (42Jb179) were found eroding out of a low dune about 300 m northeast of the Fish Springs National Wildlife Refuge headquarters/building by Fish and Wildlife Service personnel. A test excavation was undertaken at their request.

The low dune in which the burial was found is one of many that finger out into the marsh along the margin of the water courses. The dune trends north-south and is found immediately west of a series of spring siphons that are the primary sources of water to the marsh. The site itself is west of and adjacent to Middle Spring, (NE1/4, NW1/4, SW1/4, Section 23, T11S, R14W, U.S.G.S. Fish Springs SW 7.5 Quadrangle).

The surface of the dune is at the transition between the alluvial fans bordering the western margin of the Fish Springs Range and the boggy areas dominated by marsh flora at an elevation of 1313 to 1314. West of the dune the flora is dominated by halophytic species such as Allenrolfia and Distichlis, and Atriplex. East of the dune species such as Scirpus, Ruppia, Eleocharis, and Phragmites predominate.

The entire surface of the dune is littered with artifactual material, primarily chipped stone detritus. Although this is concentrated in some areas, there is no discernible pattern. Materials collected from the dune surface include Archaic points such as Gypsum, Fremont/Sevier pottery such as Great Salt Lake gray, Paiute/Shoshoni pottery, and numerous historic artifacts. The assortment suggests there may have been some deflation of the dune and that present surface artifact associations are spurious.

Testing was initiated by mapping the site, collecting and mapping surface artifacts, and with the aid of Refuge personnel, relocating the preform caches associated with the burial (Fig. 21). An area of 8 sq m around the burial was excavated in arbitrary 5cm levels since no stratification was apparent in the profiles of an exploratory test pit. The upper 8-9cm of fill contained cultural material, but it was not clearly the result of deposition and may well have worked from the surface down into the sterile fill of the dune. Beneath this surface layer was 1m of undifferentiated eolian sand.

Two caches of obsidian preforms or crude bifacially retouched knives were removed from the area adjacent to the burial by Refuge personnel who reported that they came from discernible pits excavated into the sand. However, no pits were identified during the excavation, and inasmuch as cultural materials were found only in upper 10cm of fill, any existing pits may have been disturbed beyond recognition. The burial itself was altered by surface weathering, root intrusion, and the effects of ground water. The skeletal material was disintegrating and only partially articulated; a shallow interment pit could be discerned, but its depth and point of origin could not be determined.

The only cultural materials directly associated with the burial were two preforms and a modified metal ball. The two preforms are similar to those in the caches removed prior to excavation and help confirm the probable association of the caches. Two ash/charcoal lenses were detected in the otherwise sterile eolian sand. Both of these concentrations were badly disturbed by rodents and neither could be defined as hearth areas.

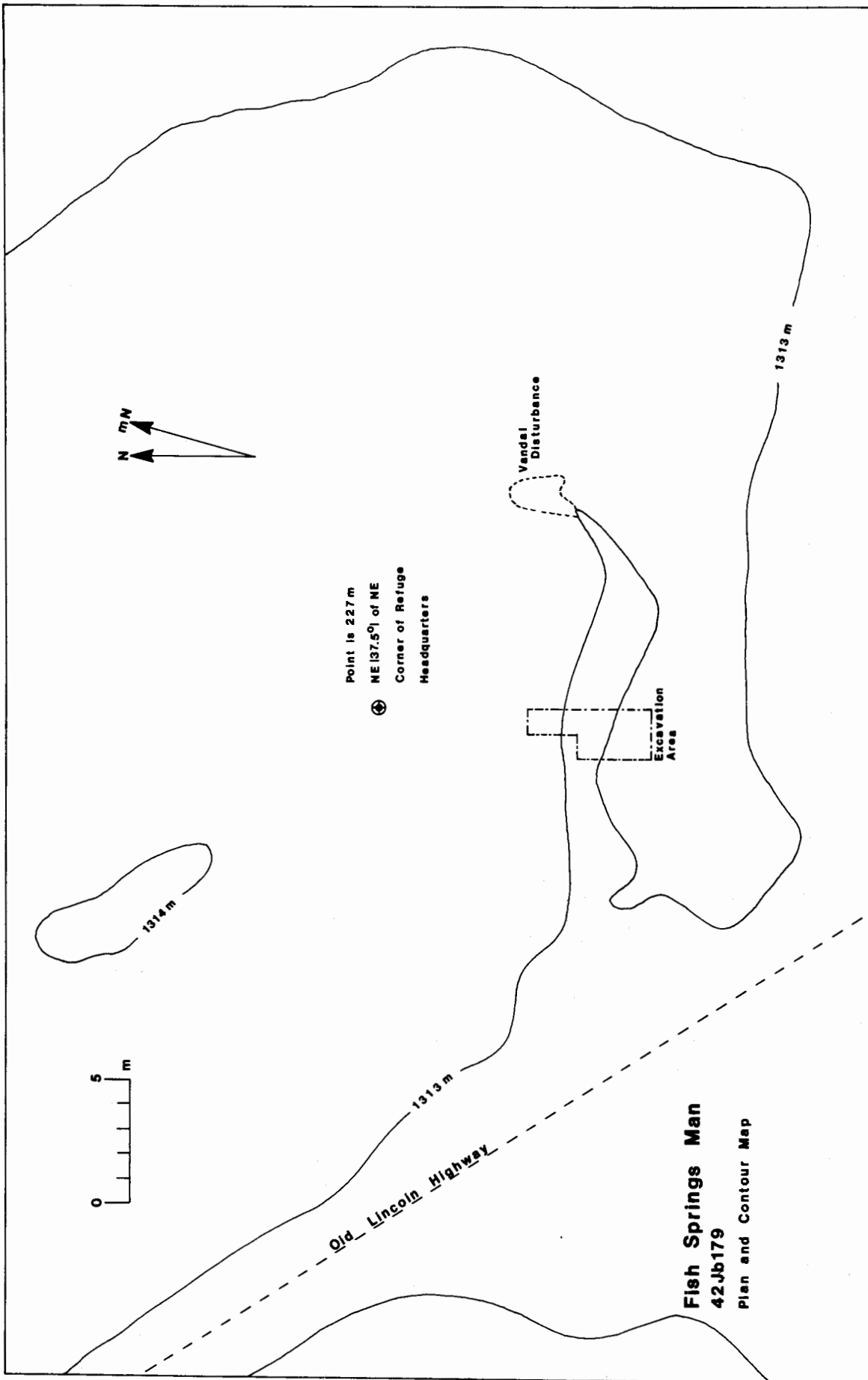


Figure 21. Plan Map of the Fish Springs Man Site (42Jb179).

Dating

No chronologically diagnostic artifacts were recovered in association with the burial. Charcoal from a lens in the excavation area was collected for possible radiocarbon dating, but the amount proved to be insufficient for analysis.

Burial

The burial was interred in a pit 1.0m long by 65cm wide and was oriented on a northwest-southeast axis with its head toward the southeast (Figs. 22 and 23). The body was in a flexed position on its right side. The skeletal material was badly disturbed by roots, water, insects, and rodents, precluding determination of possible pathologies. Neither could the sex could be determined, although size and shape of several elements suggest it was a male. Dental wear is characteristic of a young adult 18 to 24 years of age.

Three artifacts were directly associated with the burial -- a chalcedony biface blade or preform and a metallic ball found near the right hand and an obsidian blade found near the left hand. Two caches of obsidian bifaces one from the area of the pelvis and the other near the feet were probably associated with the burial.

Artifacts

With the exception of the metal object, all the artifacts recovered from the test excavation consisted of chipped stone tools, preforms, and detritus (Table VII). Only six of the 96 chipped stone artifacts can be considered finished tools and five of these are simple retouched flakes. Of the remaining number, 27 are preforms and 63 are flakes resulting from tool production.

ELKO SIDE-NOTCHED POINT

The single finished tool is the base of an Elko Side-notched point. It is broken across the notches and only the hafting element remains. The basal width is 22mm. Elko Side-notched points are generally considered to be diagnostic of Archaic depositions (e.g., Holmer 1978), although they have been recovered in Piute/Shoshoni contexts as well (Fowler et al. 1973). Its presence here in what is probably an historic burial is further evidence that chipped stone tools with this morphology are neither chronologically nor culturally diagnostic.

PREFORMS

A number of bifacially worked chipped stone obsidian artifacts were associated with the burial. Twenty-four of these were directly associated with the skeletal material and the remaining three most probably were. Most of the worked flakes were found in two caches -- 15 near the feet and six over the pelvis. The artifacts are manufactured from large flakes and range from those with no retouching at all (Figs. 24, a-c) to those that are bifacially retouched around their entire circumference and have secondary flake scars completely obliterating the

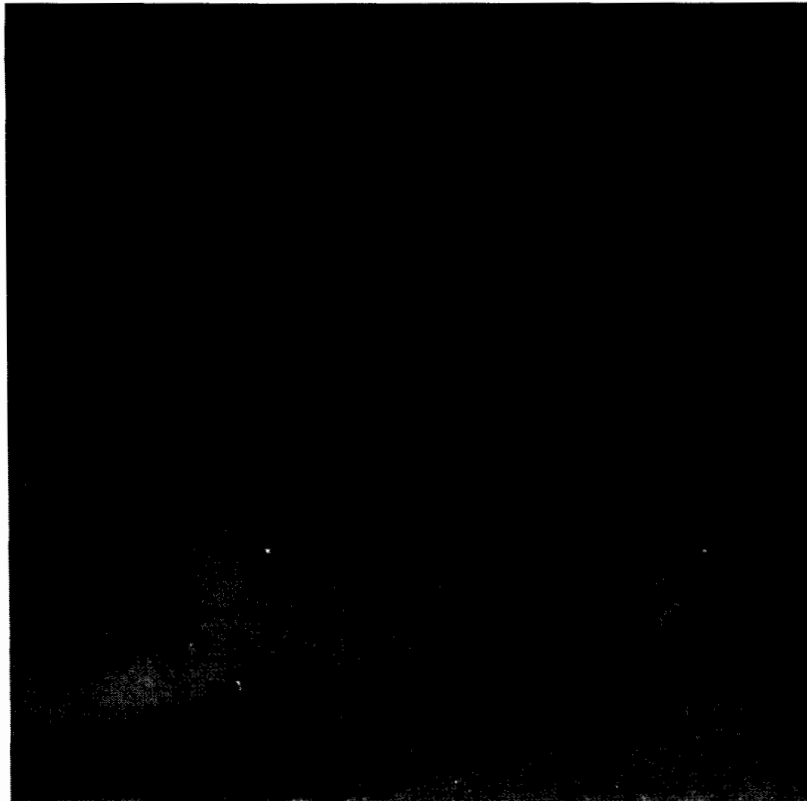


Figure 22. View of burial partially exposed. Note limits of interment pit.

original flake surface (Figs. 24, g-i). They range in size from 66 by 64mm maximum (Fig. 28t) to 48 by 38mm minimum. The wide variation in the amount of retouching, the crude flaking on even the best specimens, and the lack of any evidence of use indicate these were preforms. Whether or not they were manufactured specifically to accompany the burial is unknown. However, they appear to have been made quickly, probably at the material source, and transported for finishing elsewhere.

BIFACE BLADE

The only chipped stone implement associated with the burial that is not obsidian is half of a large chalcedony biface blade (Fig. 25a), that was found adjacent to the right hand of the burial. It is bifacially retouched around the entire unbroken portion of the margin, with the flake scars extending to the middle of the blade. One edge is stained with red ocher. It is 52mm wide and 7mm thick.

RETOUCHED FLAKES

Five flakes associated with the burial were intentionally retouched along one edge. Four are unifacially retouched; one is bifacially retouched.

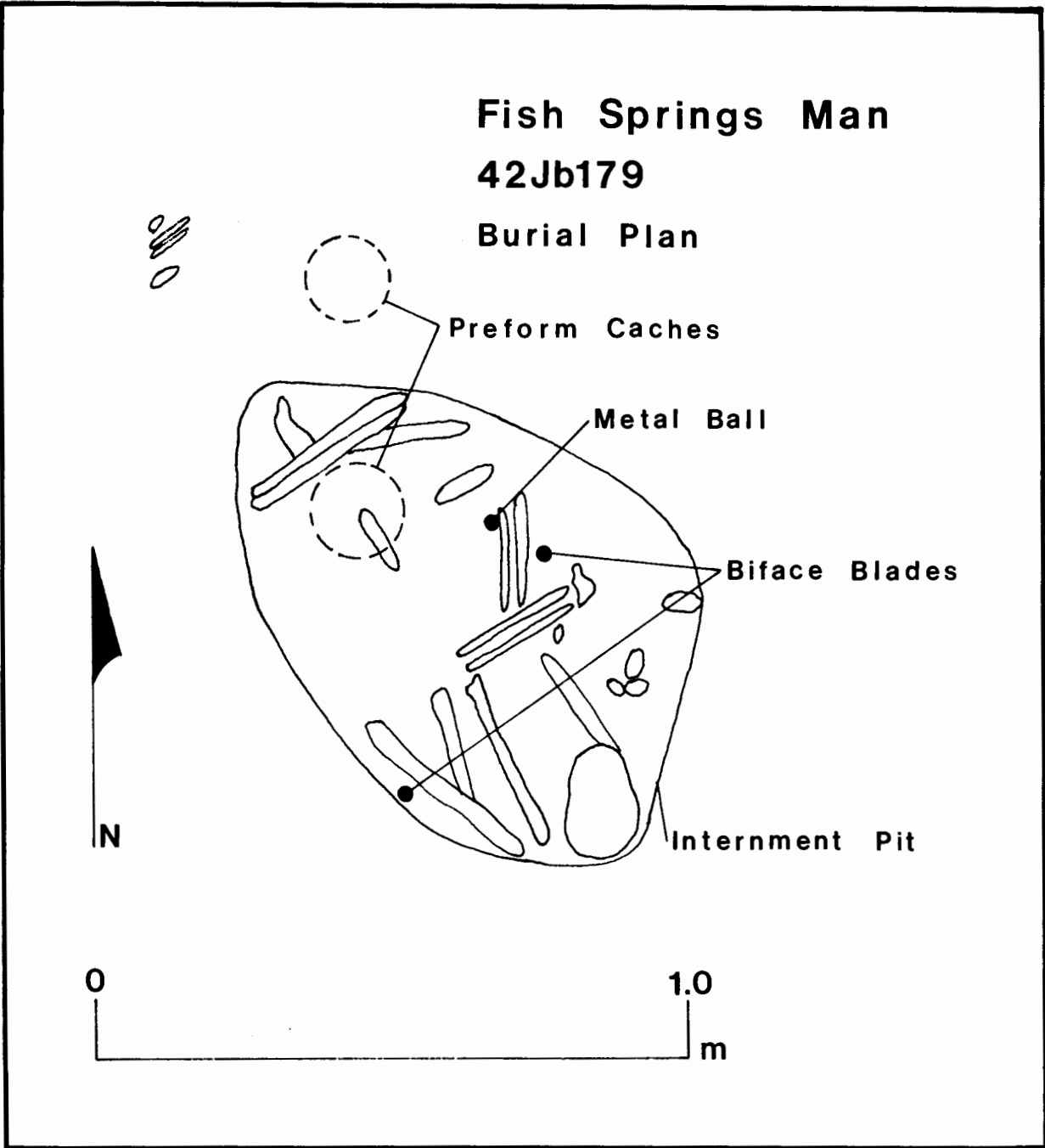


Figure 23. Plan map of burial showing location of skeletal elements and artifacts.

DETRITUS

The remaining 63 chipped stone artifacts are waste flakes derived from small obsidian cobbles. None of these flakes were directly associated with the burial and most were probably associated with the surface. Nelson and Holmes (1979) indicate the source area for obsidian samples from this site is in the Thomas Range, only 20km southwest of the marsh area.

METAL BALL

A hemispheric metal object was found near the right hand of the burial (Fig. 25b). Cut marks on the flat surface of the hemisphere indicate it may have been completely spherical and was cut in half. The ball is 27mm in diameter and is ground on its outer surface. It cannot be associated with any known historic implement (including firearms) and its function is unknown.

Summary

Fish Springs man is an isolated burial in a shallow internment pit. It is in a dune littered with artifactual debris from several thousand years of occupation, the burial cannot clearly be associated with a particular period of deposition. The metal ball in the pit suggests it may be of protohistoric or historic origin. Twenty-seven preforms were included with the body in the burial pit.

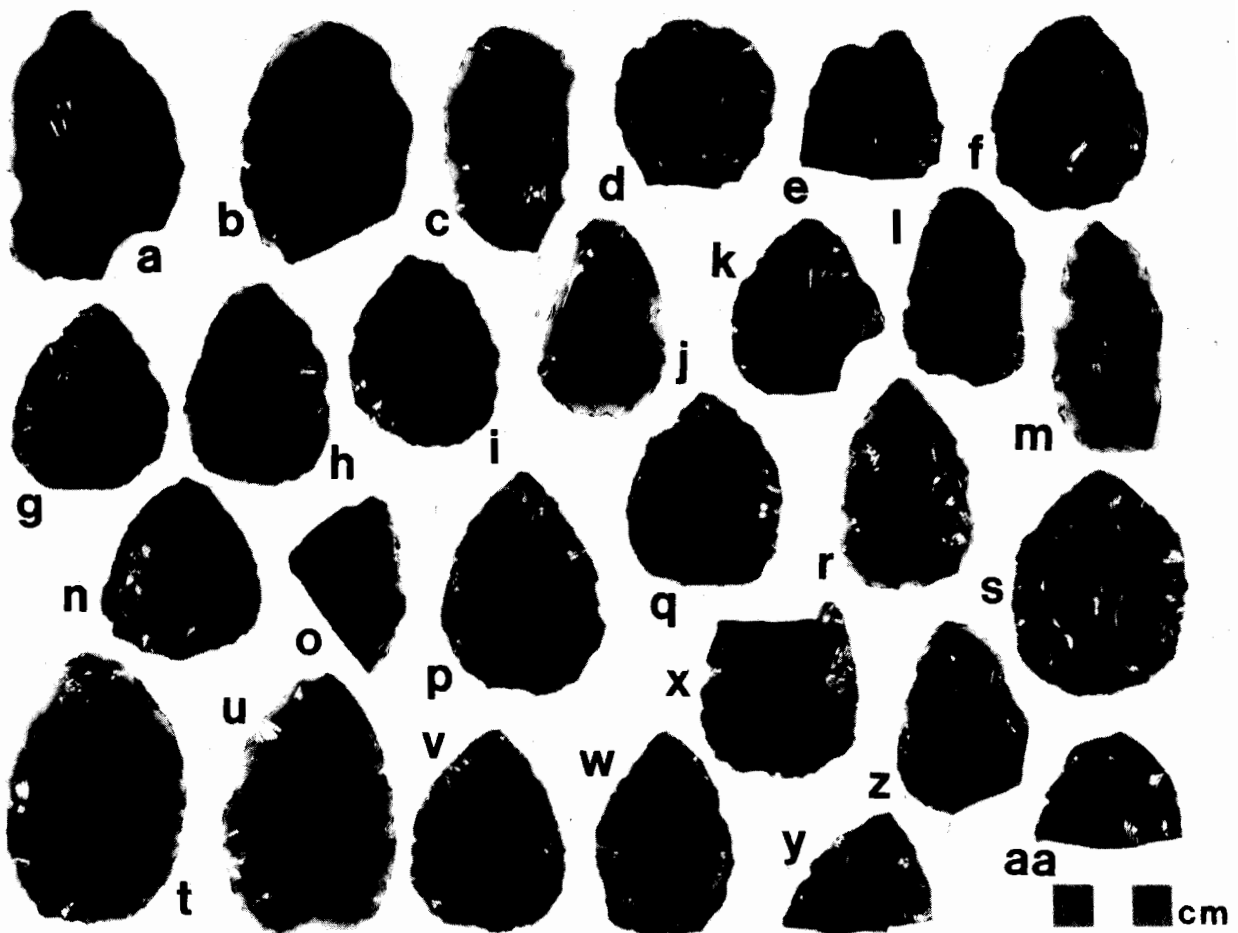


Figure 24. Preforms associated with burial.

Table VII. Provenience of Artifacts associated with Fish Springs Man (42Jb179).

Fish Springs Man (42Jb179)	Biface Blade Preforms	Elko Side-notched Projectile Point	Unifacially Retouched Flakes	Decortification Flakes	Primary Flakes	Secondary/ Finishing Flakes	Metal Ball
Surface			1	1	1		
General Fill (0-40cm)	1		2	10	20	22	
Probably burial Association	2		1	1 4		4	
Burial Association	3	1	1				1
Cache #1	15						
Cache #2	6						
TOTAL	27	1	5	12	25	26	1

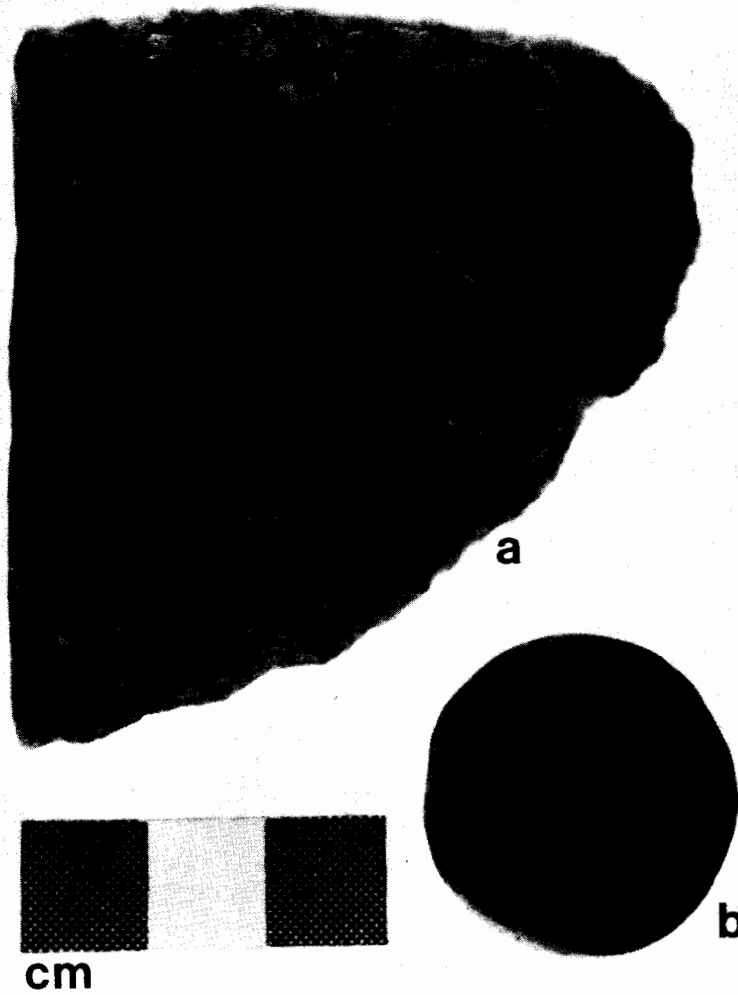


Figure 25. Chalcedony biface (a) and metal ball (b) associated with burial.

GENERAL SUMMARY

In general, results of the test excavations in the Fish Springs marsh area conform to what is known about occupational chronology and subsistence adaptations at other eastern Great Basin sites. The sites were initially occupied by Archaic hunter gatherers between four and five thousand years ago and appear to have been continuously albeit seasonally occupied until historic times. No major occupational breaks are discernible. The data from the Fish Springs sites, in conjunction with those from sites in the Deep Creek Mountains, suggest that the hiatus between Archaic and Sevier (Fremont) groups in the eastern Great Basin hypothesized by Madsen and Berry (1975) is a relatively localized phenomenon. Occupational gaps occur in sites adjacent to resource zones that were flooded during the Neoglacial period, but at similar sites above the level of flooding, evidence of an occupational break is less clear cut. Confirmation of cultural continuity in the area then, remains a primary objective of future research, but the Fish Springs data as well as the similarity in subsistence (i.e., Madsen 1979) support such continuity. There does appear to be a marked reduction in population judging from the small number of sites that contain evidence of continuous occupation, which might in turn point to diminished carrying capacity of the general area during the Neoglacial.

The Fish Springs area appears to have been based on the hunting and collection of marsh resources, which took place subsequent to a fall pinyon harvest in the Deep Creek Mountains. Subsistence adaptation during the early periods of occupation is less clear because of poor preservation in the lower strata at the caves, but seems basically similar to the Sevier (Fremont) pattern. Faunal resources were primarily small marsh animals and birds, with fish utilized to some extent. Scirpus (bulrush) appears to have been a major floral resource. The area seems to have been seasonally occupied during the early winter months. The caves are comparatively warm in the winter and provide comfortable shelter. The Sevier (Fremont) groups who occupied the caves may have utilized the area as part of a subsistence system which included a spring through fall occupation of horticultural villages or which included the use of other marsh areas. The timing of occupation at Fish Springs sheds no light on the question, but it does suggest that this was not a minor portion of the subsistence cycle. If the occupation of the Deep Creek Mountains and Fish Springs area are considered together, it is probable that one-quarter to one-third of the year was spent in the procurement of wild foods. There may ultimately prove to be no real conflict between the current subsistence theories, since it is certainly possible that crops could have been raised in conjunction with the utilization of marsh resources. How subsistence and occupation during the Archaic period related to subsistence and occupation at other sites during the year is not clear at present. However, the evidence of seasonal movement and procurement of resources from different environmental zones does support the notion of Madsen and Berry (1975) and Madsen (1979b) that groups during this period were less sedentary than during earlier Archaic periods.

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AN ARCHEOLOGICAL SURVEY
OF
CLAY BASIN, DAGGETT COUNTY, UTAH

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PREFACE

An archeological survey (total inventory) of 19km² in Clay Basin, Daggett County, Utah was conducted by the Antiquities Section, Division of State History, State of Utah. The survey was performed for Mountain Fuel Supply Company of Rock Springs, Wyoming in order to provide the Bureau of Land Management necessary locational information for the protection of archeological sites. Recorded sites were assessed in contexts of a rather unique extant environmental setting and known cultural prehistory of northeastern Utah and southwestern Wyoming.

The survey was performed under the direction of David B. Madsen, State Archeologist, and the field supervision of La Mar W. Lindsay. Crew members included, at various times during the eighteen field days, Kay Sargent, Susan W. Taylor, and Tom Zeidler. Kay Sargent is credited with much of the photography, and Amy Pringle and Rebecca Hobbs typed the manuscript.

The assistance of Mountain Fuel personnel, Rex Head, Rock Springs, and Elmer Widdick, Clay Basin, who provided locational data, is appreciated. Mr. Widdick also shared both his time and shop for much needed vehicle repair. Also, the cooperation of Lloyd Ferguson and Jerry Huff of the Bureau of Land Management, Vernal District, who maintain the jurisdiction of Clay Basin, is acknowledged. Mr. Huff provided botanical and faunal data. Robert Lee Sappington, University of Idaho, Moscow, conducted a non-destructive energy dispersive x-ray fluorescence analysis of obsidian samples from two of the sites. He is credited with providing additional support for the assessment that the Clay Basin sites are for the most part the product of Paiute-Shoshoni late fall/winter occupation.

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ABSTRACT

An archeological inventory of Clay Basin, Daggett County, northeastern Utah, resulted in the identification of 18 archeological sites. Although they are predominantly open lithic sites with little or no depth, some contain fire-hearths and subsurface cultural material and are probably campsites. Clay Basin has relatively mild winters and is attractive to migratory game species. It apparently served as a locus for Paiute-Shoshoni winter hunting encampments postdating 650 B.P. There is some evidence of Plano and Archaic occupations; the absence of Fremont pottery influence may indicate an eastern extent of Fremont cultural penetration.

INTRODUCTION

The archeological survey of Clay Basin in Daggett County, northeastern Utah (Fig. 1), entailed an inventory of sites within a 19km² area covering much of the basin. This included the S 1/2 Secs. 15, 16, and 17; E 1/2 Sec. 20, 21, 22, and 23; and N 1/2 Secs. 26, 27, and 28, T3N, R24E (U.S.G.S. Clay Basin 7.5 Min. Quadrangle). In addition, several accesses to the basin, where sites were thought to occur were spot-checked during the early part of the survey. This was done in order to gain a better understanding of the site types and cultural components which we would expect to encounter during the formal inventory. Archeological sites were identified at several spring locations in Richards Gap, in the SE 1/4 Sec. 15, T12N, R105W (U.S.G.S. Richards Gap, Wyoming 7.5 Min. Quadrangle) and at Edith Aspden Park in Martin Draw in the SE 1/4 Sec. 23, T3N, R23E (U.S.G.S. Goslin Mtn. 7.5 Min. Quadrangle). No sites were identified at the head of Clay Basin Creek.

The 18 archeological sites include three that were identified outside of the confines of the basin and two additional sites reported by Charles Love of the College of Western Wyoming in Rock Springs. Sites were defined by the presence of ten or more, either culturally modified or unworked lithic flakes. Where none were modified, the existence of more than one cryptocrystalline stone type (suggestive of cultural debitage or wastage) was required to define a site. Isolated projectile point finds were recorded in two cases as bonafide sites because of their significance. Sites are assigned the numbers of the Smithsonian trinomial system. A few sample diagnostic artifacts and a limited sample of faunal material were collected for identification in the laboratory. Obsidian samples were collected from two sites in the basin during the summer of 1980. These were submitted for non-destructive energy dispersive x-ray fluorescence analysis to determine the natural source area. Obsidian is not indigenous to Clay Basin. All artifact specimens have been forwarded to the Utah Museum of Natural History at the University of Utah now that analysis is completed.

CA. 3200 acres done

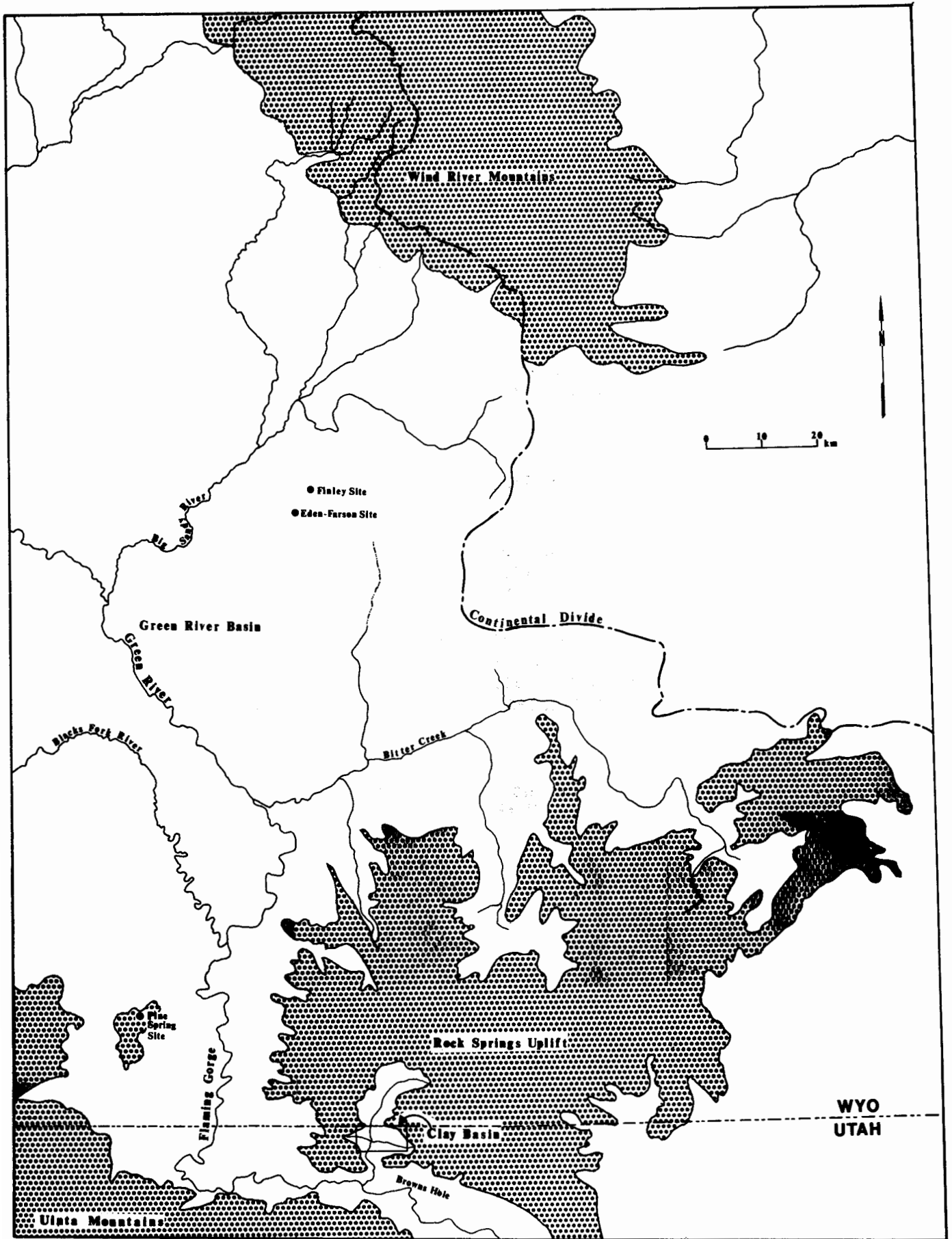


Fig. 1. Location Map Showing Clay Basin and the Distribution of Archeological Sites Discussed in Text.

ENVIRONMENTAL SETTING

Location

Clay Basin is located on the north flank of the Uinta Mountain arch of northeastern Utah and at the extreme southern margin of the Green River Basin, of southwestern Wyoming (Keller 1961). It is a relatively low lying (1,890 - 2,010m elevation) well protected basin. The Tepee Mountains on the north, Bender Mountain on the east, Mountain Home and Goslin Mountain on the south, and Richards Mountain on the west (2,290 - 2,740m elevations) circumscribe the basin. High mountains and plateaus rise beyond the basin and its immediate surrounds (2,590 - 2,740m) to the north. The lesser mountains of the high Uinta Range (2,740 - 3,050m) are dominant landforms to the south and west.

Access to Clay Basin from the north and west is possible only through Richards Gap from Red Creek Basin (Fig. 2) and through Martin Draw, respectively. Red Creek, which originates about 15mi to the northeast, flows southward nearly 5 miles through the western portion of the basin enroute to the Green River. Access to the basin from the Green River appears to be particularly difficult. Red Creek is fed by a large spring on the east side of Richards Gap. All other basin water courses, including west - trending Clay Basin Creek, maintain only seasonal flow. Additional springs are found in Martin Draw and at the head of Clay Basin Creek.

Geology

Clay Basin is an east-west elongated, closed anticline paralleling the Uinta fault to the south (Keller 1961). It is eroded in soft, gray Upper Cretaceous Mancos shales bounded on the north and east by sheer Mesa Verde sandstone bluffs; maroon and gray Pre-Cambrian Uinta Mountain foothills rise to the south (Fidlar 1963). The quartzite found in many of the basin's archeological sites was apparently obtained from the Pre-Cambrian Red Creek exposure.

Considerable recent erosion is evident throughout the basin, but is particularly noticable along Red and Clay Basin Creeks. Older alluvial deposits some 6 to 8m deep are exposed in the west central portion of the basin.

Remnant gravel terraces can be seen adjacent to and on the east side of Red Creek and in the basin's interior. The creekside gravels are covered with eolian sands where several archeological sites were found. Recent mudslides on the south-facing slopes of Red Creek Basin have displaced power poles and threatened the East Flaming Gorge Highway. This catastrophic alluviation is probably attributable to overgrazing, as ranching was well established in Clay Basin by the turn of the century.

Climates: Past and Present

The climate of the region is characterized as mid-latitude dry (Burnham 1950). Although no records are kept for the basin, they are available for Manila, Utah, about 55km to the west and at a similar elevation and latitude. Precipitation at Manila has averaged about 9.5

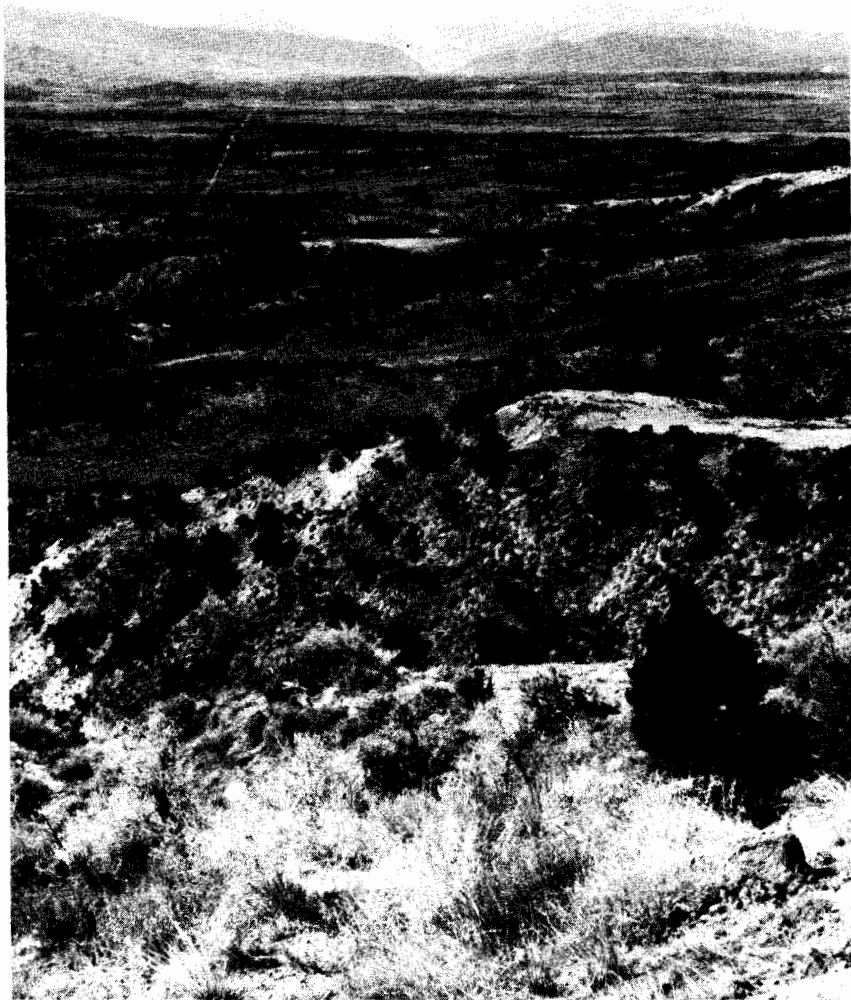


Fig. 2. Red Creek Basin Showing the Access to Clay Basin Through Richards Gap in Background (looking southwest).

inches per year for the 66 years recorded. Greater amounts fall during April, May, September, and October during normal water years. In dryer years, precipitation is more evenly distributed. Average annual temperatures varied from about 42° to 45° F. (5° to 7° C.) during the 66 year period. The average highest temperature is 97° F. and lowest is -25° (-32° C.). The average number of frost-free days is 118, although this has varied from 75 to a maximum of 147 days during the period from 1961 to 1970 (U.S. Weather Bureau Climatic Census 1931, 1957, 1965, 1961-70).

At higher elevations of the surrounding plateaus and mountains precipitation increases markedly while temperatures proportionately decrease. Clay Basin, which is surrounded by these mountains, has more moderate temperatures, particularly during the winter (Jerry Huff, Bureau of Land Management, 1977 personal communication). This has implications regarding the migration of wild game species and no doubt influenced aboriginal movement/routes.

Paleoenvironmental and paleoclimatological data are entirely lacking from the Clay Basin area. The one attempt at pollen analysis at the Pine Springs Site was unsuccessful (Sharrock 1966). However, the pollen analyses of natural deposits of southeastern Idaho (Bright 1966) and the Wasatch Plateau of northern Utah (Madsen and Currey 1977) provide a tentative reconstruction.

The deglaciation of Wisconsin ice began sometime prior to 12,000 B.P. thus heralding the onset of the Holocene (Bright 1966; Madsen and Currey 1977). From about 12,000 to 10,800 B.P. the climate was somewhat cooler and wetter than now. Limber pine, which today is a minor component of the Douglas fir forests at lower elevations of southeastern Idaho, was abundant (Bright 1966). By 10,000 B.P. limber pine is less well represented and Douglas fir became more abundant (Bright 1966). This suggests that although the climate continued to be cooler and wetter than present and remained so to ca. 8000 B.P. (Madsen and Currey 1977), a general warming leading to the arid Altithermal (Antevs 1948) was initiated during that time. A refugia of Douglas Fir above Clay Basin suggests that the basin was probably forested during early Post-pluvial times, however this forest component was probably replaced by juniper and other more xeric species shortly after 8000 B.P. Basin aridity continued to about 5000 B.P. (Madsen and Currey 1977) when the climate returned to one more like the present.

Clay Basin probably provided ample opportunity for aboriginal occupation throughout Post-pluvial times. It would have been a particularly optimal setting prior to the Altithermal when the aboriginal economy depended heavily on big game hunting. It is difficult to speculate on the effect of the intervening hot-dry period and subsequent Neoglacial events (cf. Currey 1976), but these events may have been of little consequence because of the basin's higher and well protected location and the role likely served later populations -- an optimal habitat for winter encampments and hunting.

Vegetation

The vegetation of Clay Basin is apparently well stratified according to effective moisture and edaphic factors such as soils and salinity. Black greasewood is found immediately adjacent to Red and Clay Basin

Creeks; saltbush communities, principally shadscale, occupy the south facing slopes to the north where erosion is pronounced and soils are particularly shallow.

Sagebrush communities which include both big and black sagebrush, rabbitbrush, bluebunch wheatgrass, and Indian rice grass, occupy the north facing slopes south of Clay Basin and the east of the basin where soils are relatively deep. Sagebrush also dominates the large flat in the mouth of Martin Draw to the west of Red Creek. Juniper occupies the slopes on the eastern and western margins of the basin. Pinyon pine found in abundance near the Green River, is virtually nonexistent in the Clay Basin juniper forest.

At higher elevations of the surrounding mountains (above 2280m), Douglas fir and Ponderosa pine refugia are in shallow to moderately deep soils in the draws on the slopes. Antelope bitterbrush is also found at the higher elevations.

Fauna

Clay Basin is transitional between the Middle Rocky Mountain (Uinta Mountain Province) and the Northern Great Plains (Bridger Basin) Faunal Areas (Durrant 1952). This suggests that the area may have been particularly sensitive to climatic change with fluctuations affecting local fauna in several ways. The basin may have supported different faunal communities at particular times. Also, this transitional zone may have provided a habitat for both plains and montane fauna during optimal periods. These fluctuations over time may have provided an adequate food supply for a greater variety of species at particular times (cf., Odum 1963).

The basin is presently occupied by a variety of both game species and predators. Modern big game species include mule deer, elk, and antelope. The area is primarily a winter range for deer, although there are some summer residents. Elk are also more numerous in winter, however they are present in the surrounding mountains during the summer (Jerry Huff, Bureau of Land Management, 1977 personal communication). Antelope are present year around. Moose were recently sighted along the Green River south of the basin (Richard E. Fike, Bureau of Land Management, 1977 personal communication), although their normal habitat is well to the west on the north slope of the Uinta Mountains. Despite an unusually mild-dry winter, at least a hundred deer and several hundred antelope were sighted during the survey. While elk were not seen, they have in past seasons been abundant to the south above Martin Draw. Bison were also present during prehistoric times (Dale 1918; Barnes 1922).

Predators include coyote and bobcat, which are permanent residents, and mountain lion, which follow the migrating deer herds (Huff, 1977 personal communication). Bear were reported during early historic times (Durrant 1952). Other fauna include badger, otter, skunks, squirrels, chipmunks, and various species of gophers, mice, rats, and bats. The wide variety of birds includes migratory fowl and raptors such as the Golden Eagle and numerous hawks and falcons (Huff, 1977 personal communication).

CULTURAL AND RESEARCH CONTEXTS

Archeological research in the Upper and Middle Green River drainages has been fairly extensive, representing the full spectrum of Great Basin and Northwestern Plains aboriginal cultures. Excavated and dated sites however are for the most limited to the more recent developments.

Paleo-Indian projectile points -- Folsom (ca. 11,000 - 9000 B.P.) and Plano (ca. 10,500 to 8500 B.P.) -- have been identified both to the north and south of Clay Basin. Folsom fluted points have been recovered from the Finley Site (Howard 1943; Howard, Satterthwaite, and Bache 1941; Satterthwaite 1957) and the Fontenelle Reservoir (Dibble and Day 1962) in Bridger Basin. They have also been identified in the Uinta Basin to the south (Crouse 1954; Lindsay 1976). Plano lanceolate points have been recovered from the Finley Site -- the type site for Eden points -- and the Pine Spring site (Sharrock 1966). Points reminiscent of unfluted Agate Basin and Angostura types were recovered from Occupation I at Pine Springs where a 9695 ± 195 B.P. radiocarbon date was obtained from associated bison bone. The absence of Clovis fluted points (ca. 12,500 to 11,000 B.P.) suggests man's presence in the drainage no earlier than 9000 to 11,000 years ago. Renaud's (1938, 1940) preprojectile point horizon from Blacks Fork has been challenged by Sharrock (1966) who concludes that the "pebble tools" were naturally occurring lithics.

The subsequent ca. 8500 to 1700 B.P. Archaic is widely distributed throughout the entire Green River drainage. Diagnostic points have been recovered from Bridger - Teton National Forest (Frison 1974), Big Sandy Reservoir area (Davis 1956), Fontenelle Reservoir, the Pine Spring Site, Flaming Gorge survey (Day and Dibble 1963), Thorne Cave (Day 1964), Deluge Shelter (Leach 1967, 1970) and Hells Midden (Lister 1951, 1953). The Archaic, Occupation 2, at Pine Spring is dated 3635 ± 80 B.P. This agrees closely with the earliest dated level from Deluge Shelter to the south where McKean points are associated with a 3630 ± 85 B.P. radiocarbon date. This essentially dates the terminus of the ca. 5000 - 3500 B.P. range of the McKean Complex (cf. Berry and Berry 1976). Radiocarbon dates 4230 ± 250 and 4170 ± 250 B.P. have also been obtained from Thorne Cave.

The subsequent ca. 1450 - 1050 B.P. agricultural Fremont (cf. Marwitt 1970) in the Green River drainage is present at Deluge Shelter, Whiterocks Village (Shields 1967), the Goodrich Site (Shields 1967), Caldwell Village (Ambler 1966), Boundary Village (Leach 1966), and various sites in Dinosaur National Monument (Breternitz 1965, 1970). An undated component, Occupation 3, at Pine Spring is also interpreted as Fremont as are a number of undated sites at Flaming Gorge. The Uinta Basin and presumably other Fremont sites of the Middle Green River Drainage were apparently abandoned several hundred years earlier than either the Fremont settlements on the Colorado Plateau or the Sevier sites of the Great Basin (cf. Marwitt 1970; Madsen and Lindsay 1977).

Numic speakers arrived in northern Utah by 750 - 650 B.P. (Madsen 1975) from a southwestern Great Basin "homeland" (Lamb 1958; Miller, Tanner, and Foley 1969). Shoshonian occupation of southern Idaho appears to be no earlier than 650 B.P. (Gruhn 1961). A late proto-historic occurrence is dated 230 ± 100 B.P. on the Upper Green River (Frison 1971). The subsistence system of the Paiute-Shoshoni appears to be less

specialized than any of the previous occupants of the region. They engaged in hunting and gathering in the Great Basin (Steward 1938; Kelly 1964) and seem to have focused primarily on hunting on the northwestern Plains with some supplemental gathering (Frison 1971). The Wind River Shoshoni is historically well documented in the upper Green River drainage (Simkin 1947). This Numic group established rather wide-ranging hunting patterns reaching a radius of about 150 miles (330km) from a central local point near the Wind River Range (Simkin 1947). Clay Basin is within the Wind River Shoshoni domain.

Clay Basin and its immediate environs have been the subject of only minor archeological research. Recent clearances have been performed within the past several years by the University of Utah, the Bureau of Land Management, and the College of Western Wyoming in connection with the development of natural gas. Two archeological sites were identified in the basin (Charles Love, site reports on file), but they are nondiagnostic. Fire hearths, exposed by erosion in Browns Park on the Green River east of Red Creek, have been radiocarbon dated 1490 \pm 110 and 1300 \pm 100 B.P. (Richard Fike, 1977 personal communication). Although artifact associations are unclear, they may represent an early or transitional date on the Fremont in the region.

In summary then, the extant archeological record suggested that throughout the Upper and Middle Green River drainages all of the Colorado Plateau aboriginal developments were likely to be encountered in Clay Basin.

ARCHEOLOGICAL SITES

Twenty archeological sites are reported in the Clay Basin area (Fig. 3). These include 18 identified by the Antiquities Section and two reported by Charles Love of the College of Western Wyoming. Three of the sites are immediately beyond the confines of the basin. The sites are mostly sparse lithic scatters and isolated projectile point finds. Several larger sites contain lithics, ground stone and faunal material. Only one has pottery. Although the sites are widely scattered throughout the basin, they tend to be more concentrated on the terraces immediately to the east and west of Red Creek (Figs. 4 and 5). The larger sites are found in the sagebrush and juniper in the northwestern part of the basin. Most of the sites have no apparent depth perhaps because of advanced erosion in the basin, but this also may reflect the nature of aboriginal settlement.

The sites identified in the Clay Basin area are summarized:

42Da74 is an open campsite 2.8mi (4.5km) west of Red Creek at Edith Aspden Park, a spring in Martin Draw. The site consists of a scatter of lithic flakes, a biface, two unifaces and a groundstone fragment. No depth is apparent. Cultural affiliation is unknown.

42Da78 is an open lithic site on a low ridge, 1.5mi (3.3km) east of Red Creek in north central Clay Basin. The site consists of a small scatter of lithic flakes. No depth is apparent. Cultural affiliation is unknown.

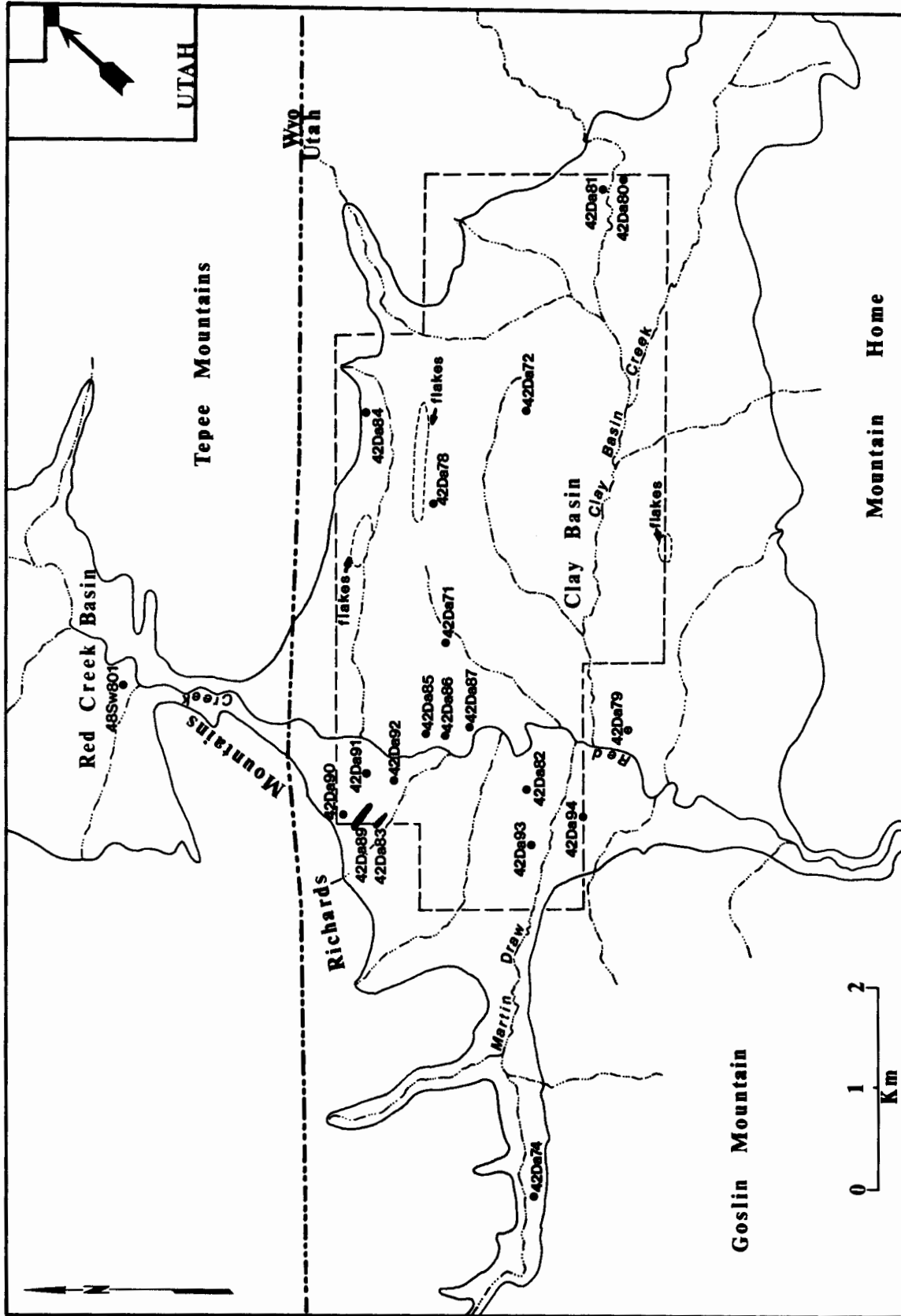


Fig. 3. Location Map of Clay Basin Archeological Sites.



Fig. 4. Site Locations on Terraces on the East Side of Red Creek (looking north).



Fig. 5. Site Locations in Juniper on Slopes Below and on Terraces on Opposite Side of Red Creek (looking east).

42Da79 is an open lithic or possible camp site on a bluff east of and overlooking Red Creek. It is 0.5mi (1.1km) north of the confluence with Clay Basin Creek in western Clay Basin. There is a scatter of lithic flakes and a possible metate fragment, but no apparent depth. Cultural affiliation is unknown.

42Da80 is an open campsite on the south side of a tributary to Clay Basin Creek in northeastern Clay Basin. The site consists of a scatter of lithic flakes, a preform fragment, and a large unifacial flaked stone implement. Several groundstone fragments and a large hearth area were identified. The site has little depth and no evidence of cultural affiliation.

42Sa81 is an open lithic site on the north side of a tributary to Clay Basin Creek. It is 3.5mi (7.7km) east of Red Creek in northeastern Clay Basin. The site comprises a scatter of lithic flakes, a preform fragment, an unfinished biface, a uniface, and a possible fire-cracked rock. There is little depth and the cultural affiliation is unknown.

42Da82 is an open campsite on a terrace 0.25mi (0.6km) west of Red Creek in southwestern Clay Basin. The site consists of a scatter of lithic flakes and a biface. A metate was apparently recovered by a local resident of the basin. A hearth with fire-cracked rock was identified. The site has limited depth and no known cultural affiliation.

42Da83 is an open campsite at the base of the Richards Mountains, 0.5mi (1.1km) west of Red Creek and 1mi (2.2km) north of Martin Draw in northwestern Clay Basin (Fig. 5). The site consists of a scatter of lithic flakes, a small corner-notched projectile point, two point fragments, and several biface fragments. Fire-cracked rock was identified. The site may have some depth. Cultural affiliation is Post-Archaic.

42Da84 is an open campsite at the base of the Tepee Mountains, 2mi (4.4km) east of Red Creek on the north side of Clay Basin. It consists of a sparse lithic scatter and a "spent" core. No depth is apparent and cultural affiliation is unknown.

42Da85 is an open isolated point find on a terrace overlooking Red Creek from the east. It is 1.25mi (2.7km) south of Richards Gap in western Clay Basin (Fig. 4). A large elongate triangular projectile point, possibly Archaic (or Plano), was found.

42Da86 is an open lithic site on a terrace east of and overlooking Red Creek. It is 1.5mi (3.3km) south of Richards Gap, in western Clay Basin (Fig. 4). This scatter of lithic flakes, a core/biface fragment, and an unfinished biface of unknown cultural affiliation. The site may have some depth.

42Da87 is an open lithic site on a terrace east of and overlooking Red Creek. It is 1.75mi (3.8km) south of Richards Gap in western Clay Basin (Fig. 4). The site consists of a scatter of lithic flakes, a small triangular projectile point, two drills, a biface, two unifaces and a worked flake. The site has limited depth. Cultural affiliation is Post-Archaic.

42Da89 is a large open campsite, 0.25mi (0.5km) west of Red Creek and 1mi (2.2km) north of Martin Draw in northwestern Clay Basin (Fig. 5). The site consists of a number of scattered lithic flake concentrations (Fig. 6) and hearths with charcoal, ash, and fire-cracked rock (Fig. 7). Artifacts include two side-notched projectile points, an unusual stemmed point, a nondiagnostic point fragment, a utilized flake, a fingernail impressed pottery sherd, bone fragments and numerous large cores and worked flakes. Subsurface cultural deposits are evident. Obsidian flake samples were collected for x-ray fluorescence analysis. Cultural affiliation is Paiute-Shoshoni. *Obsidian collected*



Fig 6. Site 42Da89 Showing Lithic Scatter (Note Fingernail Impressed Pottery Sherd)

obsidian
42Da90 is a rockshelter campsite, 0.5mi (1.1km) west of Red Creek and 1.25mi (2.7km) north of Martin Draw in northwestern Clay Basin (Fig. 5). The site consists of several scatters of lithic flakes, one small side-notched point fragment, a uniface, a core, and a large steatite stone vessel fragment. Two eroded hearth areas consisting of fire-cracked rock and containing burned bone were identified. The site has limited depth. Obsidian samples were collected for x-ray fluorescence. Cultural affiliation is Paiute-Shoshoni.

42Da91 is an open lithic site, 0.25mi (0.5km) west of Red Creek and 1mi (2.2km) north of Martin Draw in northwestern Clay Basin (Fig. 5). The site consists of a scatter of lithic flakes. No depth is apparent. Cultural affiliation is unknown.

42Da92 is an open campsite, .13mi (0.3km) west of Red Creek and .75mi (1.6km) north of Martin Draw in northwestern Clay Basin (Fig. 5). There is a sparse scatter of lithic flakes, groundstone fragments, and two hearth areas with fire-cracked rock. The site may have limited depth. Cultural affiliation is unknown.

42Da93 is an isolated point find on a terrace above and north of Martin Draw. It is 0.5mi (1.1km) west of Red Creek in western Clay Basin. The site consists of a broad-stemmed triangular Pinto atlatl point. Cultural affiliation is Archaic.

42Da94 is an open campsite, .13mi (0.3km) south of Margin Draw and 0.5mi (1.1km) west of Red Creek in western Clay Basin. The site consists of a scatter of lithic flakes and several groundstone fragments. No depth is apparent. Cultural affiliation is unknown.



Fig. 7. Site 42Da89, Hearth Area.

48Sw801 is an open campsite west of and overlooking Red Creek at the north end of Richards Gap. The site consists of a scatter of lithic flakes, a small side-notched point recovered by a local resident, a hammerstone, and several groundstone fragments. A hearth area with fire-cracked rock was identified. The site may have limited depth. The cultural affiliation is Post-Archaic.

Two additional sites were recorded by Charles Love of the College of Western Wyoming (site reports on file, Antiquities Section):

42Da71 is an open lithic/campsite 1mi (2.2km) north of Clay Basin Creek and .75mi (1.6km) east of Red Creek in west-central Clay Basin. The site consists of a sparse scatter of worked and unworked lithic flakes and a biface. No depth is apparent. Cultural affiliation is unknown.

42Da72 is on a steep slope 0.5mi (1.1km) north of Clay Basin Creek and 2mi (4.4km) east of Red Creek in central Clay Basin. The site consists of several poorly preserved fire-hearths with fire-cracked rock and a lithic flake. No depth is apparent. Cultural affiliation is unknown.

In addition to the recorded sites, a thin veneer of flakes (including several exhibiting retouch), two small bifaces and a small core (all isolated finds) were observed scattered over a distance of 1mi (2.2km) along the top of an east-west trending ridge in north-central Clay Basin. Sites on the ridge would have been scattered and destroyed with the building of the airstrip and roadway. Occasional flakes were also found along the entire base of the Tepee Mountains in the northeastern part of the basin and also on the slope to the south and above Clay Basin Creek. The materials were not found in sufficient concentrations or quantities to warrant the status of archeological sites. A large lithic scatter is apparently located along the Utah-Wyoming boundary immediately east of Red Creek, just south of Richards Gap (Jerry Huff, 1977 personal communication). The site lies north of the survey area and remains unreported.

In general, sites tend to be located on benches and terraces overlooking the two stream channels. They were also concentrated near the springs and at the two principal access routes to the basin. The largest sites, which contain hearths and extensive midden components suggesting long term occupations, were at the base of the Richards Mountains. This area affords the best protection from advancing Pacific winter storms, which are derived from the northwest and track southward during normal years.

ARTIFACTS

The sample of 55 artifacts was obtained from several of the sites identified during the Clay Basin survey (see Table I). The total does not include the few obsidian flake samples collected for x-ray fluorescence analysis in 1980. A variety of artifacts are represented including points, drills, bifaces, unifaces, a utilized flake, unworked flakes, a large crescentic flake, cores, a pottery sherd, and a stone vessel fragment. These are morphologically classified according to various attributes such as configuration, size, material, and manner of workmanship (Table II). The lithic materials used in manufacture include several grades of chert/chalcedony, obsidian, quartzite, and silicified limestone. Quartzite is the only material present in abundance. Red Creek quartzite, a principal component south of the Uinta fault, was observed on more than half of the sites. Most of the remaining materials were presumably imported. Non-destructive energy dispersive x-ray fluorescence analysis was conducted on six obsidian flakes collected from adjacent sites, 42Da89 and 42Da90. The analysis indicates that the natural source of the imported stone was either the Wright Creek source near Malad, south central Idaho or the Teton Pass - Fish Creek locality near Jackson, west-central Wyoming (L. Sappington 1980, personal communication).

Points

TYPE I

No. of Specimens: 1 (Fig. 8,a)

Description: The specimen is a small triangular side and basal-notched point with excurvate edges. The three notches are bifacial. The basal edges are straight and slightly more narrow than the body. The specimen is lenticular in cross section, although it is almost plano-convex toward the tip. The dorsal face shows collateral flaking which has produced a medial ridge more pronounced at the mid-section. Both faces show random flaking. The opaque chalcedony from which the point was made may have been heat-treated (see Crabtree and Butler 1964).

Provenience: 42Da89

Comparable Types: Jennings 1957, Fig. 100a, W30; Aikens 1970, "Desert Side-notched", Fig. 18c; Frison 1971, Fig. 6j; Berry and Berry 1976, Fig. 14b; Breternitz 1965, Type 4D, Fig. 25; Most similar to Bliss 1950, Level V, Fig. 58.

TYPE II

No. of Specimens: 1 fragmentary

Description: The specimen is a small triangular side-notched point with excurvate edges and missing base. The specimen is made on a curved flake, and it is plano-convex in cross section. The dorsal face has been randomly flaked leaving a medial ridge in which a thinning flake has been removed toward the base. Bifacial secondary retouch is present along the edges. The side-notches are bifacial.

Provenience: 42Da90

Comparable Types: Two fragmentary for comparison.

TABLE I PROVENIENCE OF CLAY BASIN ARTIFACTS

	POINTS	Type I	Type II	Type III	Type IV	Type V	Type VI	Type VII	Type VIII	Type IX	Type X	DRILLS	Type I	Type II	BIFACES	Type I	Type II	Type III	UNIFACES	UTILIZED FLAKE	UNWORKED FLAKE	CRESCENTIC FLAKE	POTTERY	SEALITE VESSEL FRAG.	UNWORKED BONE	TOTALS
42Da74																1	2	5							8	
42Da78																										
42Da79																										
42Da80																										
42Da81									1						1										2	
42Da82																1									1	
42Da83									2																3	
42Da84																										
42Da85									1																1	
42Da86																						1			1	
42Da87													1	1											6	
42Da89	1																			1	2	1		5	14	
42Da90									1																18	
42Da91		1																								
42Da92																										
42Da93																									1	
42Da94																										
48Sw801																										
TOTALS	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1	2	5	1	7	1	2	1	1	19	55	

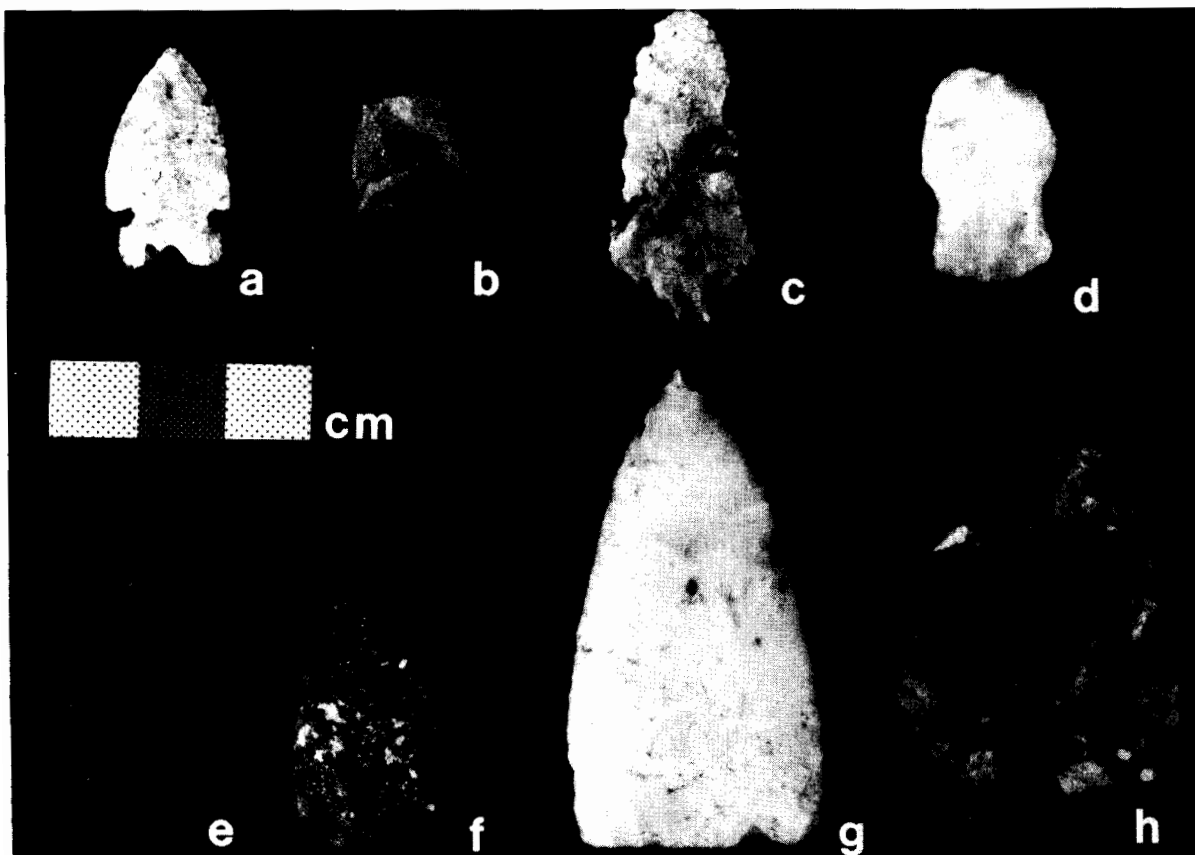


Fig. 8. Projectile Points: Type I (a), Type III (b), Type IV (c), Type V (d), Type VI (e), Type VII (f), Type VIII (g), Type X (h).

Table II

ARTIFACT MEASUREMENTS AND MATERIALS
(Measurements in cms. and gms.)

		Length	Width	Thickness	Weight	Material
Points:						
Type I	(Fig. 8a)	2.6	1.5	0.4	1.17	Opaque chalcedony
Type II		1.6	1.25	0.4	0.41	Obsidian
Type III	(8b)	1.6	1.5	0.25	0.57	Tannish, gray quartzite
Type IV	(8c)	3.6	1.8	0.35	1.68	Tan chert
Type V	(8d)	2.5	1.65	0.55	2.21	Semitranslucent chalcedony
Type VI	(8e)	3.2	2.45	0.5	3.37	Dark brown flint
Type VII	(8f)	3.6	1.8	0.4	1.91	Brown flint
Type VIII	(8g)	5.55	3.0	0.7	10.25	Semitranslucent chalcedony
Type IX		--	1.85	0.7	--	Red quartzite
		--	1.2	0.3	--	Opaque chalcedony
		--	1.6	0.75	--	Tannish quartzite
Type X	(8h)	4.7	3.2	1.5	20.25	Reddish brown chert
Drills:						
Type I	(Fig. 9a)	2.9	2.4	0.4	2.55	Semitranslucent reddish chert
Type II	(9b)	2.55	1.6	0.45	1.18	Black flint
Bifaces:						
Type I	(9c)	--	3.9	1.05	--	White-pink chalcedony coarse-grained quartzite
Type II	(9d)	12.0	8.3	3.9	300.5	Tan
Type III	(9e)	10.65	5.2	1.7	81.2	Red quartzite
		7.35	5.5	1.6	70.5	Red quartzite
Unifaces:						
	(9f)	5.6	3.9	1.85	35.86	Fine-grained white-pink quartzite
	(9g)	4.9	3.7	0.9	14.54	Red quartzite
	(9h)	3.4	2.1	0.8	7.75	Silicified limestone
		5.2	4.0	0.7	15.39	Red quartzite
		3.7	3.5	1.1	10.42	Gray quartzite
Utilized flake:						
	(Fig. 10a)	3.3	2.5	0.5	3.93	Semitranslucent brown chert
Crescentic flake:						
	(10b)	6.6	2.5	1.8	18.92	Opaque chalcedony
Cores						
	(10c)	9.2	6.3	3.1	166.0	Red quartzite
		6.5	4.8	1.9	53.20	Red quartzite
Pottery	(10d)	--	--	1.3	--	Tan clay with sand temper
Stone vessel fragment	(10e)	--	--	0.9	--	Steatite

TYPE III

No. of Specimens: 1 fragmentary (Fig. 8,b)

Description: The specimen is a small unfinished triangular side-notched point with straight to excurvate edges and straight to concave, expanding base. The approximate upper half is missing. The point is made on a curved flake, and it is plano-convex in cross section. The dorsal face shows oblique transverse parallel flaking. The shallow notches are unifacial. The base is unretouched.

Provenience: 42Da89

Comparable Types: Frison 1971, Fig. 600; Sharrock 1966, Fig. 45c.

TYPE IV

No. of Specimens: 1 (Fig. 8,c.)

Description: The specimen is an elongate triangular corner-notched point with expanding stem, concave base, and worked blunt (rounded) tip. The tangs are fragmentary. It is lenticular in cross section. The edges are straight overall but irregular (almost serrated). One face shows some parallel collateral flaking which has produced a slight medial ridge. Random flaking is present on both faces. The specimen is bifacially notched. The base is bifacially thinned; the blunt tip is thinned and rounded.

Provenience: 42Da83

Comparable Types: Jennings 1957, W37; Aikens 1970, "Rose Spring Corner-notched", Fig. 18g-i; Lanning 1963, Plate 7c; Frison 1971, Fig. 6yy; Sharrock 1966, Fig. 41b, c, from Pine Spring Occupation 3; Leach 1967, Type 4a, Fig. 6b.

TYPE V

No. of Specimens: 1 (Fig. 8,d)

Description: The specimen is a small unfinished stemmed, triangular point with expanding stem and convex base. The shoulders are weak. The edges are excurvate; the tip is blunt and rounded. It is made on a curved flake with random flaking present on both faces. The point is lenticular in cross section, and it is relatively thick in proportion to length, particularly toward the tip. The base has been bifacially thinned.

Provenience: 42Da89

Comparable Types: Similar to Aikens 1970, "Pinto Sloping Shoulder", but with convex base, Fig. 21g.

TYPE VI

No. of Specimens: 1 (Fig. 8,e)

Description: The specimen is a broad stemmed, triangular point with excurvate edges and pronounced shoulders. The stem is slightly longer than half the length of the point. The specimen is made on a curved flake, and it is lenticular in cross section. The base and stem have been thinned by the removal of large, lateral flakes. Both faces show random flaking while the edges show parallel retouch.

Provenience: 42Da93

Comparable Types: Similar to Aikens 1970, "residual side-notched", Fig. 22d; Berry and Berry 1976, Type XXIIg, Fig. 12; Bliss 1950, Level II, Fig. 28; cf.,. Amsden 1935; Wormington 1957, Fig. 55; Breternitz 1965, Type 2B, Fig. 1,k,l; Leach 1967, Type 2i, Fig. 4m; Mulloy 1954, "McKean Points", Fig. 4; Sharrock 1966, TB-5, but without bifurcated base, Fig. 38.

TYPE VII

No. of Specimens: 1 (Fig. 8,f)

Description: The specimen is an elongate triangular point with excurvate edges and convex base. It is made on a curved flake. The specimen is lenticular in cross section. The random removal of flakes on one face has produced a slight medial ridge. Parallel pressure retouch is present along one edge on the face opposite the medial ridge.

Provenience: 42Da87

Comparable Types: Similar to Sharrock 1966, Fig. 47z; Bliss 1950, Level IV.

TYPE VIII

No. of Specimens: 1 (Fig. 8,g)

Descriptions: The specimen is a large elongate triangular to lanceolate point with excurvate edges and straight base. A shallow notch is present in the base about one-quarter of the distance toward one corner. The notch, which is bifacial, is apparently deliberate. The specimen is lenticular in cross section. It shows fine, well controlled parallel, collateral flaking on both faces along the edges and base. Lengths of the parallel flake scars vary from about one-third to one-half the maximum width of the point.

Provenience: 42Da85

Comparable Types: Jennings 1957, from Shaw Cave, Fig. 11-Bii; similar in outline to Aikens 1970, Fig. 27c; Sharrock 1966, from Pine Spring Occupation 2, Fig. 35e; Breternitz 1965, Type 2A, Fig. 1c; similar to Leach 1967, Type 1a but more elongate, Fig. 3a; cf., Wormington 1957, "Agate Basin", Fig. 46.

TYPE IX

No. of Specimens: 3 fragmentary

Description: Specimens are fragments (two tips and one mid-section) of elongate triangular points. One tip has been thinned by random and parallel flaking. The edges are straight to slightly excurvate. It is lenticular in cross section. The chalcedony from which it was derived may have been heat-treated (Crabtree and Butler 1964). The remaining fragments, also lenticular in cross section, are particularly thick in relation to width. One is made on a curved flake, and each shows random flaking along the edges of both faces. The tip fragment has a pronounced medial ridge along the dorsal face.

Provenience: 42Da83 (2), 42Da89

Comparable Types: Too fragmentary for comparison.

TYPE X

No. of Specimens: 1 fragmentary (Fig. 8,h)

Description: The specimen is a large unfinished, ovoid to triangular preformed point. Large flakes have been randomly removed for initial shaping. It is lenticular in cross section. The base is missing. No pressure flaking is evident.

Provenience: 42Da81

Comparable Types: Jennings 1957, W-45, Fig. 115a; Aikens 1970, Fig. 28h; Day and Dibble 1963, Fig. 5x,y; Sharrock 1966, "Stage 3 blank", Fig. 29; Dibble and Day 1962, Fig. 6k; Fowler, Madsen, and Hattori 1973, Fig. 13, i,j.

Drills

TYPE I

No. of Specimens: 1 (Fig. 9,a)

Description: The specimen is a drill with symmetrical, square to rounded body and missing tip. It is particularly thin in proportion to width. The edges of the body are straight to slightly excurvate. The base is rounded. The specimen is made on a curved flake. The body is plano-convex in cross section, but it is lenticular toward the tip. Secondary retouch is present along the edges of the body.

Provenience: 42Da87:

Comparable Types: Frison 1971, Fig. 5a; similar to Fowler, Madsen, and Hattori 1973, Fig. 27r.

TYPE II

No. of Specimens: 1 (Fig. 9,b)

Description: The specimen is a small "tear-drop" shaped drill with symmetrical, rounded body and base. The tip is missing. The edges are straight to slightly incurvate above the body. The specimen is made on a curved flake. It is lenticular (almost plano-convex) in cross section. The random removal of secondary flakes along the edges has produced a medial ridge on the dorsal face. This is more pronounced at the mid-section.

Provenience: 42Da87

Comparable Types: None precisely comparable.

Bifaces

TYPE I

No. of Specimens: 1 fragmentary (Fig. 9,c)

Descriptions: The specimen is the basal fragment of an unfinished biface. It is lenticular in cross section. The specimen has been thinned by the random removal of large flakes. Only one edge shows secondary retouch.

Provenience: 42Da81

Comparable Types: Possibly similar to Jennings 1957, W-48, Fig. 118a; Aikens 1970, Fig. 28e; Sharrock 1966, Fig. 35h.

TYPE II

No. of Specimens: 1 (Fig. 9,d)

Description: The specimen is a large ovoid biface (in outline). Large random percussion flakes have been bifacially removed from around the entire circumference. It is lenticular in cross section. Small unifacial flakes have been removed along a ca. 2cm section on one edge. This may be the result of use.

Provenience: 42Da82

Comparable Types: Jennings 1957, W-51, Fig. 121a; Aikens 1970, Fig. 31a,b; Day and Dibble 1963, Fig. 8L; Sharrock 1966, "Stage 2 blank", Fig. 25.

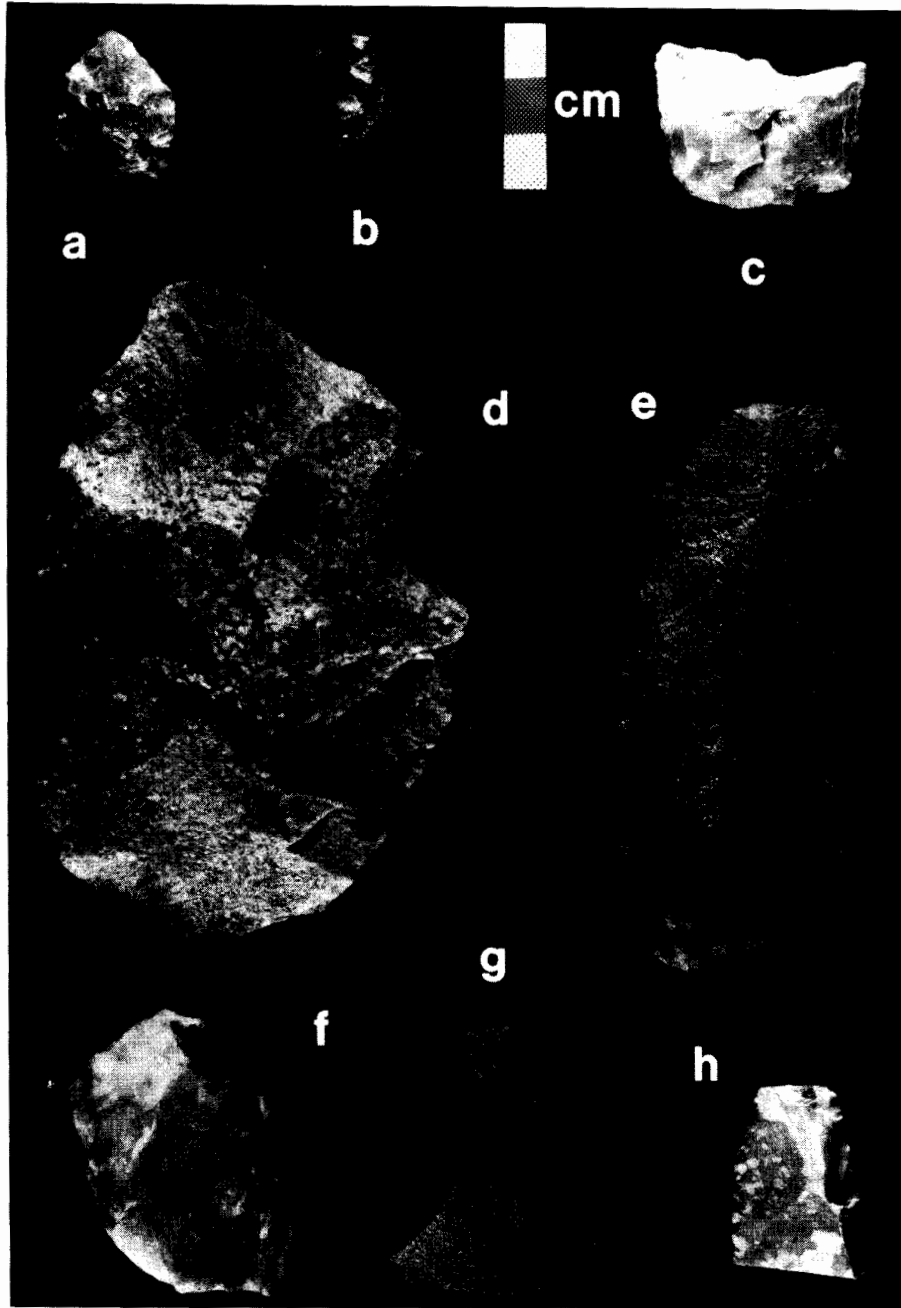


Fig. 9. Drills: Type I (a), Type II (b); Bifaces: Type I (c), Type II (d), Type III (e); Unifaces: (f-h).

TYPE III

No. of Specimens: 2 (Fig. 9,e)

Description: Specimens are large bifacially worked flakes of amorphous shapes. Bulbs of force are present on both specimens. Percussion flakes have been randomly removed along one edge of each specimen. The larger of the two (Fig. 10,e), shows steep unifacial retouch along the edge opposite that which has been bifacially worked and at the distal end. This may be the result of use.

Provenience: 42Da74, 42Da87

Unifaces

No. of Specimens: 5 (Fig. 9,f-h)

Description: Specimens are coarse flakes of amorphous shapes in which small secondary pressure flakes have been removed along one edge. The edge on one specimen (Fig. 10,f) shows possible use.

Provenience: 42Da87 (2), 42Da74 (2), 42Da90

Utilized Flake

No. of Specimens: 1 (Fig. 10,a)

Description: The specimen is a small triangular flake. Secondary retouch is present along the rounded edge which also shows wear cross-cutting the small flake scars.

Provenience: 42Da89

Unworked Flakes

No. of Specimens: 7 collected

Description: Specimens are unworked flakes of various amorphous shapes and sizes. Two of these are large decortification flakes. The remainder appear to be smaller thinning flakes derived from intermediate stages of manufacture.

Materials: Silicified limestone (1); siltstone (2); chalcedony (1); flint (1); obsidian (2).

Provenience: 42Da74 (5); 42Da89 (2)

Crescentic Flake

No. of Specimens: 1 (Fig. 10,b)

Description: The specimen is a large crescent-shaped prismatic flake. No secondary flakes have been removed although some minute scars on one face along the concave edge may indicate minimal use. The chalcedony from which the flake was derived may have been heat-treated (Crabtree and Butler 1964).

Provenience: 42Da89

Comparable Types: Jennings 1967, Fig. 156; Day and Dibble 1963, Fig. 7d.

Cores

No. of Specimens: 2 (Fig. 10,c)

Description: Specimens are prepared cores in which large percussion flakes have been removed from one face (striking platform) around the

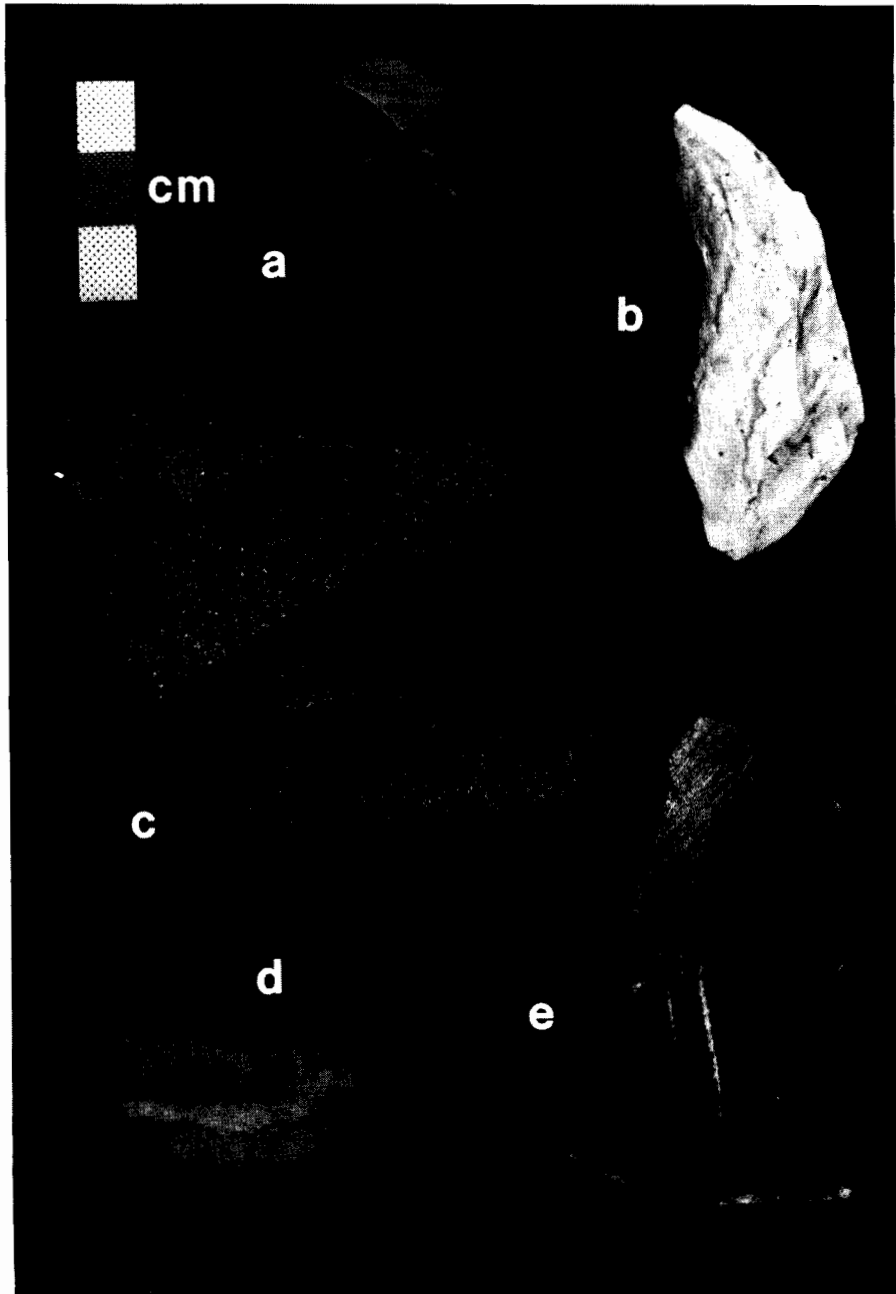


Fig. 10. Utilized Flake: (a); Crescentic Flake (b); Core (c);
Fingernail Impressed Paiute-Shoshoni Pottery (d); Steatite Vessel
Fragment (e).

entire circumference. The smaller of the two, nearly triangular in outline, is "spent".

Provenience: 42Da90, 42Da86

Comparable Types: Day and Dibble 1963, Fig. 80.

Pottery

No. of Specimens: 1 fragmentary (Fig. 10,d)

Description: The specimen is a small tan pottery sherd predominantly with fine quartz sand and a few coarse basalt tempering particles. The sherd appears to be a body sherd derived from just below the rim (see Summary and Discussion). Parallel, vertical fingernail impressions are present on the exterior. The ease with which the sherd is broken, the apparently high porosity, and homogeneity of color through its cross section, suggest it was fired at a very low temperature.

Provenience: 42Da89

Comparable Types: Cf., Rudy 1953, (Fig. 58a); Mulloy 1958; Dibble and Day 1962; Frison 1971.

Stone Vessel

No. of Specimens: 1 fragment (Fig. 10,e)

Description: The specimen is a stone fragment. Heavy parallel striations are present on the interior. Fine parallel striations are present on the exterior. Three "fresh" scratches are present on the smoke-blackened exterior exposing the stone. These cross-cut the striations made during the original manufacture.

Provenience: 442Da90

Comparable Types: Dibble and Day 1962, Fig. 5f; Day and Dibble 1963; Lindsay 1976, Figs. 2 and 3; Bliss 1950, Level V; cf., Wedel 1954.

Summary and Discussion

The artifact collection provides an estimate of the temporal range and sequence of aboriginal occupations in Clay Basin. These estimates are based on typological cross-dating -- a "best guess" in the absence of excavation and direct dating.

Type VIII points are found both in the Great Basin (Aikens 1970) and on the Plains (Jennings 1957b) where they cover the full spectrum of cultural development. This specimen a specialized type (symmetrical, finely made, parallel-collateral flaked) -- is reminiscent of Agate Basin types (Wheeler 1954; Roberts 1962; Wormington 1957). It also compares favorably with several from Pine Spring Occupation 2 (Sharrock 1966:53), which has been radiocarbon dated at 3635 + 80 B.P. The question of Plano or Archaic affiliation is problematic as Pine Spring Occupation 2 includes both technologies, and may be transitional. Sharrock indicates, however, the 3500 B.P. date is far too recent for Agate Basin types, which are dated 9500 B.P. on the Plains (Irwin 1971). The date also falls short of the established Plano range of ca. 10,500 to 5500 B.P. (Irwin 1971). Since "...(occupation 2 at Pine Spring) may have consisted of several undifferentiated occupations" (Sharrock 1966:25) the association between the dated material and Agate Basin points may be spurious. The Clay Basin specimen could have come from an earlier Plano occupation or it may be of legitimate Archaic manufacture deposited during mid- to late-Archaic times.

Type VI (and possibly Type V) points are similar to both Pinto (Amsden 1935) and McKean points (Mulloy 1954) of the Great Basin and Plains, respectively. However, the convex bases of these specimens differentiate them, to some degree, from the Basin and Plains types. Pinto point dates range from at least ca. 9500 B.P. (Jennings 1957) to 3000 B.P. (Clewlow 1967). The suggested temporal range for McKean points (Berry and Berry 1976) is somewhat more restricted (ca. 5000 - 3500 B.P.) but regardless of the complex, these specimens are probably products of Archaic technology. The 3500 B.P. dates associated with McKean points from Pine Spring Occupation 2 (Sharrock 1966) and Deluge Shelter (Leach 1967, 1970) provide a terminal date for the suggested range and the Clay Basin specimen(s) may be of a similar age.

Point Types IV (corner-notched) and I through III (side-notched) appear by about 1450 B.P. (Wedel 1961) and 650 B.P. (Kehoe 1966), respectively, on the Plains. They are similarly dated (1350 to 650 B.P.) and (650 B.P. to historic) in the western Great Basin (Hester 1973).

The apparent sequence of corner-notched to side-notched points on the Plains is not evident on the northern Colorado Plateau where current records show them to be contemporaneous (Berry and Berry 1976). They also appear together in the archeological record of the eastern Great Basin at ca. 1000 B.P. (Madsen and Lindsay 1977). Their co-occurrence at adjacent Clay Basin sites 42Da83, 42Da89, and 42Da90 is consistent with the Basin and Plateau pattern.

Corner- and side-notched arrow points occur in both Fremont and Paiute-Shoshoni contexts; however, the Desert side-notched point (Aikens 1970) is dated after 650 B.P. (Baumhoff and Byrne 1959). This more recent date for the appearance of the Desert side-notched point type, though contrary to Aikens' estimates, appears to be the more acceptable

one (Madsen and Berry 1975), placing its appearance in Clay Basin with the Paiute-Shoshoni.

The remaining lithics -- point types (excepting VII), drills, bifaces, and unifaces -- are found in a variety of contexts and are essentially nondiagnostic. Type VII is an arrowpoint, and is indicative of either Fremont or Paiute-Shoshoni occupation (cf. Madsen and Berry 1975). The crescentic flake is probably a spall derived from stone fractured during heat treatment, although it shows little use. It does not in any way resemble the crescentic implements of considerable antiquity from Borax Lake (Harrington 1948) and the Northwest (Daugherty 1956) except in general outline, nor is there any secondary flaking.

The relative abundance of coarse tools and cores serves to demonstrate both the availability of Red Creek quartzite and a general focus on hunting activities as a primary feature of subsistence in Clay Basin. The occurrence of obsidian likely imported from the Teton Pass - *Asselin* Fish Creek source near Jackson, Wyoming (L. Sappington 1980, personal communication), confirms the wide-ranging occupation pattern of the Paiute-Shoshoni in the region.

The fingernail-impressed pottery sherd, judging from all attributes, is Paiute-Shoshoni (Rudy 1953; Coale 1963). The type is noted for a wide range of tempering material, although fine to medium quartz sand is common, as is finger-nail impressed decoration. Fremont pottery, predominately calcite tempered Uinta Gray, has been identified along the Green River (Sharrock 1966; site reports on file); however the sherd from 42Da89 does not conform to known Fremont types (D. Madsen 1970; R. Madsen 1977), and is more likely Paiute-Shoshoni. This identification is supported by the presence of the Desert side-notched arrow point (Type I) at the site (Holmer and Weder 1980).

Steatite vessels are widely distributed throughout southwestern Wyoming (Wedel 1954), and have also been recovered from northeastern Utah (Lindsay 1976). They are also reported in use by the Paiute-Shoshoni on the Snake River in southeastern Idaho during ethnographic times (Wedel 1954). The vessels are probably derived from the Wind River Range to the north, and are a product of Paiute-Shoshoni occupation (Wedel 1954) post-dating 750 to 650 B.P. (Madsen 1975).

Taken together, the side-notched points (more particularly the Desert side-notched), fingernail impressed pottery, and the steatite vessel are good evidence of Paiute-Shoshoni occupation of the basin. The Pinto/McKean point(s) indicate an Archaic substratum. The Plano identification is more tentative although most certainly plausible considering the well documented presence of this Paleo-Indian component in the Upper Green River drainage.

FAUNAL REMAINS

Faunal bone material representing at least two species was identified on the surface of sites 42Da89 and 42Da90. Small samples were collected for analysis in the laboratory. Because all were extremely burned and fragmented, only four samples could be tentatively identified.

SAMPLE 1

Description: These specimens were fragments of the outer enamel layer of three small teeth. The fragments, definitely not deer, were probably derived from antelope (Antilocapra americana).

Provenience: 42Da89

SAMPLE 2

Description: The specimen is an extremely burned, articulated fragment of a long bone. It is either elk or young bison.

Provenience: 42Da90

SAMPLE 3

Description: The specimen is a burned, right astragalus from an antelope or possibly a young deer.

Provenience: 42Da90

SAMPLE 4

Description: The specimen is a burned distal phalange, possibly an elk or bison.

Provenience: 42Da90

The remaining 12 fragments include two from 42Da89 and 10 from 42Da90. These are too badly burned and fragmented to allow identification. Most of the bone was found in two badly eroded hearths that were essentially beds of fire-cracked rock without charcoal or ash. The teeth fragments came from a midden deposit located near the center of 42Da89, the largest site identified in the basin.

The tentative identification of antelope are probably reliable; there is a large year-around population resident today. Antelope have also been recovered from a number of excavated archeological sites including Archaic, Fremont, and Paiute-Shoshoni contexts in the northern Great Basin (Jennings 1957; Aikens 1970), Fremont in the Uinta Basin (Ambler 1966), Paiute-Shoshoni in the Upper Green River (Frison 1971), and Wind River Basins (Bliss 1950). Deer were also found at most of these sites particularly from the Paiute-Shoshoni levels but in smaller proportions.

Deer are, of course, plentiful today throughout the region, though they may have been less abundant during aboriginal times (Barnes 1922). However, Dalley (1970) in a review of the proportions of faunal remains from Fremont sites shows that deer were however, hunted extensively throughout the region. This may also have been the case in Clay Basin. The question of elk or bison is unresolved. Elk are today present in fairly large numbers in the surrounding mountains, and buffalo were in the area during aboriginal times (Dale 1918; Barnes 1922). Buffalo were hunted by the Paiute-Shoshoni of the northern Great Basin (Frison 1971, 1973). Elk remains are less abundant except for the large number recovered from Fremont sites in the northern Great Basin (Aikens 1966, 1967).

SURVEY SUMMARY AND DISCUSSION

The archeological sites identified in Clay Basin are predominantly lithic scatters with several sites containing fire hearths, vessel fragments, and/or groundstone indicating encampment. The recovery of Paiute-Shoshoni pottery, a steatite vessel fragment from the Wind River Range, and imported obsidian from a distant southwestern Wyoming source, indicates basin occupation by these Numic speakers. The failure to identify Fremont pottery may suggest that a number of the sites of unknown cultural affiliation are also Paiute-Shoshoni.

Projectile points typologically similar to Plano and Archaic types tentatively place these cultural developments in Clay Basin as well, though the points could be artifact survivals collected elsewhere by the Paiute-Shoshoni and redeposited in the basin. If the Plano and Archaic points did originate here, basin occupation could range from ca. 10,500 B.P. to historic times. Without the support of data from excavated sites, however, temporal placement is highly conjectural. I am more inclined to consider the isolated find from site 42Da85 contemporaneous with those of the Pine Spring Site (Sharrock 1966), thus placing the Archaic occupation of Clay Basin at around 3500 B.P. ← The isolated point from site 42Da93 tends to support the more recent date. (1550 BC)

The absence of Fremont pottery is perplexing. There are Fremont sites along the Green River and pottery is abundant at numerous small Fremont encampments throughout the region. However, there is no doubt that the northeasternmost limits of Fremont penetration lie somewhere north and east of the Green River and, quite possibly may fall short of Clay Basin. Also, it may be that the basin for any number of reasons, such as saline soils, limited rainfall or an irregular growing season, was not suitable for agriculture. The limited number of economic plant types there may have also been a factor.

Such is not the case for the Paiute-Shoshoni. Clay Basin would have been an ideal location for cultures predominantly adapted to hunting for several reasons:

- 1) It is well known, present-day, winter foraging area for a variety of mammalian species including antelope (Fig. 11), deer (Fig. 12), and elk.
- 2) It is fairly circumscribed by surrounding mountains, permitting communal drives and entrapment.
- 3) The terraces overlooking Red Creek would have afforded excellent vantage for hunting along the creek.
- 4) The limited number of water sources would have resulted in concentrations of wild game at these few locations.

The concentration of basin sites, including the larger 42Da89 and 42Da90, at the base of the Richards Mountains supports the notion of winter hunting encampments; this is the optimal location for protection from predominantly winter Pacific storms.

In sum, the settlement pattern, lithics, limited groundstone, faunal material, present migratory patterns and ethnohistoric evidence, suggest that most of the Clay Basin sites are Paiute-Shoshoni winter hunting encampments or related special use sites postdating 650 B.P. Evidence of earlier groups, including Plano and Archaic, remains inconclusive. The question of the northeastern boundary of the Fremont use requires additional research in the region east of the Green River.

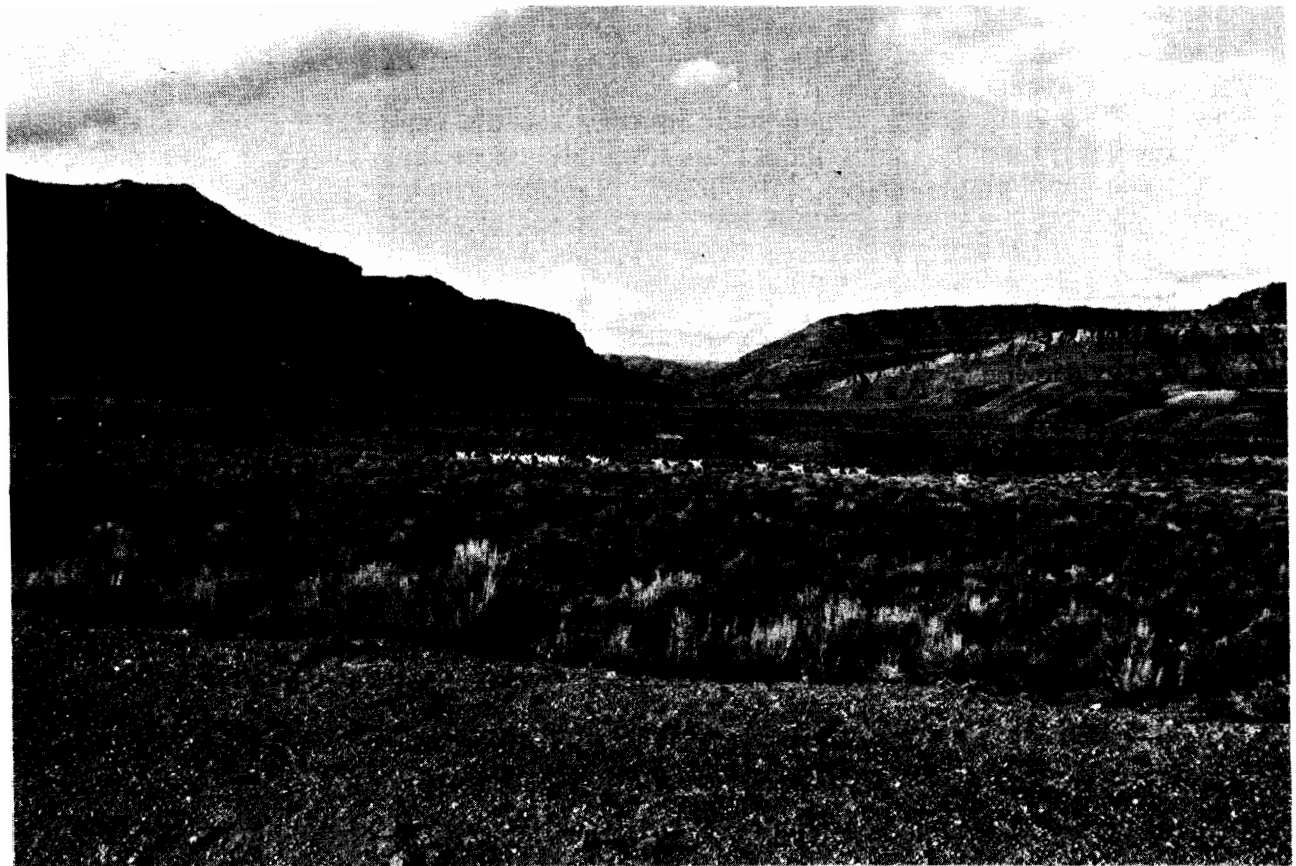


Fig. 11. Antelope in Mouth of Martin Draw (looking north).



Fig. 12. Deer Herd in Richards Gap.

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APPENDIX I

CLAY BASIN FLORA

(From a General Plant List, Goslin Mountain Allotment -
Clay Basin Area, Bureau of Land Management, Vernal District;
Common Names from Arnow 1971, Rydberg 1954, and
Gleason and Cronquist 1963)

Trees and Shrubs

<u>Abies lasiocarpa</u>	Subalpine Fire
<u>Amelanchier alnifolia</u>	Saskatoon Serviceberry
<u>Artemisia frigida</u>	Silver Sagebrush
<u>A. nova</u>	Little Sagebrush
<u>A. spinescens</u>	Bud Sagebrush
<u>A. tridentata</u>	Big Sagebrush
<u>Atriplex canescens</u>	4-wing Saltbush
<u>A. confertifolia</u>	Shad-scale
<u>A. nuttallii</u>	Saltbush
<u>Berberis repens</u>	Creeping Barberry
<u>Cercocarpus ledifolius</u>	Curly-leaf Mahogany
<u>C. montanus</u>	Mountain Mahogany
<u>Chrysothamnus nauseosus</u>	Rubber Rabbitbrush
<u>C. viscidiflorus</u>	Rabbitbrush, False Goldenrod
<u>Eurotia lanata</u>	White Sage
<u>Gutierrezia sarothrae</u>	Snakeweed
<u>Juniperus osteosperma</u>	Little Utah Juniper
<u>Pinus edulis</u>	Pinyon
<u>Populus tremuloides</u>	Quaking aspen
<u>Prunus virginiana</u>	Chokecherry
<u>Purshia tridentata</u>	Antelope Bitterbrush
<u>Ribes spp.</u>	Current
<u>Sarcobatus vermiculatus</u>	Greasewood
<u>Tetradymia canescens</u>	Horsebrush

Grasses

<u>Agropyron cristatum</u>	Crested Wheat-grass
<u>A. smithii</u>	Western Wheat-grass
<u>A. spicatum</u>	Bluebunch Wheat-grass
<u>Bromus inermis</u>	Smooth Brome
<u>B. tectorum</u>	Cheat-grass
<u>Elymus cinereus</u>	Wild Rye
<u>Hordeum jubatum</u>	Foxtail
<u>Koeleria cristata</u>	June Grass
<u>Melica bulbosa</u>	Onion-grass
<u>Oryzopsis hymenoides</u>	Indian Rice-grass
<u>Poa ampla</u>	Blue-grass
<u>P. fendleriana</u>	Mutton-grass
<u>P. sandbergii</u>	Sandberg Bluegrass

Grasses

Sitanion hystrix
Sporobolus cryptandrus
Stipa comata
S. lettermanii

Squirreltail
Sand Dropseed
Needle-and-thread
Letterman Needle-grass

Rushes and Sedges

Carex spp.
Juncus spp.

Sedge
Rush

Forbs

Achillea lanulosa
Allium spp.
Artemisia ludoviciana
Aster
Astragalus spp.
Balsamorhiza sagittata
Bassia hyssopifolia
Calochortus nuttallii
Castilleja spp.
Cirsium arvense
Cryptantha spp.
Erigeron spp.
Eriogonum spp.
Gilia spp.
Lupinus spp.
Oenothera caespitosa
Pentstemon spp.
Opuntia spp.
Phlox spp.
Plantago spp.
Salsola kali
Sedum stenopetalum
Sphaeralcea grossulariaefolia
Taraxacum officinale

Yarrow
Onion
Louisiana Sagebrush
Aster
Locoweed
Balsam-root

Sego Lily
Indian Paint-brush
Canada Thistle

Fleabane
Wild Buckwheat

Lupine
Tufted Evening Primrose
Beard-tongue
Prickly pear
Wild Sweet William
Plantain
Russian thistle
Stonecrop
Globe Mallow
Common Dandelion

APPENDIX II

FAUNA AND AVIFAUNA OF NORTHEASTERN UTAH (from Mammals of the Vernal District, Bureau of Land Management; and Checklist of the Birds of the Vernal District)

Shrews (Insectivora)

Merriam shrew (Sorex merriami)
Vagrant shrew (Sorex vagrans)
Northern water shrew (Sorex palustris)

Bats (Chiroptera)

Little brown myotis (Myotis lucifugus)
Long-eared myotis (Myotis evotis)
California myotis (Myotis californicus)
Silver-haired bat (Lasionycteris noctivagans)
Western pipistrel (Pipistrellus hesperus)
Big brown bat (Eptesicus fuscus)
Spotted bat (Euderma maculatum)
Pallid bat (Antrozous pallidus)
Mexican free-tailed bat (Tadarida mexicana)
Hoary bat (Lasiurus cinereus)

Carnivores (Carnivora)

Black bear (Ursus americanus)
Raccoon (Procyon lotor)
Ring-tailed cat (Bassariscus astutus)
Long-tailed weasel (Mustela frenata)
Black-footed ferret (Mustela nigripes)
Mink (Mustela vison)
Badger (Taxidea taxus)
Spotted skunk (Spilogale putorius)
Striped skunk (Mephitis mephitis)
Coyote (Canis latrans)
Red fox (Vulpes fulva)
Gray fox (Urocyon cinereoargenteus)
Swift fox (Vulpes velox)
Mountain lion (Felis concolor)
Bobcat (Lynx rufus)

Rodents (Rodentia)

Yellow-bellied marmot (Marmota flaviventris)
White-tailed prairie dog (Cynomys leucurus)
Rock squirrel (Citellus variegatus)
Thirteen-lined ground squirrel (Citellus tridecemlineatus)
Golden-mantled ground squirrel (Citellus lateralis)

Rodents (Rodentia)

White-tailed antelope squirrel (Ammospermophilus leucurus)
Least chipmunk (Eutamias minimus)
Cliff chipmunk (Eutamias dorsalis)
Colorado chipmunk (Eutamias quadrivittatus)
Northern pocket gopher (Thomomys talpoides)
Ord's kangaroo rat (Dipodomys ordii)
Great Britain pocket mouse (Perognathus parvus)
Olive-backed pocket mouse (Perognathus fasciatus)
Beaver (Castor canadensis)
Western harvest mouse (Reithrodontomys megaiotis)
Canyon mouse (Peromyscus crinitus)
Deer mouse (Peromyscus maniculatus)
Brush mouse (Peromyscus boylii)
Pinyon mouse (Peromyscus truei)
Northern grasshopper mouse (Onychomys leucogaster)
Desert woodrat (Neotoma lepida)
Bushy-tailed woodrat (Neotoma cinerea)
Mountain vole (Microtus montanus)
Long-tailed vole (Microtus longicaudus)
Sagebrush vole (Lagurus curtatus)
Muskrat (Ondatra zibethicus)
Western jumping mouse (Zapus princeps)
Porcupine (Erethizon dorsatum)

Hares and Rabbits (Lagomorpha)

White-tailed jackrabbit (Lepus townsendii)
Black-tailed jackrabbit (Lepus californicus)
Showshoe hare (Lepus americanus)
Mountain cottontail (Sylvilagus nuttalli)
Desert cottontail (Sylvilagus audubonii)

Even-Toed Hoofed Mammals (Artiodactyla)

Mule deer (Odocoileus hemionus)
Elk (Cervus canadensis)
Prong-horn (Antilocapra americana)
Bighorn sheep (Ovis canadensis)

Birds

Common Loon	Rough-legged Hawk
Eared Grebe	American Widgeon
Western Grebe	Shoveler
Pied-billed Grebe	Redhead
White Pelican	Ring-necked Duck
Double-crested Cormorant	Canvasback
Great Blue Heron	Lesser Scaup
Common Egret	Common Goldeneye
Snowy Egret	Barrow's Goldeneye
Mallard	Bufflehead

Birds

Black Duck	Oldsquaw
Gadwall	Ruddy Duck
Pintail	Common Merganser
Green-winged Teal	Red-breasted Merganser
Blue-winged Teal	Sandhill Crane
Cinnamon Teal	Virginia Rail
Black-crowned Night Heron	
American Bittern	Common Gallinule
White-faced Ibis	American Coot
Whistling Swan	Killdeer
Canada Goose	American Golden Plover
Black Brant	Common Snipe
White-fronted Goose	Long-billed Curlew
Snow Goose	Willet
Blue Goose	Caspian Tern
Turkey Vulture	Band-tailed Pigeon
Goshawk	Golden Eagle
Sharp-shinned Hawk	Bald Eagle
Cooper's Hawk	Marsh Hawk
Red-tailed Hawk	Osprey
Swainson's Hawk	Prarie Falcon
Peregrine Falcon	Purple Martin
Sparrow Hawk	Gray Jay
Sage Grouse	Steller's Jay
California Quail	Scrub Jay
Ring-necked Pheasant	Black-billed Magpie
Chukar	Common Raven
Long-billed Dowitcher	White-throated Swift
Marbled Godwit	Broad-tailed Hummingbird
American Avocet	Rufous Hummingbird
Black-necked Stilt	Belted Kingfisher
Wilson's Phalarope	Red-shafted Flicker
California Gull	Pileated Woodpecker
Ring-billed Gull	Red-headed Woodpecker
Franklin's Gull	Lewis' Woodpecker
Bonaparte's Gull	Yellow-bellied Sapsucker
Common Tern	Williamson's Sapsucker
Spotted Sandpiper	Hairy Woodpecker
Lesser Yellowlegs	Downy Woodpecker
Black Tern	Northern Three-toed Woodpecker
Mourning Dove	Eastern Kingbird
Great Horned Owl	Western Kingbird
Burrowing Owl	Ash-throated Flycatcher
Long-eared Owl	Mountain Chickadee
Poor-will	White-breasted Nuthatch
Common Nighthawk	Red-breasted Nuthatch
Say's Phoebe	Brown Creeper
Traill's Flycatcher	Dipper
Dusky Flycatcher	House Wren
Western Wood Peewee	Cannon Wren
Olive-sided Flycatcher	Rock Wren

Birds

Horned Lark	Common Crow
Violet-green Swallow	Pinon Jay
Tree Swallow	Clark's Nutcracker
Bank Swallow	Black-capped Chickadee
Rough-winged Swallow	Western Bluebird
Barn Swallow	Mountain Bluebird
Cliff Swallow	Townsend's Solitaire
Golden-crowned Kinglet	Slate-colored Junco
Water Pipit	Oregon Junco
Cedar Waxwing	Cassin's Finch
Northern Shrike	House Finch
Loggerhead Shrike	Pine Grosbeak
Starling	Black Rosy Finch
Solitary Vireo	Common Redpoll
Warbling Vireo	Pine Siskin
Orange-crowned Warbler	American Goldfinch
Yellow Warbler	Red Crossbill
Brown-headed Grosbeak	Green-tailed Towhee
Western Tanager	Rufous-sided Towhee
Black-headed Grosbeak	Lark Bunting
Blue Grosbeak	Gray-headed Junco
Lazuli Bunting	Chipping Sparrow
Evening Grosbeak	White-crowned Sparrow
Mockingbird	Fox Sparrow
Catbird	Lincoln's Sparrow
Sage Thrasher	Song Sparrow
Robin	Lapland Longspur
Hermit Thrush	Snow Bunting
Swainson's Thrush	Audubon's Warbler
Townsend's Warbler	MacGillivray's Warbler
Yellowthroat	Yellow-breasted Chat
Wilton's Warbler	American Redstart
House Sparrow	Western Meadowlark
Yellow-headed Blackbird	Red-winged Blackbird
Bullock's Oriole	Brewer's Blackbird
Vesper Sparrow	Lark Sparrow
Sage Sparrow	

THE SITTERUD BUNDLE: A PREHISTORIC CACHE
FROM CENTRAL UTAH

By

Michael P. Benson

Division of Utah State History
Antiquities Section
Salt Lake City, Utah

January, 1980

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The author wishes to express gratitude to Dr. David B. Madsen and the Antiquities Section for help in the preparation of this report. Dr. Madsen initially brought the bundle to the attention of the author. Arrangements were made with Mrs. Anne Whissler, Emery County Museum Director, and Mr. LaVar Sitterud, the owner of the bundle, for a temporary loan; they were both helpful in providing information concerning its location and discovery. In the lab, Alan Spencer helped in the analysis of the perishable goods and Kay Sargent labored diligently to procure the photos. Special thanks goes to Rachel Olschewski who typed the final draft of the report.

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ABSTRACT

A large elk hide bundle, recovered from an overhang near the San Rafael River in Emery County, Utah in 1969, is one of the more valuable archeological finds of the Southwest Plateau, in that it appears to represent a portable subsistence kit. It contained a variety of perishable items, including leather and sinew cordage, a sinew snare, leather leggings (one filled with a large quantity of squawbush berries and leaves), and a palm pad. The kit also held a variety of bone tools used for making chipped stone tools. There were chipped stone implements in the kit such as knives, scrapers, fleshers, and drills, as well as a number of implements in various stages of manufacture. A large (39cm long) bifacial knife stained with ocher -- the largest stone tool of the bundle -- is very unusual in the Southwest Plateau. Two artifacts were made from obsidian that originated in the Mineral Mountains and Black Rock areas of west central Utah. Leather in the kit was radiocarbon dated to 650±50 B.P.; and it was probably manufactured and used by a Numic speaking group inhabiting the Castle Valley area after the Fremont abandonment.

INTRODUCTION

In October, 1979, a bundle containing a number of prehistoric artifacts was brought to my attention by David B. Madsen. Our mutual interest stemmed from the likelihood it contained a tool kit for the manufacture of flaked stone implements. The bundle was first found by LaVar Sitterud who donated it to the Emery County Museum, where Dr. Madsen noticed it. In October 1979, I visited the museum and made arrangements with Museum Director, Ann Whissler, and Mr. Sitterud for a temporary loan of the bundle to the Antiquities Section, Division of Utah State History. At that time, Mr. Sitterud also showed me the spot where the bundle was found and described its discovery and original condition.

According to Mr. Sitterud, the bundle was found in the spring of 1968 when he, a son, and grandson were looking at petroglyphs about 12km east of Castledale. While walking up a canyon from the San Rafael River, they noticed a piece of rawhide sticking out of the dirt in a small overhang. Further exploration uncovered a large leather bundle, laced closed with a long strap of leather. An elk antler had been placed on top of the bundle and both were buried under a pile of rocks and dirt. Inside the bundle were numerous complete and fragmentary stone implements, bone tools, miscellaneous pieces of leather, sinew and cordage, a painted strap or belt, a thin small leather bag that contained the stone implements, a leather bundle of ocher, a cylindrical pouch full of dried seeds or berries, and an exceptionally large bifacially chipped stone knife. All were in an excellent state of preservation. When the Emery County Museum opened in 1969, Mr. Sitterud placed the bundle on display.

This paper hopes not only to provide the pertinent data on the bundle itself, but also to show how archeology is enriched by cooperation with interested individuals and organizations.

ENVIRONMENTAL SETTING

Geology and Geomorphology

The Sitterud bundle was recovered from a small dry overhang (42Sall94) in an unnamed drainage that enters the San Rafael River about 0.6km below Hambrick Bottoms. It is about 0.8km up the drainage from the river and on the east side (SE 1/4 SE 1/4 SW 1/4, Sec. 26, T19S, R9E) at an elevation of 1646m (5400 ft) (Figs. 1 & 2). The overhang was created by the advancement of an intermittent stream into the soft laminated sandstone that makes up the drainage sidewalls. Eventually the stream course altered leaving a small terrace and the overhang a few meters above the present stream bottom (Figures 3 & 4). The floor of the overhang is very loose, unconsolidated sand deposited by the stream and roof spalling.

Upstream from the overhang the drainage gradually flattens out and the side walls are less steep. Downstream, however, the side walls become steeper and higher with numerous terraces and switchbacks created by the downcutting action of the stream.

The overall topography of the area is dominated by the San Rafael River and the San Rafael Swell. The present river course is well established and is in an old age stage of development characterized by low gradients and large active and abandoned meanders. Where recent tectonic activity is present, such as the San Rafael Swell, the river's course still remains largely unaltered from its pre-swell track, indicating that it was established and flowing before the major uplifting activities. Topography near the river is highly dissected characterized by steep walled drainages with zig-zagging bottoms. Further away from the river to the southwest, the topography becomes less diverse, eventually becoming a rolling semiarid landscape.

Upper Jurassic fluvial sandstone and mudstone of the Morrison formation are the primary rock types in the vicinity. These soft rocks are the basic parent material for the sandy aeolian soils which dominate the area (U.S. Geologic Map of Utah, SE 1/4:1964 and Wilson et al: 1975). Nodular and tabular cherts and quartzites abound in the formations and were a primary lithic resource in prehistoric times.

Climate

Castle Valley's has a midlatitude, dry climate with precipitation distributed evenly throughout the year (Burnham 1950). Mean annual precipitation is less than 25cm. Mean annual temperatures vary between 8 to 15° C (47 to 59° F), while mean summer temperatures are more than 15° C (59° F) (Wilson et al. 1975). The average frost-free period varies between 120 and 140 days.

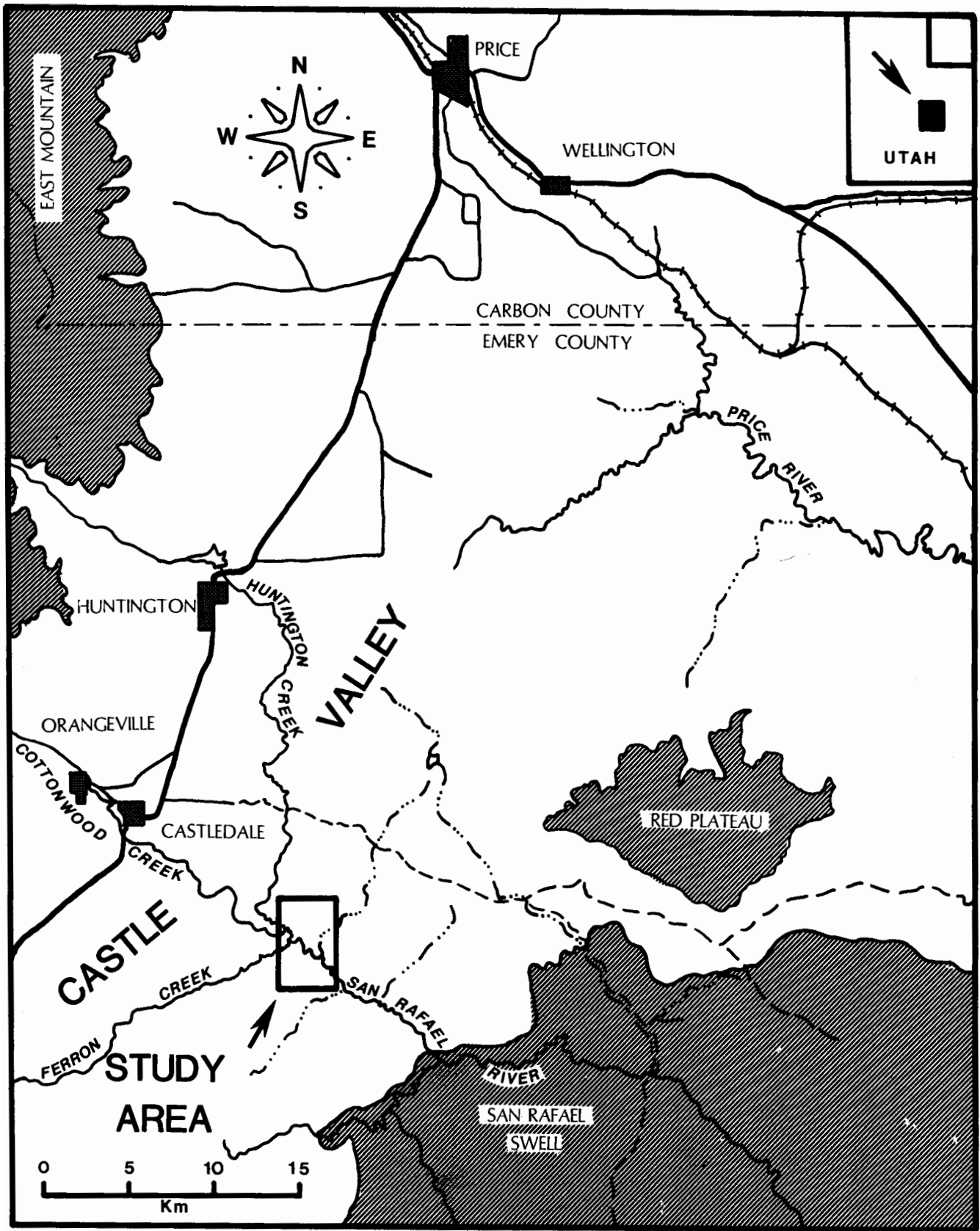


Figure 1. Castle Valley and the study area.

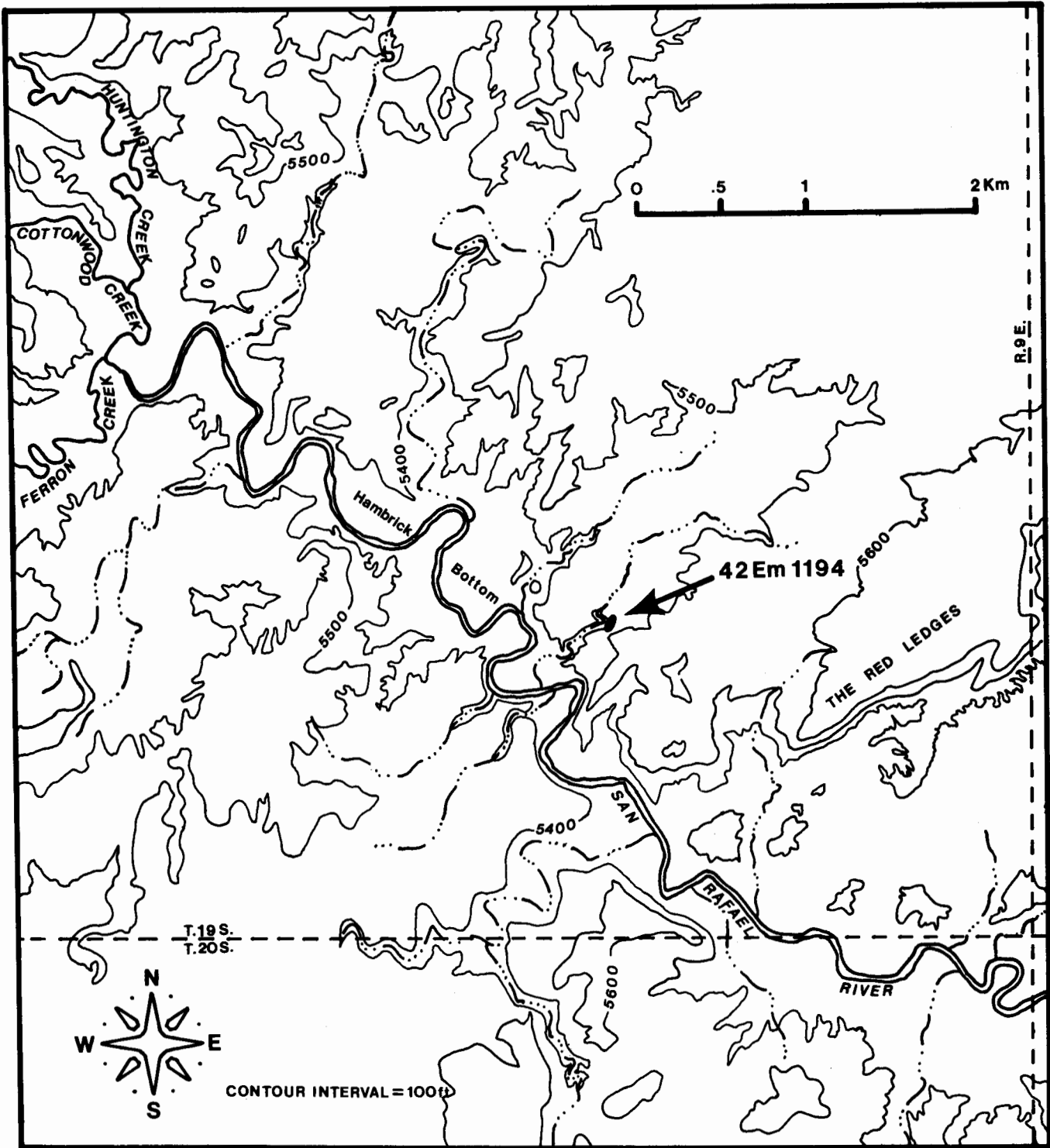


Figure 2. Site location, 42Em1194.



Figure 3. View of the overhang and drainage where 42Em1194 is located.

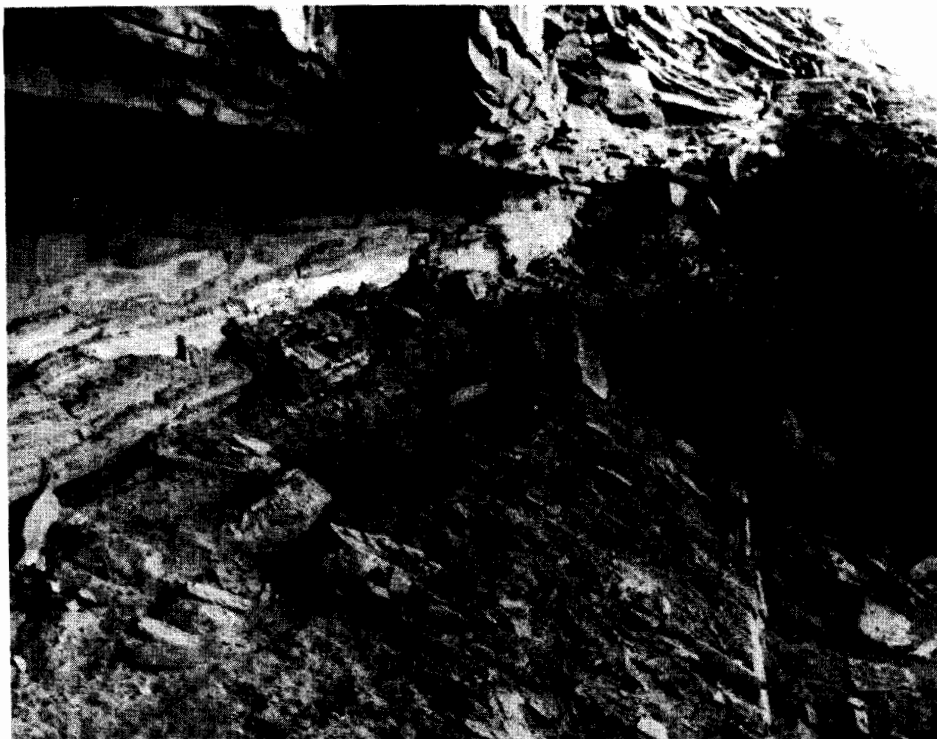


Figure 4. Close-up view of the terrace and overhang of 42Em1194.

Flora and Fauna

Within the dominate vegetation ecozone -- the Northern Desert Shrub Formation (Tidestrom 1925) -- the overhang is located in a Saltbrush-Greasewood community with associations to Great Basin Sagebrush and Pinyon-Juniper communities (Kuchler 1964). Plant species noted at or near the overhang site include greasewood, rabbitbrush, saltgrass, shadscale, curly grass, Mormon tea, yucca, and prickly pear. All major archeological sites of the region are found in or near riverine ecosystems along the San Rafael River on perennial streams. Undoubtedly these plant types played an important part in the area's aboriginal subsistence economy.

Local fauna includes an assortment of bats, cottontail, jackrabbit, prairie dogs, squirrels, chipmunks, gophers, kangaroo mice, native rats and mice, beaver, porcupine, coyote, red fox, gray fox, ring-tailed cat, weasel, badger, skunk, bobcat, mountain lion, and mule deer (Durrant 1952). Other fauna include the western and desert rattlesnake, western and common gartersnake, numerous species of lizards, frogs, hawks, turkey vulture, owl, sparrow, jays, crow, and magpie (Collins 1959).

INVENTORY

Perishables

The Sitterud bundle is a collection of perishable and non-perishable artifacts which constitute a basic subsistence kit. All of its contents, except the elk antler, were found wrapped up in a large crudely tanned elk hide bundle laced closed with a buckskin strap. The preservation of the bundle and its contents is remarkable. Many perishable items, including two leggings, (one whole and one dessicated), and ocher pouch, a palm pad, a small thin pouch, miscellaneous leather fragments and thongs, a sinew snare, raw sinew, rabbit fur cordage, squawbush berries and leaves, and bone tools appear to have been made and used only yesterday. Many of the chipped stone implements are so fresh and unused that they still have the undetached distal ends of thinning flakes normally removed after they have been used for a period of time. This section of the paper describes and discusses the items found in the bundle.

A basic attribute list derived from that utilized in analyzing the non-perishables (see Appendix) was used to conduct the analysis and record significant attributes on the perishable artifacts. This outline is descriptive in nature, emphasizes qualities which are readily apparent, and does not employ exhaustive laboratory analyses.

Leather

OUTER BUNDLE (Figure 5).

Material.

Elk hide with buckskin straps.

Color.

Creamy white with dark brown streaks; buckskin straps dark red-brown.

Culturally Significant Adhesions.

A few areas appear to be stained with ocher.

Item Condition.

The bundle is dessicated in spots and very brittle; it is ripped where it was folded and fungus has attacked it in a few localities; buckskin strips are complete and in excellent condition.

Measurements.

Elk hide pouch, length -- 115cm folded, 135cm unfolded; width -- 47cm folded, 95cm unfolded; buckskin straps, length -- ca 130cm, width -- ca 3cm, thickness -- 1.5mm.

Comments.

Several knots were tied on the buckskin strip. Two at the top of the bundle are square knots while one near the bottom is an overhand knot. The bundle appears only to have been roughly tanned as it is very stiff and was prepared with urine. Loops around the edges of the bundle, where the buckskin strap has been threaded, may not only have served to tie it closed, but also to stretch it out while tanning.

INNER BUNDLE (Fig. 6).

Material.

Fawn hide or coyote hide (?) (a local taxidermist identified this bundle as possibly the hide of a coyote or bobcat).

Color.

Cream to white.

Culturally Significant Adhesions.

One spot is stained with ocher.

Condition.

Dessicated and brittle although apparently complete.

Measurements.

Length -- 89cm, Width -- 43cm, Thickness -- .35 - .5mm.

Comments.

This hide is extremely thin. There is little evidence of tanning or tanning loops. All hair follicles have been scraped off and three small circular pieces apparently were removed while it was still green. Most of the stone tools were found in this bundle, which was in turn placed in the larger bundle.

OCHER BUNDLE-(Fig.7).

Material.

Buckskin.

Color.

Red-brown.

Culturally Significant Adhesions.

Bundle is completely covered and stained with ocher.

Condition.

Apparently complete with no dessication or fungus.

Measurements.

Length -- 73cm, Width -- 38cm, Thickness -- 1.5mm.

Comments.

This bundle is made from a piece of buckskin that has had a small corner tied off with a buckskin thong to create a small pouch. The pouch contains ca 400 grams of red ocher (hematite). According to Mr. Sitterud, the large biface (B-1) was wrapped up in the excess hide.

LEGGING (Figs. 8 & 9).

Material.

Buckskin.

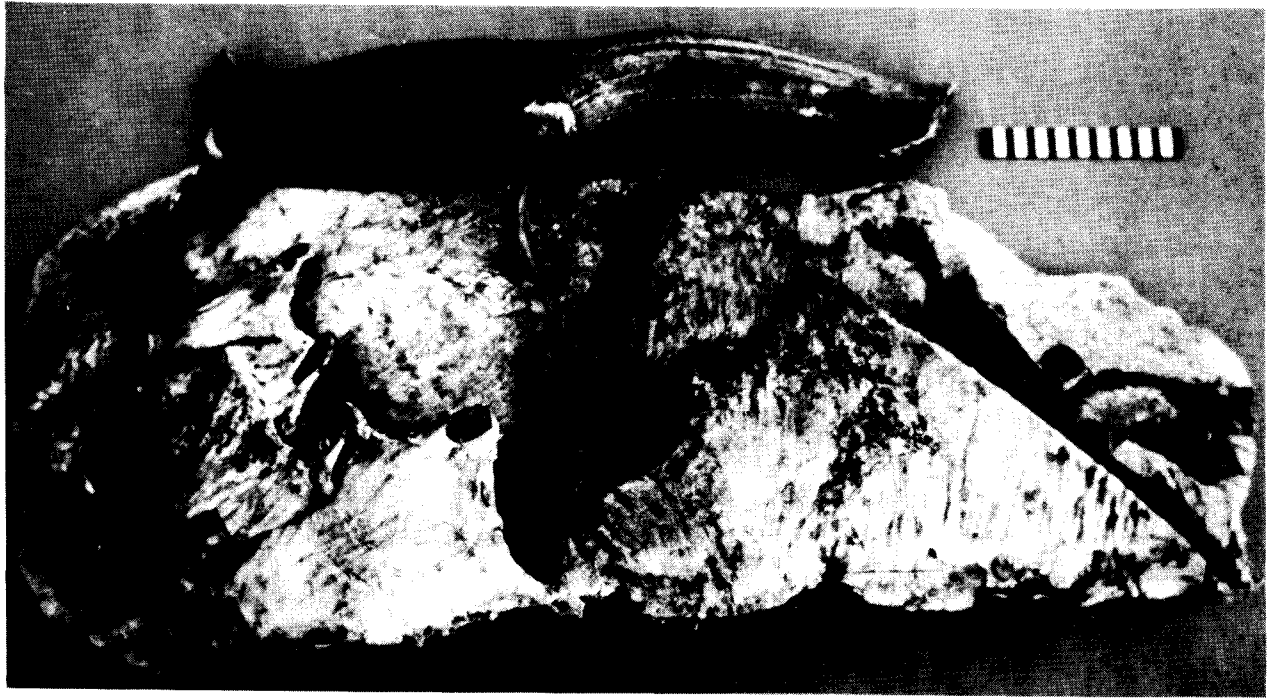


Figure 5. Large elk hide bundle and antler.



Figure 6. Small inner bundle containing stone tool implements.

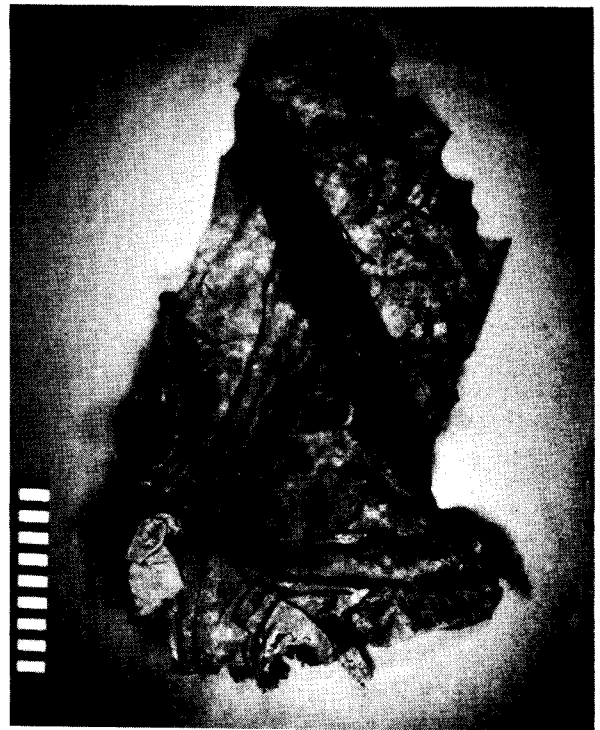


Figure 7. Buckskin ocher pouch and large biface (B-1).

Color.

Red-brown.

Culturally Significant Adhesions.

There are other stains on the inside of the legging.

Condition.

Apparently complete and in excellent condition.

Measurements.

Length -- 87cm, Width -- 18,3cm, Thickness -- 1.5mm.

Comments.

This legging not only served as protection from the elements but also as a bag for the storage of approximately 2.7 liters of Squawbush berries. One end of the legging is wider than the other (presumably the top) and has been tied closed with two buckskin thongs. One of these is actually part of the legging while the other appears to be a repair as it has been tied onto a small buldge at the top edge where the stitching ends. This buldge has been created by placing a small piece of wood along the inner surface of the legging and then wrapping the thong around it and forming a slip knot. The bottom opening is also tied off with a piece of buckskin thong and sinew cordage. The legging was sewn up using a sinew thread and a overhand diagonal stitch. The stitch is spliced in three places and all are square knots (Figs. and). Along the outside stitch is a thin decorative fringe that extends along the entire length of the legging. One small hole is found in the legging near the top, but it is unclear if this is intentional or deterioration of the leather.

PAINTED STRAP OR BELT (?) (Figure 14).

Material.

Elk hide.

Color.

Cream with black, orange, and green designs.

Culturally Significant Adhesions.

Paint pigments.

Condition.

Complete and excellent preservation.

Measurements.

Length -- 90cm, Width -- 7cm, Thickness -- 3.5mm.

Comments.

This strap has been only crudely tanned and is very rigid. As found, it was folded in the middle. On one end there is a loop and on the other end is the remnants of what appears to be another. These could have served as tanning loops or else as places to tie the strap onto another object (possibly the big bundle?). One side has a rough surface and is not decorated, while the other is smooth and has four painted designs. Two of these are near the ends of the strap and are line and hatching motifs. The other two are near the median of the strap and in most respects are mirror images of the same embellished triangular motif. All of the designs have been outlined in black with the areas inside of the triangles painted a blueish-green. The areas between the linear motifs at the ends have been painted in orange and blueish-green as well as some of the embellishments of the triangles.

SEWN BUCKSKIN FRAGMENT (Figure 10).

Material.

Buckskin.

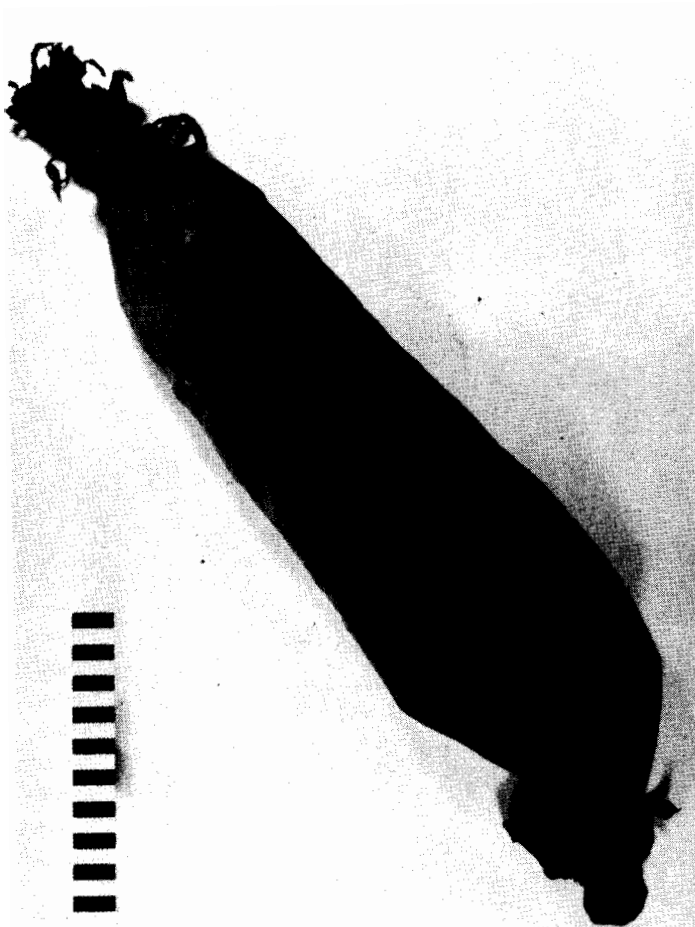


Figure 8. Sewn legging used as a seed pouch.

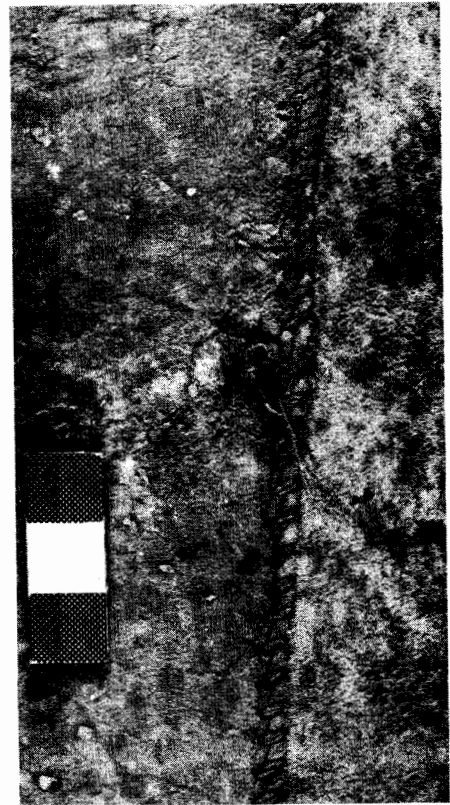


Figure 9. Close-up view of stitch and splicing knot on inner surface of legging.

Color.

Red-brown.

Culturally Significant Adhesions.

Covered with ocher.

Condition.

Fragment only.

Measurements.

Length -- 33cm, Width -- 12cm, Thickness -- 1.5mm.

Comments.

This buckskin fragment may be the partner to the legging described above. It is well tanned and sewn like the legging, and has a thin decorative fringe along the outside stitch. Unfortunately, it has been largely eaten away by fungus.

PALM PAD (?) (Fig. 11a).

Material.

Buckskin.

Color.

Red-brown.

Culturally Significant Adhesions.

Stained with ocher.

Item Condition.

Complete (?).

Measurements.

Length -- 20cm, Width -- 15.5cm, Thickness -- 1.5mm.



Figure 10. Sewn leather fragment, possibly a second legging.

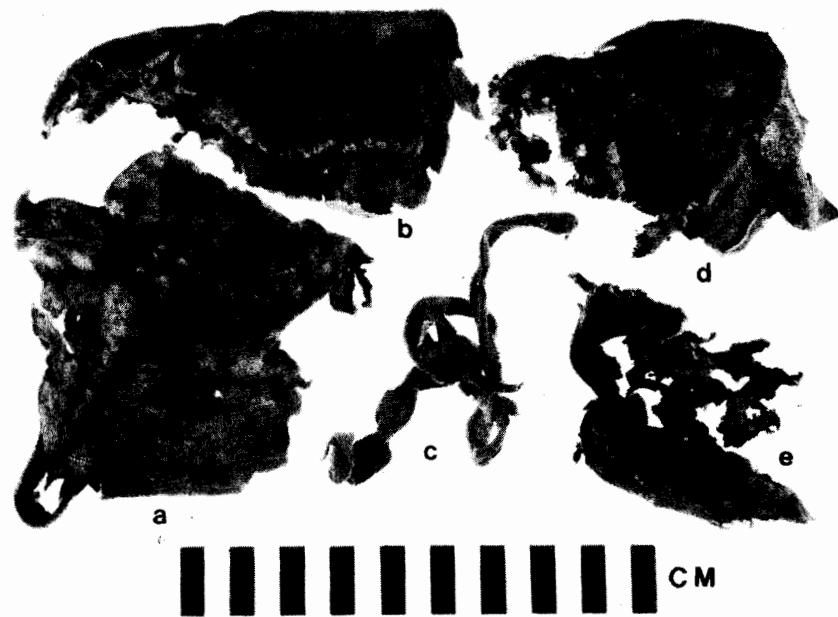


Figure 11. Palm pad and miscellaneous leather fragments.

Comments.

The size and loop in one corner of this piece of buckskin suggests it is a pad worn over the palm of the hand to protect the wearer while shaping stone. A few areas on the pad that are damaged from wear; but more have been etched by fungus.

MISCELLANEOUS LEATHER (Figs. 11b-e, 12c-e).

Material.

Elkhide and buckskin.

Color.

Red-brown.

Culturally Significant Adhesions.

All pieces are stained with ocher.

Condition of Items.

Fragments, all showing damage by fungus.

Comments.

Three pieces of leather, two thongs, and a segment of cordage are included here. one of the thongs has a square knot tied in it; the cordage segment has been twisted to resemble a shoestring.

Sinew

RAW SINEW STRAND (Fig. 12b).

Material.

Elk or deer sinew.

Color.

Light red-brown.

Condition.

Complete.

Measurements.

Length -- 50cm, Width -- 3mm.

Comments.

This is a raw piece of sinew and, probably had a variety of uses.

SNARE (Fig. 12a).

Material.

Elk or deer sinew.

Color.

Light red-brown.

Condition.

Complete.

Measurements.

Length -- 148cm, Width -- 3-10mm.

Comments.

This sinew cordage snare appears to have been made by twisting a single strand of sinew counterclockwise, then doubling back on itself and twisting it clockwise. The loose end of the cord was then backspliced into the double twisted strand to form the loop or snare.



Figure 12. Sinew snare, raw sinew, rabbit fur, and leather cordage.

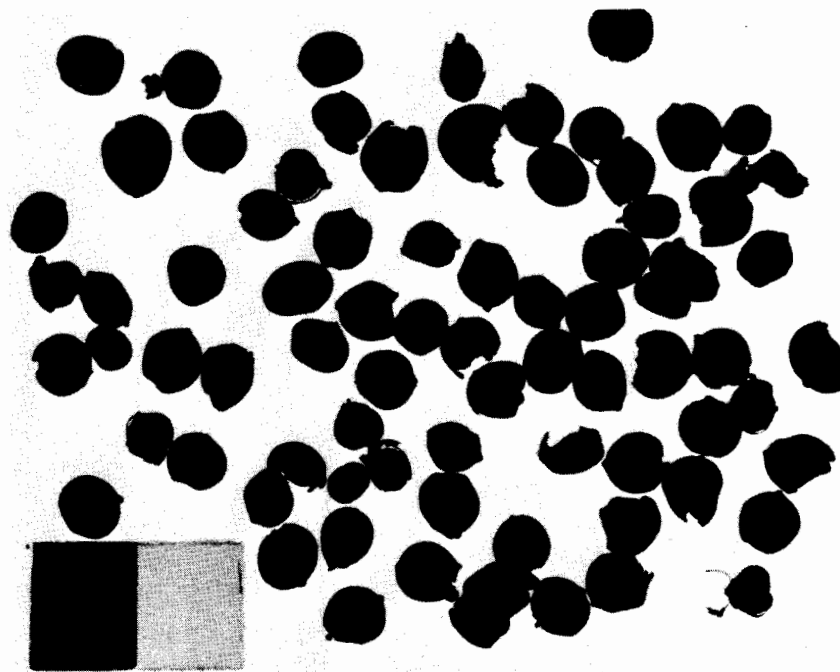


Figure 13. Squawbush (*Rhus trilobata*) berries.

Rabbit Fur

RABBIT FUR CORD (Fig. 12d).

Material.

Rabbit fur.

Color.

Dark gray.

Condition.

Fragment only.

Measurement.

Length -- 8mm.

Comments.

The cord appears to have been made by twisting a strip of fur and hide counterclockwise.

Vegetable

SQUAWBUSH BERRIES AND LEAVES (Fig. 13).

Material.

Rhus trilobata.

Amount.

2.7 liters.

Condition.

Dried and well preserved.

Season of Harvest.

Late July to early August.

Identification by: Beverly Albee, Assistant Curator, Garrett Herbarium, University of Utah.

Comments.

About 2.7 liters of squawbush berries and a small bundle of trilobata leaves were contained in the complete legging. The reason for the leaves is unknown.

Bone

ANTLER BATON (Figs. 5, 14a,b).

Material.

Elk antler.

Color.

Cream to dark tan.

Culturally Significant Adhesions.

Some other stains.

Condition.

Trunk only, all tines or branches have been removed.

Measurements.

Length -- 73cm, Width -- 7.8cm, Thickness -- 5cm.

Surface Attributes.

The proximal end has been battered; on the distal end, saw marks are evident where the antler was grooved to remove sections of solid antler for alternate uses. A notch 4.3cm wide extends the whole

length of the antler; this strip has been removed with a burin-like tool, leaving numerous saw markings near the grooved edges.

Comments.

The antler served as a multipurpose implement as well as a source of raw material for smaller bone tools.

PUNCH (Fig. 15b).

Material.

Mammal longbone (elk?).

Color.

Cream.

Culturally Significant Adhesions.

None.

Condition.

Complete.

Measurements.

Length -- 20cm, Width -- 2.0cm, Thickness -- 1.5cm.

Surface Attributes.

The proximal end is flat with numerous striations left by shaping. A small spall is missing from the ventral side, as if the end had been struck. The right side of the distal end is obliquely ground. The tip is flat and shows signs of nibbling and striations. A portion of the medullary cavity begins at the proximal end of the ventral face and continues up to 3.5cm from the distal end where the bone turns porous. Edges of the cavity have been ground down perpendicular to the axis of the implement. No shaping or modification is evident on the dorsal surface.

Comments.

Because of the spall at the proximal end and the intense nibbling on the distal end, this appears to have been a punch used to flake prepared cores or roughed out blanks. The polish on some of the surfaces indicates the tool was hand held.

BATON/PRESSURE FLAKER (Fig. 15a).

Material.

Elk antler tine.

Color.

Light tan and brown.

Culturally Significant Adhesions.

Small patches of pitch.

Condition.

Complete.

Measurements.

Length -- 21cm, Width -- 21cm in diameter.

Surface Attributes.

The proximal end is rounded and battered from use; there are numerous striations and nicks on the end and edges. The distal end is highly polished and shows extensive nibbling and striations, also from use. It is nearly flat and perpendicular to the axis of the implement. The surface is highly polished and has a glossy appearance for 7cm from the distal end. The proximal surface has no polish.

Comments.

Polish on this tool apparently results from extensive handling and natural body oils that have soaked into the surface.



Figure 14. Large elk antler and painted leather strap.

NOTCHER (Figure 15c).

Material.

Antler.

Color.

Light tan.

Culturally Significant Adhesions.

None.

Condition.

Complete.

Measurements.

Length -- 11.7cm, Width -- 1.3cm, Thickness -- 1cm, bevel angle -- 38°.

Surface Attributes.

Some battering of the proximal end may be present. The distal end has been beveled. There is some battering of the proximal end and the distal end has been beveled. There is nibbling of the edge, which is generally dull and polished and striations just below the edge. The ventral surface is porous, and has been formed from the inner core of the antler. The rough natural surface of the antler is characterized on the dorsal face.

Comments.

The implement was apparently a notcher and possibly secondarily used as a punch. The sides have been shaped by grinding and there are striations parallel to the longitudinal axis.

SHAFT OR HANDLE(?) (Fig. 15d).

Material.

Bone (dense).

Color.

Cream.

Culturally Significant Adhesions.

Pitch on the distal end.

Condition.

Distal tip and medial section only.

Measurements.

Length -- 9.4cm, Width -- 5mm diameter at distal end; 8mm diameter at proximal end.

Surface Attributes.

The distal end, which is stained with pitch, has been tapered. Otherwise, the implement has been shaped so that it is nearly cylindrical in crosssection. The surface is polished.

Comments.

This implement served either as a shaft or a handle to a stone tool (?); it was hafted at least partially with pitch as indicated by the stains on the distal end.

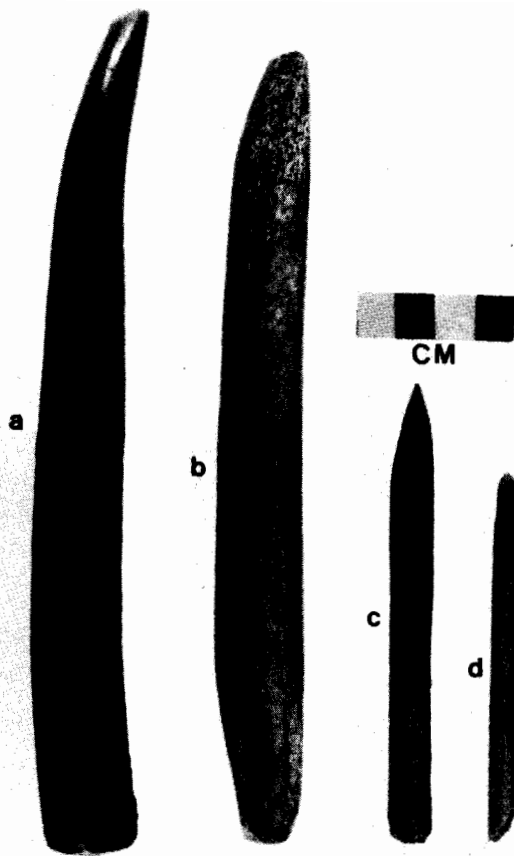


Figure 15. Bone tools used for making stone implements.

NON-PERISHABLES

Chipped Stone

Bifaces

B-1. (Fig. 16a,b).

Material.

Cryptocrystalline basalt.

Color.

Brown-black.

Culturally Significant Adhesions.

Stained with ocher on both dorsal and ventral surfaces.

Condition.

Complete.

Measurements.

Length -- 38.8cm, Thickness -- 2.5cm, Width -- 6.0cm at median,

Weight -- 572.2 grams.

Thermal Alteration Evidence.

None noted.

Outline.

Generally straight parallel edges with pointed ends.

Medial Cross Section.

Strongly convex (both dorsal and ventral surfaces).

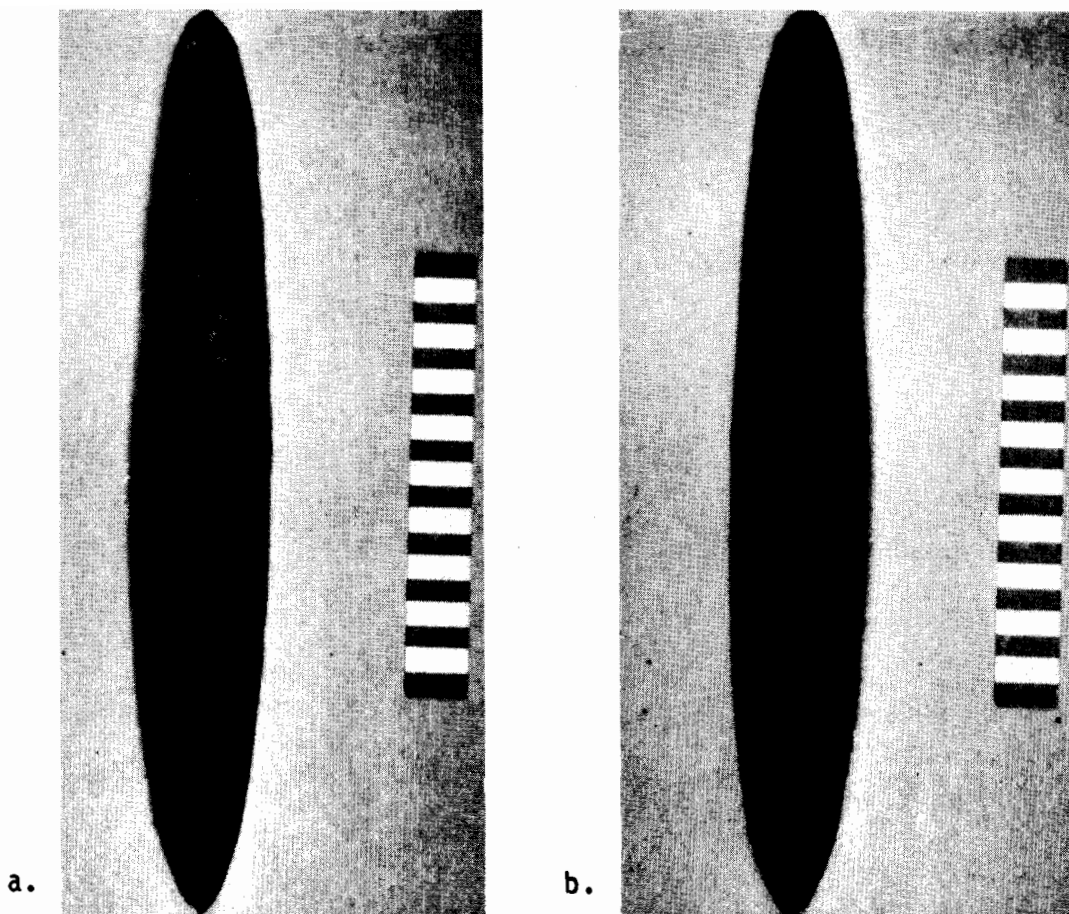


Figure 16a and b. Both sides of large biface (B-1) showing area void of ocher stain.

Longitudinal Crosssection.

Nearly straight but convex at the ends (both dorsal and ventral surfaces).

Production Stage.

Shaped but not highly stylized.

Traditional Designation.

Large knife.

Flaking Techniques and Patterns.

Percussion-collateral/pressure retouch and edge shaping.

General Flaking Quality.

Very good with large distally expanding, collateral flake scars terminating at median; very few hinges or checks.

Edge Preparation.

Edges show grinding and platform isolation.

Hafting Features.

See comments.

Basal Preparation.

Not Appropriate.

Comments.

Although no specific hafting features are evident, there is an area void of ocher. That may be indicative of how the implement was handled.

B-2. (Fig. 17a).

Material.

Fine-grained quartzite.

Color.

Red-brown.

Culturally Significant Adhesions.

None noted.

Condition.

Complete.

Measurements.

Length -- 13.5cm, Thickness -- 0.8cm, Width -- 5.8cm at median,
Weight -- 89.1gm.

Thermal Alteration.

None noted.

Outline.

One edge slightly convex, with the other slightly straight; pointed ends.

Medial Cross Section.

Slightly convex (both dorsal and ventral surfaces).

Longitudinal Cross section.

Straight (both dorsal and ventral surfaces).

Production Stage.

Shaped but not highly stylized.

Traditional Designation.

Knife.

Flaking Techniques and Patterns.

Percussion-collateral/pressure retouch and edge shaping.

General Flaking Quality.

Good percussion flaking on one surface with large parallel flake scars terminating at the median; flake scars on other side are distally expanding, but either hinge or step before median.

Edge Preparation.

Major proximal platform of original flake-blank never removed; no grinding evidence noticed.

Hafting Features.

Not Appropriate.

Basal Preparation.

Not Appropriate.

Comments.

This knife is exceptionally thin considering its relative size and the material it is made from.

B-3. (Fig. 17b).

Material.

Fine-grained quartzite.

Color.

Light tan.

Culturally Significant Adhesions.

None noted.

Condition.

Complete.

Measurements.

Length -- 13.5cm, Thickness -- 1.0cm, Width -- 4.1cm at distal,
Weight -- 5.16 grams.

Thermal Alteration.

None noted.

Outline.

Slightly irregular convex with both ends pointed; edges converge towards distal end.

Medial Cross Section.

Slightly convex (both dorsal and ventral surface).

Longitudinal Cross section.

Straight (both dorsal and ventral surface).

Production Stage.

Shaped but not highly stylized.

Traditional Designation.

Knife.

Flaking Techniques and Patterns.

Irregular percussion and pressure; pressure retouch, mainly edge shaping.

General Flaking Quality.

Most percussion flake scars are distally expanding with mixed terminations at varying lengths; one section of pressure flake scars are oblique parallel.

Edge Preparation.

Some ground platform remnants still present.

Hafting Features.

Not appropriate.

Basal Preparation.

Not appropriate.

Comments.

Many of the flake scar terminations have the end portions of the flakes still intact; appears to have had little prehistoric use.

B-4. (Figs. 17c, 21e).

Material.

Fine-grained quartzite.

Color.

Light tan.

Culturally Significant Adhesions.

Pitch on proximal dorsal/ventral end.

Condition.

Complete.

Measurements.

Length -- 8.7cm, Thickness -- 0.7cm, Width -- 3.8cm at proximal end,

Weight- 23.3 grams.

Thermal Alteration.

None noted.

Outline.

Concave edges at median; concave edges converging to a sharp point at distal; dull pointed proximal end.

Medial Cross section.

Slightly convex (both dorsal and ventral surfaces).

Longitudinal Cross section.

Nearly straight (both dorsal and ventral surfaces).

Production Stage.

Shaped but not highly stylized.

Traditional Designation.

Knife--reused as a drill (?).

Flaking Techniques and Patterns.

Percussion-irregular/pressure- oblique on median of one edge only.

General Flaking Quality.

Percussion flake scars are mostly distally expanding while pressure are small parallel scars terminating before median, usually hinging.

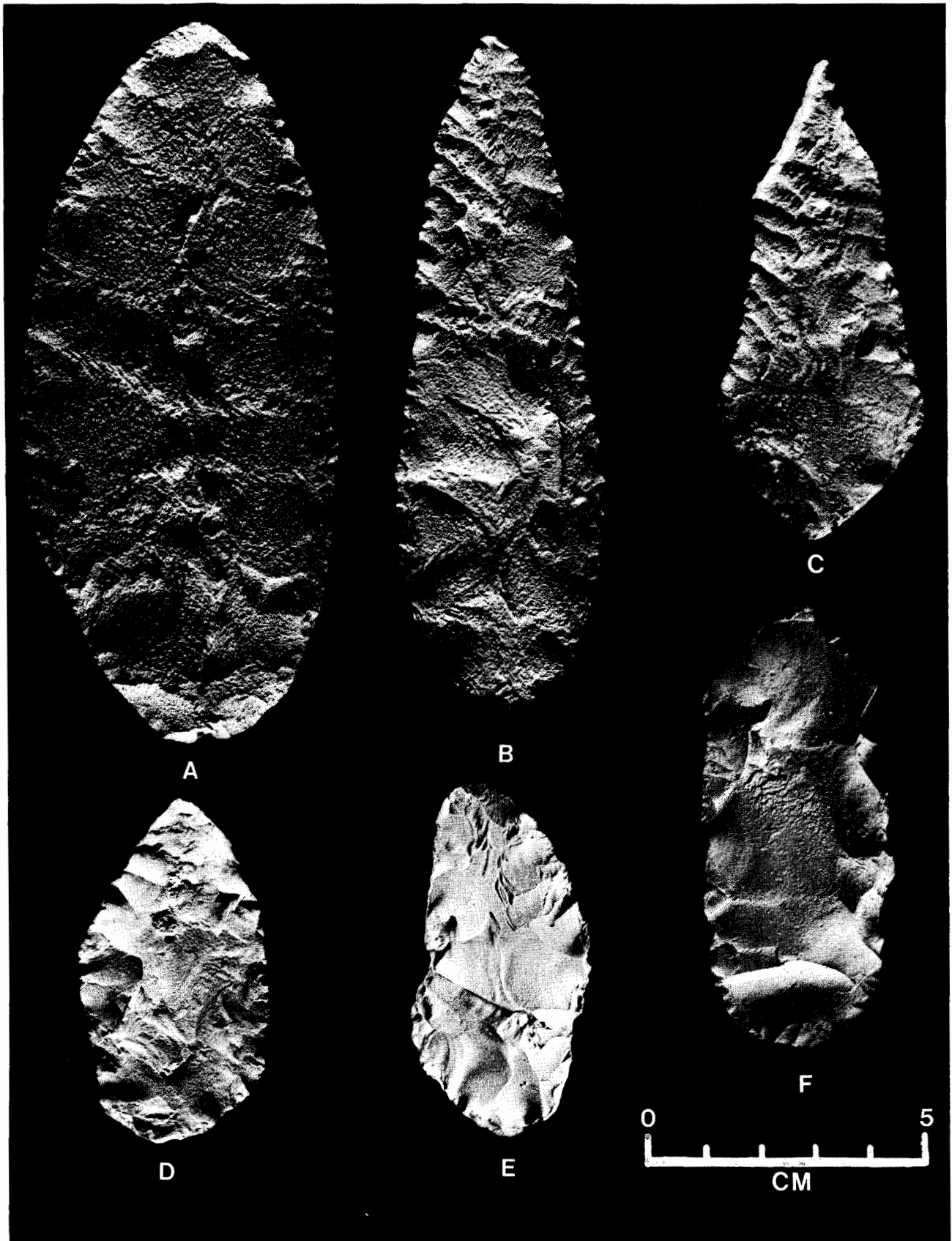


Figure 17. Bifacially chipped stone tools, B-2 to B-7.

Edge Preparation.

Some platforms still present as well as some grinding.

Hafting Features.

Pitch residues are evident on the proximal end of the implement which appears to be the remains of a bonding agent used to secure the implement in the end of a handle (Figure 21e).

Basal Preparation.

Edge ground.

Comments.

This implement has had its proximal end retouched and reshaped. Small pressure as well as microflakes are present on one surface indicating a secondary use as a drill or perforator. The uniqueness of the piece, though, is the pitch residues indicating the hafting techniques used on the implement. It should also be noted that B-3, B-4, and U-1 are all made from the same rock type.

B-5. (Fig. 17d).

Material.

Chert.

Color.

Red-brown.

Culturally Significant Adhesions.

None noted.

Condition.

Complete.

Measurements.

Length - 6.3cm, Thickness -- 0.6cm, Width -- 3.4cm at median, Weight -- 12.7 grams.

Thermal Alteration.

None noted.

Outline.

One edge is nearly straight from the proximal end to the median and then is straight, converging to the distal end; the other edge is slightly convex; distal end is sharply pointed while the proximal end is dull pointed.

Medial Cross section.

Irregular (both dorsal and ventral surfaces).

Longitudinal Cross section.

Irregular (both dorsal and ventral surfaces).

Production Stage.

Secondarily shaped blank.

Traditional Designation.

Biface or knife.

Flaking Techniques and Patterns.

Percussion-irregular; pressure-irregular.

General Flaking Quality.

Percussion flake scars are irregular and distally expanding, pressure flake scars are mainly restricted to the edges.

Edge Preparation.

Some platform isolation.

Hafting Features.

Not appropriate.

Edge Preparation.

Not appropriate.

Comments.

None.

B-6. (Fig. 17e).

Material.

Obsidian with phenocrysts.

Color.

Black.

Culturally Significant Adhesions.

None noted.

Condition.

Broken in two.

Measurements.

Length -- 6.5cm, Thickness -- 0.7cm, Width -- 3.2cm at median, Weight - 14.9 grams.

Thermal Alteration.

None noted.

Outline.

One side is strongly convex while the other is straight; both ends dull pointed.

Medial Cross section.

Irregular (both dorsal and ventral surfaces).

Longitudinal Cross section.

Irregular (both dorsal and ventral surfaces).

Production Stage.

Secondarily shaped blank.

Traditional Designation.

Biface or knife.

Flaking Techniques and Patterns.

Irregular percussion and pressure.

General Flaking Quality.

Percussion flake scars are mostly distally expanding, terminating at various lengths from the edge; pressure flake scars are isolated and restricted to the edge.

Edge Preparation.

Some evidence of platform isolation and set-up.

Hafting Features.

Not appropriate.

Basal Preparation.

Not appropriate.

Comments.

The item was obviously broken during the thinning stage by the force of the blow hitting a small inclusion.

B-7. (Fig. 17f).

Material.

Chert.

Color.

Grayish-brown.

Culturally Significant Adhesions.

Ocher adhesions on dorsal face.

Condition.

Complete.

Measurements.

Length -- 8.7cm, Thickness -- 1.4cm, Width -- 3.6cm at median, Weight -- 64.3 grams.

Thermal Alteration.

None noted.

Outline.

Very irregular straight parallel edges with a convex and irregular end.

Medial Cross section.

Irregular (both dorsal and ventral surfaces).

Longitudinal Cross section.

Irregular (both dorsal and ventral surfaces).

Production Stage.

Secondarily shaped blank.

Traditional Designation.

Biface or knife.

Flaking Techniques and Patterns.

Percussion-irregular.

General Flaking Quality.

Most flake scars are short; round and distally expanding with a mixture of terminations; flaking mostly crude or initial thinning.

Edge Preparation.

Some grinding.

Hafting Features.

Not appropriate.

Basal Preparation.

Not appropriate.

Comments.

The proximal (?) end shows some use, possibly as an end scraper.

B-8. (Fig. 18a).

Material.

Chert.

Color.

Dark brown-gray.

Culturally Significant Adhesions.

None noted.

Condition.

Distal end only.

Measurements.

Length -- not applicable, Thickness -- not applicable, Width -- not applicable, Weight -- not applicable.

Thermal Alteration.

None noted.

Outline.

Distal end pointed; incomplete.

Medial Cross section.

Slightly convex (both dorsal and ventral surfaces).

Longitudinal Cross section.

Straight (both dorsal and ventral surfaces).

Production Stage.

Preform.

Traditional Designation.

Biface or knife.

Flaking Techniques and Patterns.

Irregular percussion and pressure.

General Flaking Quality.

Small irregular flake scars with mostly hinged and stepped terminations.

Edge Preparation.

Some platforms ground and isolated.

Hafting Features.

Not applicable.

Basal Preparation.

Not applicable.

Comments.

Item was broken when the flaker struck off a flake which hit an inclusion.

B-9. (Fig. 18b).

Material.

Variegated chert.

Color.

Variegated cream and gray.

Culturally Significant Adhesions.

None noted.

Condition.

Distal tip.

Measurements.

Length -- not applicable, Thickness -- not applicable, Width -- not applicable, Weight -- not applicable.

Thermal Alteration.

Possibly as implement has a slight greasy feel.

Outline.

Slightly convex edges with a moderately sharp point.

Medial Cross section.

Straight (both dorsal and ventral surfaces).

Longitudinal Cross section.

Straight (both dorsal and ventral surfaces).

Production Stage.

Possibly a preform.

Traditional Designation.

Biface or knife.

Flaking Techniques and Patterns.

Percussion only.

General Flaking Quality.

Mostly distally expanding and round flake scars terminating at various lengths.

Edge Preparation.

Ground and platforms isolated.

Hafting Features.

Not applicable.

Basal Preparation.

Not applicable.

Comments.

Item appears to have been broken during thinning process as the fracture at the distal end is a cremated fracture caused when the line of force of the flakers blow hit an inclusion.

B-10. (Fig. 18c).

Material.

chert.

Color.

Light brown.

Culturally Significant Adhesions.

None noted.

Condition.

Estimated 1/2 of original implement - medial and distal portions.

Measurements.

Length -- not applicable, Thickness -- 0.5cm, Width -- 3.7cm at median, Weight - not applicable.

Thermal Alteration.

None noted.

Outline.

Irregular slightly converging edges with a convex distal end and a broken proximal end.

Medial Cross section.

Straight on dorsal surface and slightly convex on ventral surface.

Longitudinal Cross section.

Slightly convex on dorsal surface and slightly concave on ventral surface.

Production Stage.

Secondarily flaked blank.

Traditional Designation.

Biface or knife.

Flaking Techniques and Patterns.

Percussion-irregular.

General Flaking Quality.

Flake scars largely restricted to one surface--large distally expanding flake scars terminating at median.

Edge Preparation.

Some grinding on platforms still evident.

Hafting Features.

Not applicable.

Basal Preparation.

Not applicable.

Comments.

None.

B-11. (Fig. 18d).

Material.

Chert.

Color.

Light tan.

Culturally Significant Adhesions.

None noted.

Condition.

Incomplete -distal and medial edge only.

Measurements.

Length -- not applicable, Thickness -- not applicable, Width -- not applicable, Weight -- not applicable.

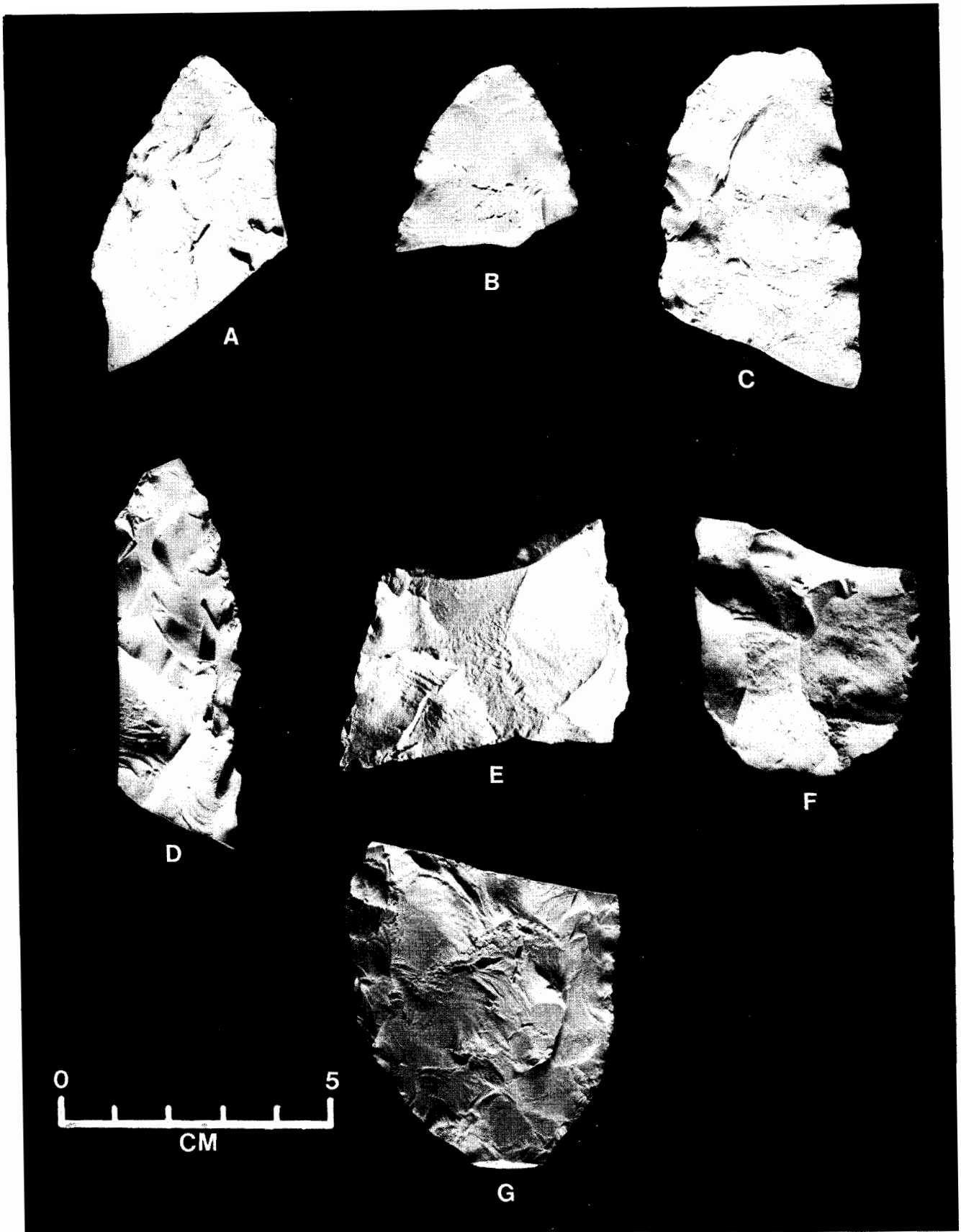


Figure 18. Bifacially chipped stone tools, B-8 to B-14.

Thermal Alteration.

None noted.

Outline.

Distal tip sharply pointed and one edge very irregular.

Medial Cross section.

Convex (both dorsal and ventral surfaces).

Longitudinal Cross section.

Irregular (both dorsal and ventral surfaces).

Production Stage.

Secondarily thinned blank.

Traditional Designation.

Biface or knife.

Flaking Techniques and Patterns.

Percussion--irregular.

General Flaking Quality.

Very mixed irregular size and shape flake scars terminating at various lengths.

Edge Preparation.

Not applicable.

Hafting Features.

Not applicable.

Basal Preparation.

Not applicable.

Comments.

None.

B-12. (Fig. 18e).

Material.

Chert.

Color.

Black with white inclusions.

Culturally Significant Adhesions.

None noted.

Condition.

Medial section only.

Measurements.

Length -- not applicable, Thickness -- not applicable, Width -- not applicable, Weight -- not applicable.

Thermal Alteration.

None noted.

Outline.

Both edges are irregular with one slightly converging.

Medial Cross section.

Strongly convex (both dorsal and ventral surfaces).

Longitudinal Cross section.

Slightly convex (both dorsal and ventral surfaces).

Production Stage.

Blank.

Traditional Designation.

Biface or knife.

Flaking Techniques and Patterns.

Percussion-irregular.

General Flaking Quality.

Only a few large distally expanding flake scars.

Edge Preparation.

None.

Hafting Features.

Not applicable.

Basal Preparation.

Not applicable.

Comments.

None.

B-13. (Fig. 18f).

Material.

Chert.

Color.

Variegated white with red, black, and pink inclusions.

Culturally Significant Adhesions.

None noted.

Condition.

Distal end.

Measurements.

Length -- not applicable, Thickness -- not applicable, Width -- not applicable, Weight -- not applicable.

Thermal Alteration.

None noted.

Outline.

End convex with one straight edge and the other slightly convex.

Medial Cross section.

Dorsal straight with ventral irregular.

Longitudinal Cross section.

Dorsal straight with ventral irregular.

Production Stage.

Blank.

Traditional Designation.

Biface or knife.

Flaking Techniques and Patterns.

Percussion-irregular.

General Flaking Quality.

Only a few large flake scars on one side which feather out at the median.

Edge Preparation.

Some platform preparation by chipping on opposite face but no grinding.

Hafting Features.

Not applicable.

Basal Preparation.

Not applicable.

Comments.

None.

B-14. (Fig. 18g).

Material.

Chert.

Color.

Brown with tan inclusions.

Culturally Significant Adhesions.

None noted.

Condition.

Distal end.

Measurements.

Length -- not applicable, Thickness -- not applicable, Width -- not applicable, Weight -- not applicable.

Thermal Alteration.

None noted.

Outline.

One irregular edge with the other somewhat straight, distal end convex with flat surface at very tip.

Medial Cross section.

Dorsal slightly concave with the ventral straight.

Longitudinal Cross section.

Dorsal irregular with ventral straight.

Production Stage.

Secondarily flaked blank.

Traditional Designation.

Knife.

Flaking Techniques and Patterns.

Percussion and pressure- both irregular.

General Flaking Quality.

Two large checks one on each side of the implement dominate most of the flake scars causing them to terminate in a step or hinge; percussion flake scars are generally distally expanding with feathering terminations, and pressure flake scars are randomly placed.

Edge Preparation.

Some platform setup and grinding.

Hafting Features.

Not applicable.

Basal Preparation.

Not applicable.

Comments.

None.

Unifaces

U-1. (Fig. 19a).

Material.

Fine-grained quartzite.

Color.

Light tan.

Culturally Significant Adhesions.

Pitch on ventral side. Condition: proximal or distal(?) end.

Measurements.

Length -- not applicable, Thickness -- 0.8cm, Width -- 3.2cm at median, Weight -- not applicable.

Thermal Alteration.

None noted.

Outline.

Convex edges with convex end.

Medial Cross section.

Dorsal slightly convex with ventral straight.

Longitudinal Cross section.

Dorsal slightly convex with ventral irregular.

Production Stage.

Secondarily thinned flake.

Traditional Designation.

Thin uniface or scraper.

Flaking Techniques and Patterns.

Percussion and pressure - both irregular.

General Flaking Quality.

Only two percussion flake scars remain with one distally expanding and terminating in a feather, and the other being round and short; pressure flake scars are mainly edge shaping.

Edge Preparation.

Slight grinding and platform set-up by flaking the opposite surface.

Hafting Features.

Not applicable.

Basal Preparation.

Not applicable.

Comments.

This piece may represent a section of a larger blank which broke during manufacture as it is made from the same material as B-3 and B-4, and is roughly the same width and thickness.

Projectile Points

PP-1. (Fig. 19b).

Material.

Obsidian.

Color.

Dark gray.

Culturally Significant Adhesions.

None noted.

Condition.

Medial section.

Measurements.

Length -- not applicable, Thickness -- 0.7cm, Width -- N/A, Weight -- not applicable.

Thermal Alteration.

None noted.

Outline.

Both edges are straight and converging but distal and proximal end are indeterminate.

Medial Cross section.

Slightly convex on both dorsal and ventral surfaces.

Longitudinal Cross section.

Slightly convex on both dorsal and ventral surfaces.

Production Stage.

Shaped and probably at one time diagnostic.

Traditional Designation.

Projectile point (atlatl point).

Flaking Techniques and Patterns.

Percussion and pressure-irregular.

General Flaking Quality.

Percussion flake/scars are either round or distally expanding and feather out near the median; pressure flake scars are general, confined to the implements edges, and are highly irregular in shape and size.

Edge Preparation.

Edges have been ground.

Hafting Features.

Not applicable.

Basal Preparation.

Not applicable.

Comments.

It is interesting to note that both dorsal and ventral surfaces have been ground down to remove facial arrises (ridges). The reason for this is unknown at this time. One of the edges has also had excessive grinding.

Drill

D-1 (Fig. 19c).

Material.

Chert.

Color.

Dark brown.

Culturally Significant Adhesions.

None noted.

Condition.

Complete.

Measurements.

Length -- 3.2cm, Thickness -- 0.3cm, Width -- 1.1cm at proximal end,

Weight -- 0.7 grams.

Thermal Alteration.

None noted.

Outline.

Edges are slightly convex with notches placed towards the proximal end of each edge; converge to a point at the distal end and proximal end is straight.

Medial Cross section.

Triangular on both dorsal and ventral surfaces.

Longitudinal Cross section.

Straight on both dorsal and ventral surfaces.

Production Stage.

Shaped but questionable as to its diagnostic value.

Traditional Designation.

Drill.

Flaking Techniques and Patterns.

Pressure - collateral.

General Flaking Quality.

Implement is made from a small percussion flake by shaping the edges by pressure; pressure flake scars are generally short but terminate in feathers at the implements median on the dorsal surface; flaking on the ventral surface is strictly limited to the edges; no flaking has occurred below notches.

Edge Preparation.

None noted.

Hafting Features.

Side notches-left notch 5mm from base, 3mm wide, 1mm deep, right notch 4mm from base, 2mm wide, 1mm deep.

Basal Preparation.

None noted.

Comments.

This implement may have been a projectile point which has been reworked into a drill.

Flesher

F-1. (Fig. 19d).

Material.

Fine quartzite.

Color.

Cream with brown and red inclusions.

Culturally Significant Adhesions.

One spot of pitch on ventral side.

Condition.

Complete.

Measurements.

Length -- 7.5cm, Thickness -- 3.0cm at proximal, 0.7cm at distal, Width -- 8.6cm at median, Weight -- 130.2 grams.

Thermal Alternative.

None noted.

Outline.

Generally oval with proximal and distal ends broader than sides.

Medial Cross section.

Irregular on dorsal surface, slightly convex on ventral surface.

Longitudinal Cross section.

Irregular on both dorsal and ventral surfaces.

Production Stage.

Edged piece.

Traditional Designation.

Hide scraper or flesher.

Flaking Techniques and Patterns.

Percussion flake scars occur only on the ventral surface and were used to even up the edge margin; all end in a step termination only a few cm from the edge; pressure flake scars are only found on the dorsal surface edge and are short and steep so as to create the proper edge angle needed for fleshing hides.

Edge Preparation.

None noted.

Hafting Features.

Probably hand held.

Basal Preparation.

Not applicable.

Comments.

Many flake scar terminations have portions of the flakes remaining which may indicate minimum use of the implement.

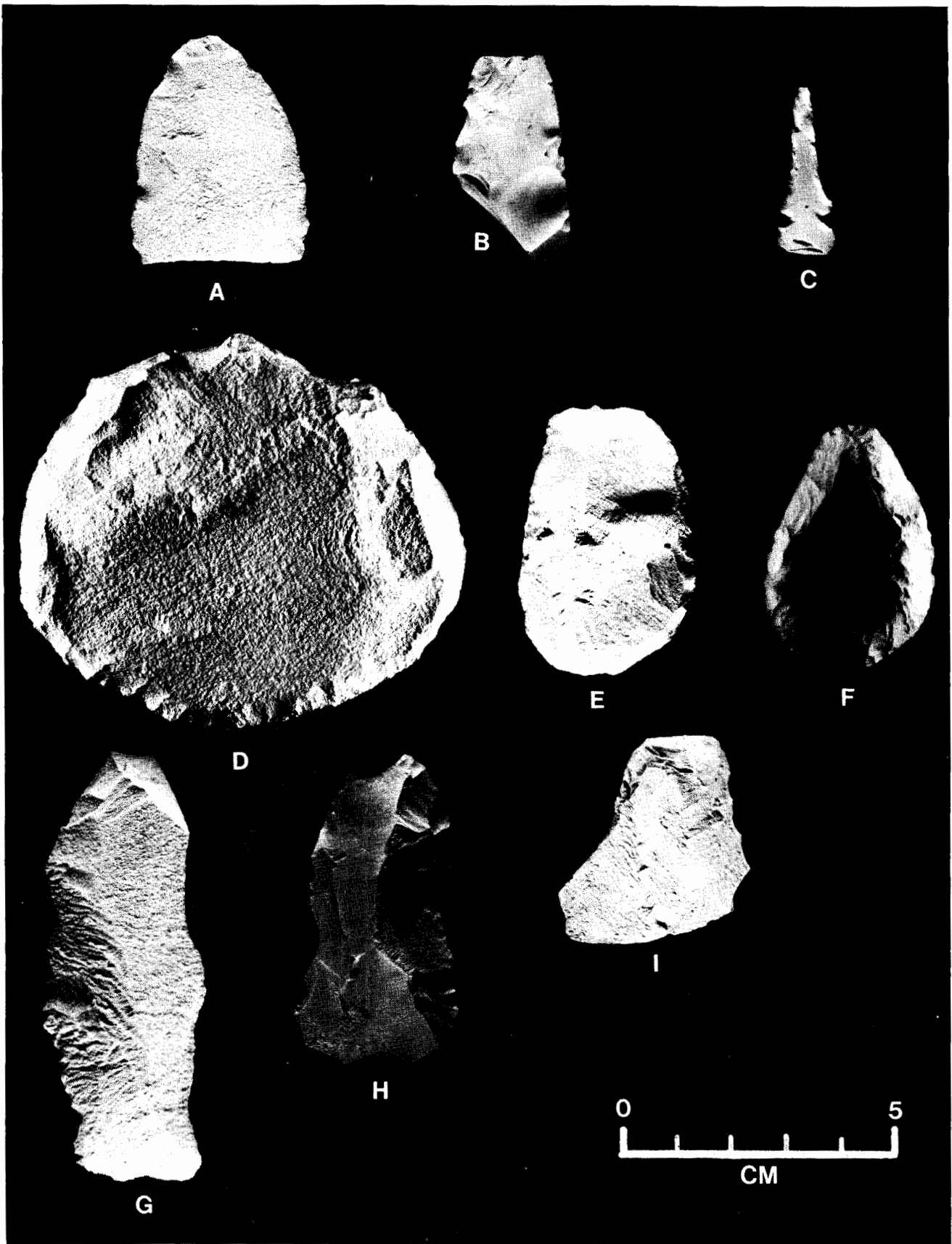


Figure 19. Unifaces, projectile points, drills, fleshers, scrapers, and utilized flakes.

End Scrapers

ES-1. (Figs. 19e, 21t).

Material.

Chert.

Color.

Grayish-tan.

Culturally Significant Adhesions.

None, but distal end of scraper wrapped with buckskin.

Condition.

Complete.

Measurements.

Length -- 5.0cm, Thickness -- 0.6cm, Width -- 3.2cm at distal end,

Weight -- 18.5 grams.

Thermal Alteration.

None noted.

Outline.

One edge straight with the other slightly convex; distal end strongly convex and proximal end is straight.

Medial Cross section.

Dorsal surface strongly convex with ventral surface straight.

Longitudinal Cross section.

Both dorsal and ventral surfaces irregular.

Production Stage.

Edged piece.

Traditional Designation.

End scraper.

Flaking Techniques and Patterns.

Pressure-irregular.

General Flaking Quality.

Dorsal/distal end pressure flake scars are found primarily on the edges with a few small parallel flake scars extending inward; some irregular flake scars are also found on the right edge dorsal surface.

Edge Preparation.

None noted.

Hafting Features.

Distal end wrapped with buckskin; implement handheld (Figure 21t).

Basal Preparation.

Not applicable.

Comments.

Distal edge shows small microflake scars which indicates the implement was used to some degree.

ES-2. (Fig. 19f).

Material.

Chert.

Color.

Tan.

Culturally Significant Adhesions.

None noted.

Condition.

Complete.

Measurements.

Length -- 4.4cm, Thickness -- 0.5cm, Width -- 3.1cm at distal end,
Weight- 14.8 grams.

Thermal Alteration.

None noted.

Outline.

Both edges strongly convex and converging to proximal end; proximal end somewhat pointed (dull) and distal end strongly convex.

Medial Cross section.

Dorsal surface straight with truncated edges, ventral surface straight.

Longitudinal Cross section.

Dorsal surface irregular with the ventral surface straight.

Production Stage.

Edged piece.

Traditional Designation.

End scraper.

Flaking Techniques and Patterns.

Pressure-irregular and parallel.

General Flaking Quality.

Steep short flake scars are evident on the dorsal surface all edges giving the implement a truncated cross-section.

Edge Preparation.

None noted.

Hafting Features.

None noted.

Basal Preparation.

Not applicable.

Comments.

Microflake scars on the dorsal surface of the distal end indicate minimum use as a scraper.

Utilized Flakes

UF-1. (Fig. 19g).

Material.

Fine-grained quartzite.

Color.

Cream.

Culturally Significant Adhesions.

None noted.

Condition.

Complete.

Measurements.

Length -- 8.4cm, Thickness -- 0.6cm, Width -- .2cm at median, Weight -- 0.8 grams.

Thermal Alteration.

None noted.

Outline.

Highly irregular edges with straight ends, dorsal surface slightly convex with ventral surface straight.

Longitudinal Cross section.

Dorsal surface straight with ventral surface slightly concave.

Production Stage.

Unmodified flake without cortex (blade form).

Traditional Designation.

Utilized flake or blade.

Flaking Techniques and Patterns.

Not applicable.

General Flaking Quality.

Not applicable.

Edge Preparation.

Not applicable.

Hafting Features.

Not applicable.

Basal Preparation.

Not applicable.

Comments.

None.

UF-2. (Fig. 19h).

Material.

Chert.

Color.

Light tan with dark brown inclusions.

Culturally Significant Adhesions.

None noted.

Condition.

Complete.

Measurements.

Length -- 5.8cm, Thickness -- 0.7cm, Width -- 3.0cm at distal end, Weight -- 12.6 grams.

Thermal Alteration.

None noted.

Outline.

Both edges highly irregular but somewhat straight and proximal end broken.

Medial Cross section.

Dorsal surface straight.

Longitudinal Cross section.

Dorsal surface slightly convex with ventral surface slightly concave.

Production Stage.

Unmodified flake without cortex (blade form).

Traditional Designation.

Utilized flake or blade.

Flaking Techniques and Patterns.

Not applicable.

Edge Preparation.

Not applicable.

Hafting Features.

Not applicable.

Basal Preparation.

Not applicable.

Comments.

None.

UF-3. (Fig. 19 1).

Material.

Chert.

Color.

Grayish-tan.

Culturally Significant Adhesions.

None noted.

Condition.

Medial and distal sections.

Measurements.

Length -- Not applicable, Thickness -- Not applicable, Width -- Not applicable, Weight -- Not applicable.

Thermal Alteration.

None noted.

Outline.

Edges both highly irregular with proximal end straight.

Medial Cross section.

Both dorsal and ventral surfaces slightly convex.

Longitudinal Cross section.

Dorsal surface slightly convex with ventral surface slightly concave.

Production Stage.

Unmodified flake without cortex.

Traditional Designation.

Utilized flake.

Flaking Techniques and Patterns.

Not applicable.

General Flaking Quality.

Not applicable.

Edge Preparation.

Not applicable.

Hafting Features.

Not applicable.

Basal Preparation.

Not applicable.

Comments.

None.

GROUND STONE

Hammerstones

H-1. (Fig. 20).

Material.

Quartzite.

Color.

Light red-tan.

Culturally Significant Adhesions.

Pitch in a few isolated spots.

Condition.

Complete.

Measurements.

Length -- 4.5cm, Thickness -- 3.5cm, Width -- 3.0cm, Weight -- 120 grams.

Thermal Alteration

None noted.

Outline.

Oval.

Medial Cross section.

Strongly convex (on both dorsal and ventral surfaces).

Longitudinal Cross section.

Strongly convex (on both dorsal and ventral surfaces).

Production Stage.

Not applicable.

Traditional Designation.

Hammerstone.

Flaking Techniques and Patterns.

Not applicable.

General Flaking Quality.

Not applicable.

Edge Preparation.

Not applicable.

Hafting Features.

Not applicable.

Basal Preparation.

Not applicable.

Comments.

The implement has battering on both of the ends indicating it was used as a hammerstone.

Other

OCHER

Material.

Hematite.

Color.

Red.

Amount.

400 grams.

Comments.

This ocher was found in a small bundle and in powder form. Nearly all of the artifacts have been stained by it, some intentionally. There are indications that it was also used to color the more finely tanned pieces of buckskin as they all have a reddish-brown color which does not go completely through the leather objects. It could have also been used in painting the orange sections of the painted leather strap.

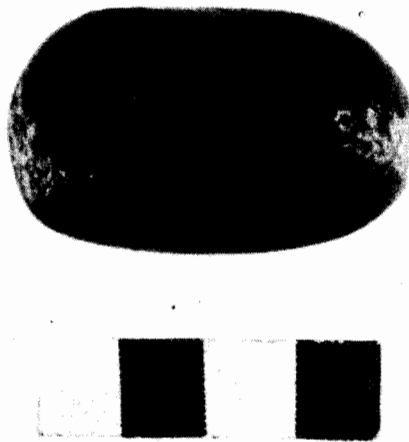


Figure 20. Hammerstone.



Figure 21. Complete stone tool assemblage, except for the large biface (B-1), showing special hafting features of some of the specimens.

DATING

Two pieces of buckskin, about 7.0 grams, were submitted for carbon-14 dating and provided a date of 600 ± 50 B.P. (A.D. 1350) (WSU 2345). This date places the bundle in an era characterized by the arrival of Shoshoni/Ute groups which replaced or co-existed with indigenous Fremont Peoples (Madsen: 1975). As a result, the date provides little help in determining cultural affiliation. Unfortunately, only non-diagnostic stone implements make up the total tool assemblage of the bundle so that typological comparisons to temporally sensitive implements is also not possible. An intensive survey and inventory of the general site vicinity located numerous sites, yet none of these were more than quarry workshop sites so inter-site comparisons are not possible at this time. (See the discussion section of the paper).

TRACE ELEMENT ANALYSIS

The two obsidian artifacts, B-6 and PP-1 were submitted to Lee Sappington, Department of Sociology and Anthropology, University of Idaho for trace element analysis. Sappington uses an X-ray fluorescence process that permits the correlation of aboriginal obsidian. Samples are run on a Tracer Northern Model NS-880 that measures extremely small amounts of elements with atomic weights greater than 20. Intensities of ten elements are recorded but only three -- rubidium, zirconium, and barium -- are used to characterize and identify a sample (Lee Sappington 1979: Personal Communication). Ratios are then plotted on triangular coordinate graphs and compared to graphs of samples from known obsidian sources.

At least sixteen specific sources are fingerprinted in the immediate region of 42Sall94 (Nelson and Holmes 1978). The obsidian biface (B-6) and the projectile point fragment (PP-1) come from different areas. The projectile point fragment (PP-1) appears to have been made from obsidian traced by Nelson and Holmes (1978) to Source 1A, 1b, or 3, all of which are found in the Mineral Mountains in close proximity to each other. The biface (B-6), on the other hand, is comparable to two source areas, Topaz Mountain (Source 4) and the Black Rock area (Sources 8, 9, 2, and 13). (Lee Sappington 1979, personal Communication).

Because of the close proximity to the Mineral Mountains, it seems more likely that the biface (B-6) was made from obsidian found at the Black Rock sources than from the Topaz Mountain source. Trade routes into the Castle Valley area are well documented (Nelson and Holmes 1978), and the bundle owner could considerably have made an expedition to the source area.

DISCUSSION

While the discovery of the Sitterud bundle at 42Em1194 was good fortune, it is not totally surprising, in this cultural context. Within

Castle Valley and all along the eastern edge of the Wasatch Front numerous sites representing cultural groups from Paleo-Indian to Protohistoric have been recorded (Morss 1931; Gunnerson 1956, 1957, 1960, 1962; Taylor 1957; Aikens 1967; Madsen 1975; Schroedl and Hogan 1975; Wilson and Smith 1975;; C. Berry 1974; Winter and Wylie 1974; Berge 1976; Nielson 1975; Berge and Nielson 1978; Berge and Benson 1977; M. Berry 1975; Lindsay and Lund 1976).

Eighteen prehistoric sites have been recorded; within 5km² of the site; all of these were classified as lithic scatters. Local cherts and fine-grained quartzites are abundant in the area and these represent aboriginal exploitation of such resources. Over 85 percent of the Sitterud bundle stone implements are fashioned from this local rock and are similar to those observed at nearby sites. Since the bundle contained stone working tools (i.e. flakers, batons, hammerstones, notchers), its owner was taking probably taking advantage of the local resources to replenish his stone supply tool kit.

Because of the substantial value of the kit and its perishable foodstuffs, it seems unlikely that it was intentionally abandoned.

Attribution of the bundle to a specific cultural group, although desirable, is a difficult task because of its age: (600±50 B.P.) and lack of nondiagnostic tools. The kit comes from a within period when the Fremont, Numic-speaking groups, and an "unnamed Plains-derived" cultural entity (Madsen and Lindsay 1977) simultaneously inhabited the area between 1300-650 B.P. (Lamb 1958; Madsen and Lindsay 1977).

Tentative cultural affiliations may be somewhat possible, based on a few of the artifacts associated with the bundle. Leggings along with highly decorated and painted leather goods are common in ethnographic plains and Great Basin Shoshoni groups (Spencer and Jennings et al 1965; Wissler 1927). Extremely large ceremonial (?) bifaces have also been discovered under non-professional conditions in portions of the Northern Great Basin (e.g. Strong 1968).

It would appear that the Sitterud bundle is affiliated with a Numic-speaking group inhabiting the Castle Valley area after or near the Fremont abandonment though the possibility it is associated with Madsen and Lindsay's unnamed "Plains-derived culture" cannot be ruled out.

There are numerous references to the use of squawbush (Rhus trilobata) prehistorically (Winter 1974) as well as among ethnographic groups (Bye 1972; Euler 1966; Chamberland 1911; Harrington 1967; Steward 1938; Kelly 1964). Berries of the squawbush mature in late summer and are ready for harvest by late July or early August. The berries stored in the legging were probably collected with the intention of eating them fresh. A small bundle of folded squawbush leaves was also found mixed in with the berries. Why the leaves were collected and folded in such a matter is open to conjecture.

Analysis of the chipped stone also revealed useful information. Early observations of prehistoric assemblages (Holmes 1890; Wormington 1957) and recent lithics replication experiments (Crabtree 1972; Muto 1971a, 1971b; Bradley 1975) confirm that a sequence of reduction stages -- blank-preform-tool -- was followed by aboriginal flint knappers. In the Sitterud kit finished tools were found, as well as implements in various stages of production. Two of the unfinished forms appear to be complete, and the remainder are fragmentary portions in various thinning stages. Why such broken implements were not discarded is intriguing.

Since edge examination showed no significant evidence of use they must have been kept for their potential. Obviously, they still held some type of functional value or the owner must have felt some useful tool was still inherent in the fragment just waiting to be chipped out.

Bifaces B-3 and B-4 and uniface U-1 were made out of the same raw material, a honey colored quartzite. U-1 shows signs of platform preparation and is probably the tip of a broken blank or preform. B-3 and B-4, on the other hand, are finished tools of approximately the same width and thickness as U-1. U-1 may be an earlier stage mistake of the production of either B-3 or B-4. Several hafting and handling features were also noted in the assemblage. B-4 apparently was hafted with pitch, a method, noted among the Anasazi of southeast Utah. One of the end scrapers (ES-1) was wrapped with a short strip of tanned buckskin; the large biface (B-1) was held in the middle judging from an interruption in the absence of ocher staining,

In conclusion, the Sitterud bundle appears to be a portable subsistence kit. Not only does it contain a complete stone tool kit, including hide preparing, cutting, and perforating implements, but also the tools required to make such implements. Tool blanks and preforms representing earlier successes, failures, and future tools are contained in the kit. Even clothing and foodstuffs are included. Examples of all of the individual items in the bundle have been found and recorded elsewhere; but nowhere has a comparable assemblage been reported. However, very few, if any, examples of complete kits such as the Sitterud bundle are reported in anthropological literature. It is a unique and valuable addition to the archeological record of the Great Basin and Southwest Plateau. The value of the bundle then depends not only in what it contains, but in the fact that it is probably one of the finest examples of such a subsistence kit found in the Great Basin and Southwest Plateau.

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APPENDIX

General stone implement analysis outline used for the Sitterud bundle.

- A. COLLECTION
- B. ITEM IDENTIFIER
- C. MATERIAL
- D. CULTURALLY SIGNIFICANT ADHESIONS
- E. ITEM CONDITION
- F. METRIC ATTRIBUTES
 - 1. Length
 - 2. Width (with point of maximum width).
 - 3. Thickness
 - 4. Weight (in grams)
 - 5. Edge Angles
 - 6. Tool angle gamma (angle between the longitudinal and bulbular axis).
- G. ITEM FACIAL DESIGNATION (Evidence of original flake orientation).
- H. THERMAL ALTERATION EVIDENCE
- I. IMPLEMENT PLAN VIEW OUTLINE
 - 1. Left side
 - 2. Right side
 - 3. Proximal end
 - 4. Distal end
- J. IMPLEMENT MEDIAL CROSS-SECTION
 - 1. Dorsal
 - 2. Ventral
- K. IMPLEMENT LONGITUDINAL CROSS-SECTION
 - 1. Dorsal
 - 2. Ventral
- L. FLAKE TOOL ORIENTATION
- M. ITEM THINNING STAGE EVALUATION
- N. TRADITIONAL TOOL FORM DESIGNATION
- O. FLAKING TECHNIQUES AND PATTERNS
- P. RETOUCH AND/OR RESHAPING
- Q. FLAKE SCAR TERMINATIONS
 - 1. Dorsal
 - 2. Ventral
- R. FLAKE SCAR SHAPE
 - 1. Dorsal
 - 2. Ventral
- S. EDGE PREPARATION
- T. HAFTING FEATURES
- U. BASAL PREPARATION
- V. COMMENTS

Variables used for I. (Implement Plan View Outline)

- 1. convex- slight, moderate, or strong
- 2. concave- slight, moderate, or strong
- 3. straight
- 4. irregular- sineous
- 5. converging- distally or proximally

Variables used for J. and K. (Cross-sections Medial and Longitudinal)

1. convex- slight, moderate, or strong
2. concave- slight, moderate, or strong
3. straight
4. irregular-sineous
5. truncated
6. triangular

Variables used for L. (Flake Tool Orientation)

1. proximal
2. distal
3. oblique

Variables used for M. (Item Thinning Stage Evaluation)

1. Unmodified flake with/out cortex
2. Edged piece
3. Primary blank
4. Secondarily flaked blank
5. Preform
6. Shaped piece but not highly stylized
7. Highly stylized piece where particular diagnostic attributes are evident.

Variables used for Q. (Flake scar terminations)

1. Feather
2. Hinge
3. Step

Variables used for R. (Flake scar shape)

1. Distally expanding
2. Distally contracting
3. Parallel long
4. Parallel short
5. Wider than long
6. Round
7. Oval
8. Square
9. Irregular

SALVAGE EXCAVATIONS AT
TICABOO TOWN RUIN
(42Ga2295)

by

David B. Madsen

APPENDICES

by

Lorraine Dobra and by Liz Manion

Division of Utah State History
Antiquities Section
Salt Lake City, Utah

May, 1982

ACKNOWLEDGEMENTS

The salvage excavations at Ticaboo were greatly aided by many of the people of the town. Mr. Roy May, project director, Ticaboo Development, and Mr. George Jolley, principal of the school, must be particularly singled out. One of the students at the school, Mike Murrey, provided valuable notes and drawings. Excavations were enhanced by James Kirkman and Lorraine Dobra, who provided assistance during nights on Witch Mountain as well as during the day during salvage operations.

The analysis of the human skeletal material was done voluntarily by Liz Manion and her help is greatly appreciated. Robert Neily assisted with the pottery identifications. Artifactual materials were processed and cataloged by James Kirkman. Photographs are by Lorraine Dobra. Manuscript preparation was handled admirably by Karen Jones.

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ABSTRACT

Salvage excavations at a small site near Ticaboo, Utah (42Ga2295) revealed a small masonry habitation structure and two masonry storage structures. Architectural style and pottery in floor contact suggests construction during late P-II times (A.D. 1050-1150). Two juveniles were buried in one of the storage features. Associated grave goods include "Fremont" moccasins, a Black Mesa B/W, Shato variety bowl, three "Bull Creek" points, and a shell neckless. The presence of both "Fremont" and "Anasazi" diagnostics raises the question of the relationship between artifacts and ethnicity. Were these individuals "Fremont," "Anasazi," "Freazi," or "Anamont?" Is such a question relevant here or elsewhere?

INTRODUCTION

Salvage excavations at Ticaboo Town Ruin took place October 13 through 17, 1981. These excavations were necessitated by vandalism of the site which followed some exploratory and reconnaissance work conducted by a science class at Ticaboo School. Mr. George Jolley, principal of the school, requested the aid of the Antiquities Section, Division of State History, when burials discovered by the students were removed by persons unknown.

The site (42Ga2295 in the State Inventory System) was first identified in 1977 by a survey team from Brigham Young University (Matheny and Gurr 1977). Ticaboo Town Ruin was one of ten sites identified during the survey and, based on ceramics at the site, was provisionally described as a "late Fremont Culture" site. While the current analysis suggests the site is the result of a Pueblo-II Kayenta Anasazi occupation, certain features do suggest rather close interaction to Fremont groups to the north.

The original survey was conducted for the Ticaboo Development Corporation which leased the section of state land in order to develop a variety of home sites and tourist support facilities. When the archaeological survey determined that none of the sites would be directly impacted by these developments, permission to proceed was given, but was based on the proviso that the sites would be protected from secondary impacts caused by increased visitation in the area. Mr Roy May, project director at Ticaboo, has personally been involved in monitoring of the site and has attempted to cope with previous attempts at vandalism and relic hunting by collecting surface artifacts and by piling rocks over exposed bone. Unfortunately, Mr. May's attempts to protect the site were thwarted.

Vandalism at the site consisted primarily of the looting of two burials and the removal of both the skeletal material and associated artifacts. Through the efforts of Messrs. Jolley and May, most of the artifacts and all of the skeletal material, minus crania, were turned into the local security officials. The primary goal of the Antiquities Section staff was to recover these materials, investigate and document the context from which they came and to delineate the nature of the site and investigate possible habitation structures.

PREVIOUS RESEARCH

The major work in the area of the Henry Mountains south to the Colorado River was conducted as part of the Glen Canyon archeological salvage project (Jennings 1966). This work was primarily concerned with the identification of sites to be inundated by the raising waters of Lake Powell and the excavation and analysis of a small portion of those sites. Very little additional work, other than small survey projects associated with energy development and highway construction, occurred for the next 15 years. During the mid-70's, salvage work in the Lake Powell area, specifically in Lake and Moki Canyons, was conducted to help stabilize sites being vandalized as a result of increased visitation (Schroedl 1976, 1978). To the east, along the Highway U-95 right-of-way, salvage excavations were also conducted on a number of sites (Dalley 1973). All of these projects focused on the excavation and analysis of Anasazi deposits related to the whole of the Anasazi time-span. In 1976-77 the University of Utah conducted an archeological field school at sites on the north flank of the Henry Mountains along Bull Creek (Jennings and Sammons-Lohse 1981). The excavation of these sites proved significant due to the extremely mixed composition of Fremont and Anasazi cultural traits. Despite the presence of "Anasazi" architecture and "Anasazi" ceramics, the sites were identified as "Fremont", and the basic questions concerning the identification of material culture items with ethnic groups were not addressed. These questions are extremely important, particularly to the study at hand, since the area is transitional between the Anasazi to the south and the Fremont to the north. What are the differences between these groups, and how do they relate? What is the relationship between artifacts and culture? Given the excavation of an "Anasazi" dwelling containing "Fremont" artifacts, were the occupants Fremont? Anasazi? Both? Neither? In the descriptive studies which have been conducted in the area in the past these questions have not even been asked, let alone addressed. The answers are critical to the explanation of Ticaboo Town Ruin, but are not yet available.

SETTING

Ticaboo Town Ruin consists of three small masonry structures lying at the base of north-south trending cliff formed from Entrada sandstone (Stokes and Hintze 1964) in the middle of the NW 1/4, Sec. 16, T36S, R11E (Fig. 1). The cliff is approximately 100 m high in the vicinity of the site; a steep talus slope (ca. 60°) consisting primarily of weathered sandstone and eolian sand descends another 50 m or so to the Cane Spring Desert where it interfinges with partially stabilized eolian sand dunes. The site is on the relatively level top of the talus slope in an area varying from 2 to 3 m wide and roughly 30 m long (Fig. 2). The view from the site is east across Cane Spring Desert towards Ticaboo Mesa and the Colorado River. Mt. Ellsworth, the southernmost peak of the Henry Mountains is the major feature to the northeast some 3 km away (Fig. 3). The extensive sand plain that comprises Cane Spring Desert consists of eolian sand partially stabilized with about a 40% vegetational cover. Vegetation is primarily sagebrush (Artemisia sp.) and Mormon tea (Ephedra sp.). Other prominent vegetation types are Atriplex sp., Chenopodium

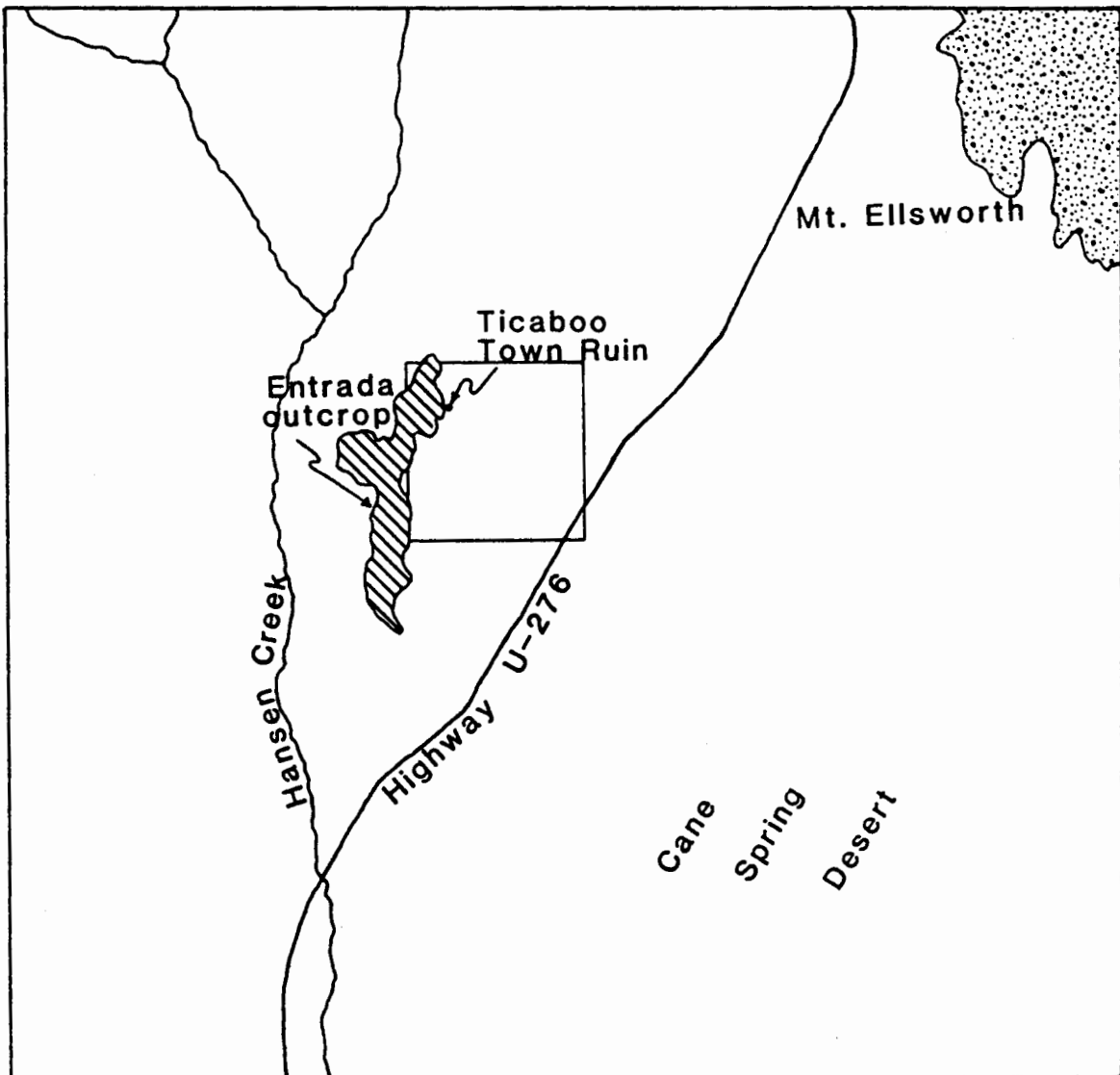


Figure 1 - General location of Ticaboo Town Ruin.

sp., and a variety of grasses such as Indian Rice Grass (Oryzopsis hymenoides).

More specific description of local geology, climates, flora, and fauna are available elsewhere (see especially Woodbury, et. al. 1959; Jennings 1966; Jennings and Sammons-Lohse 1981; Schroedl 1976, 1978) and are not repeated here. One major point which should be stressed, however, is the lack of precipitation in the immediate locale. The nearest weather station of any duration, in Hanksville, has a record average of only about 15 cm a year, with about two-thirds of this falling during the winter months (Jeppson, et. al. 1968).

This amount is insufficient for crop production unless supported by run-off from stored winter water. Since there is no source of run-off in the immediate area, it seems doubtful that horticulture could have been practiced at the site, barring some extensive change in climatic conditions. It is possible that the flood-water farming techniques



Figure 2 - View of Ticaboo Town Ruin looking west up talus slope to alcove in Entrada sandstone cliff.

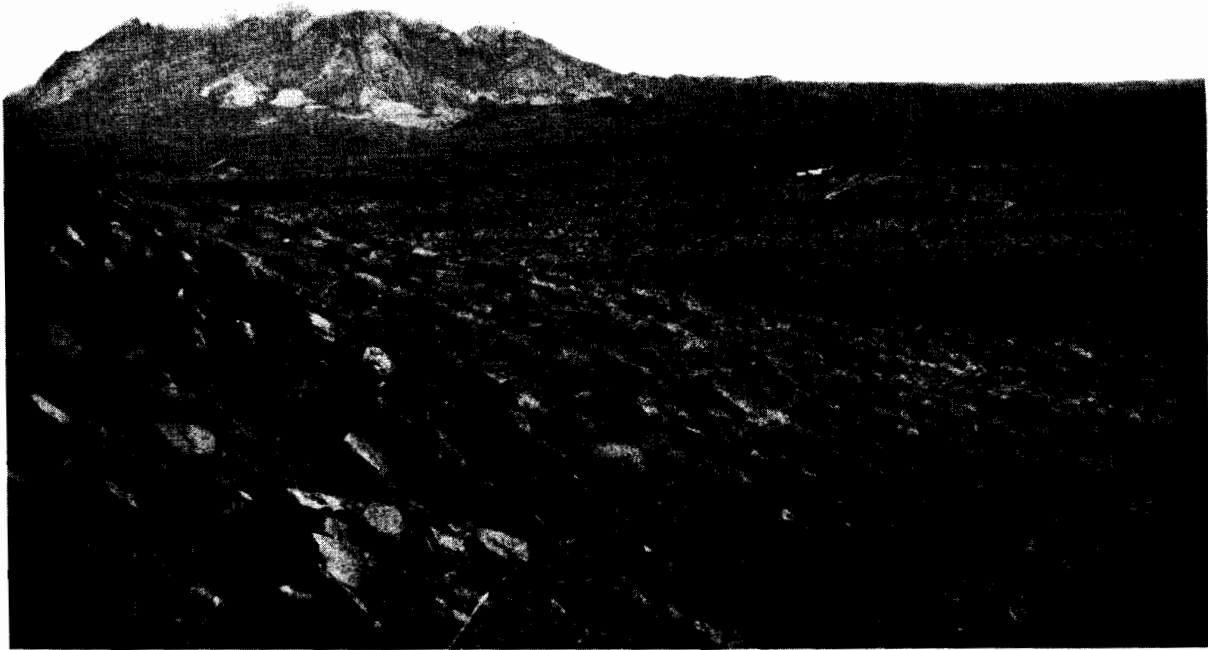


Figure 3 - View from Ticaboo Town Ruin northeast across Cane Spring Desert. Mt. Ellsworth is in the left background.

employed by the Hopi and their ancestral Anasazi groups may have been utilized at the site, but under present conditions, it is doubtful that even these techniques would be successful.

EXCAVATION METHODS

Due to the extremely disturbed nature of the site, resulting from the vandalism and removal of two burials, the focus of the Antiquities Section salvage operation was the clearing of disturbed debris and the mapping of the major features. In addition, limited test excavations were conducted in the area of a possible dwelling structure in an attempt to obtain artifacts and subsistence data in a reliable context.

Three disturbed masonry structures were evident from the outset. Two of these were constructed on large sandstone slump-blocks adjacent to the cliff face. The remaining structure abutted both the cliff face to the rear of the shelter and one of the slump-blocks to the west. The middle structure, Structure II, was the feature from which two disarticulated burials and their associated grave goods had been removed.

The initial procedure was to produce a plan and profile map of the site (Fig. 4 and 5). Once this was accomplished, the disturbed fill of Structure II was removed and screened to recover any additional artifacts

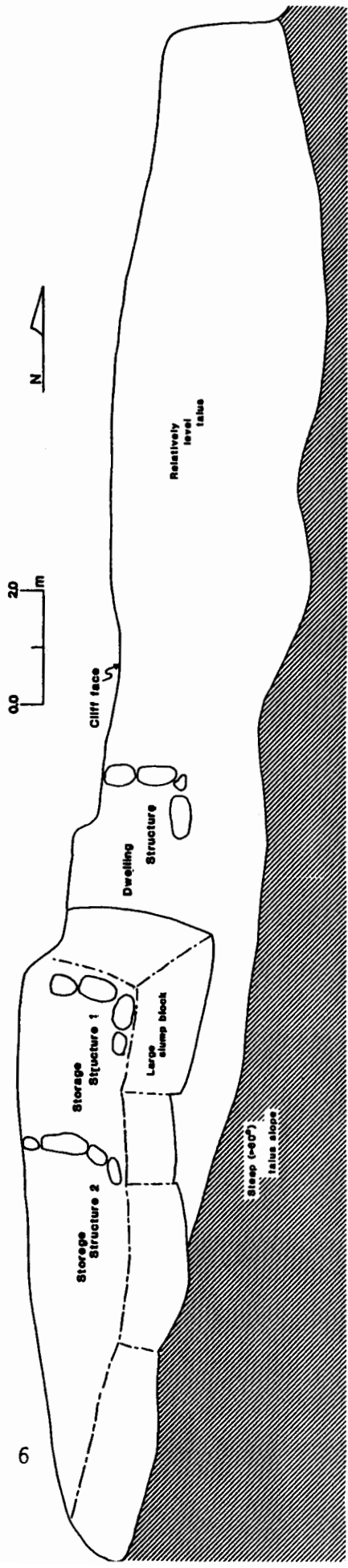


Figure 4 - Plan map of Ticaboo Town Ruin.

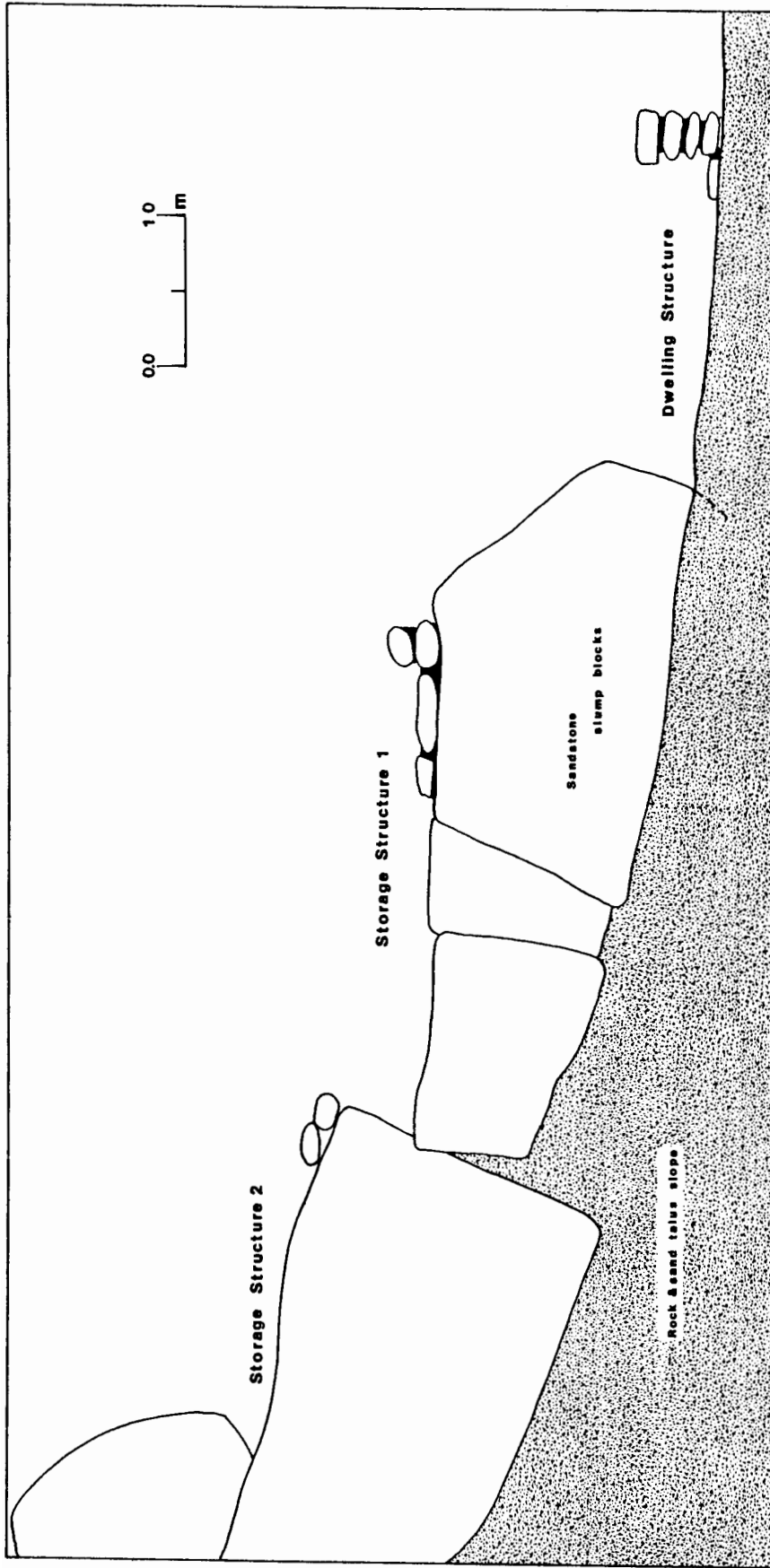


Figure 5 - Profile map of Ticaboo Town Ruin.

associated with the burials. A plan map of this feature was then produced. The final procedure was the excavation of the possible dwelling, identified as Structure I, located north of the slump-blocks on which the other masonry structures rested. Fill from the interior of the structure was removed and screened to reveal a hard-packed, ash-stained floor constructed on the eolian sand which formed a part of the upper portion of the talus slope. The masonry walls of the structure appeared to extend below this occupational level and the north half of the structure interior and a one meter area outside the northern wall were excavated down to sterile material underlying the structure. Artifacts in floor contact, datable organic materials, and fire-hearth samples for flotation analysis were collected from the structure. Further excavation of Structure I was halted to prevent collapse of the structure and to allow for possible stabilization work on the ruin. Structure III, which was subjected to only minor disturbance by the vandals, was left untouched in order to preserve contextual materials for possible later examination.

ARCHITECTURAL FEATURES

DWELLING STRUCTURE

Structure I (Fig. 6 and 7) consists of a wet-laid masonry dwelling



Figure 6 - View of dwelling structure looking southwest at slump-block overhang near cliff face.

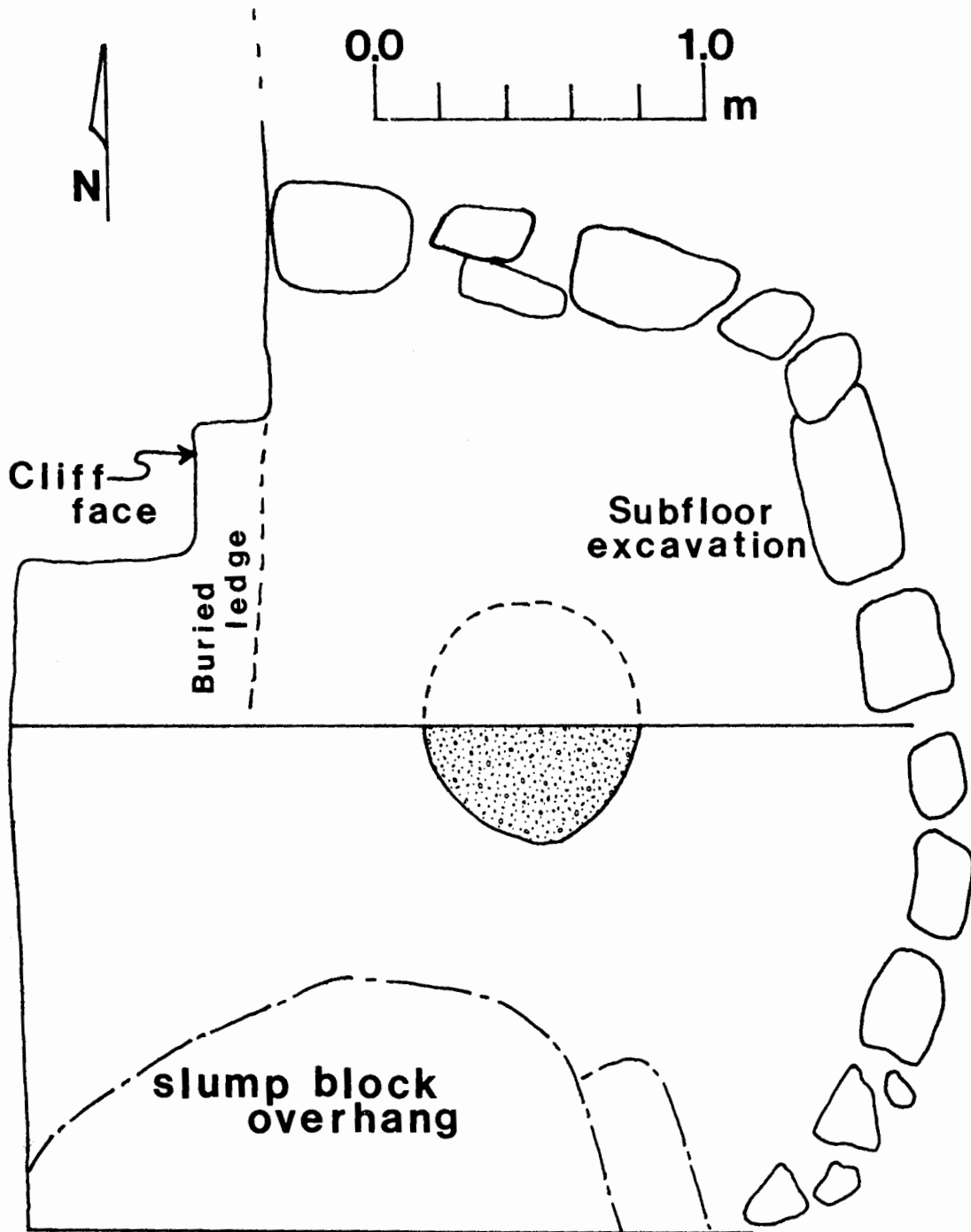


Figure 7 - Plan map of dwelling structure.

set into sterile eolian sand north of the large slump-block debris on the south end of the site. The structure is roughly rectangular with the cliff face forming the west wall, a large over-hanging slump-block forming the south wall, and the east and north walls constructed from shaped and unshaped sandstone slabs. The corner of the east and north wall is rounded and the two walls essentially form a rough semi-circular wall abutting the fixed slump-block and cliff. The sandstone blocks which form the wall range from 20-60 cm in length, 20-30 cm wide, and 10-20 cm thick. The evidence for mortar is limited to thin concentrations of mud in the lower courses, with most the the mortar having eroded away. Seven courses remain on the north wall and only three on the east wall.

The cliff face which forms the rear of the dwelling is irregular; during construction the builders compensated for the irregularities by filling the interior with sand up to the level of a small ledge. This occurred prior to occupation and construction of the interior features (Fig. 8). This interior fill extends to a depth of 57 cm below the floor. The structure walls originate at this lower point and presently

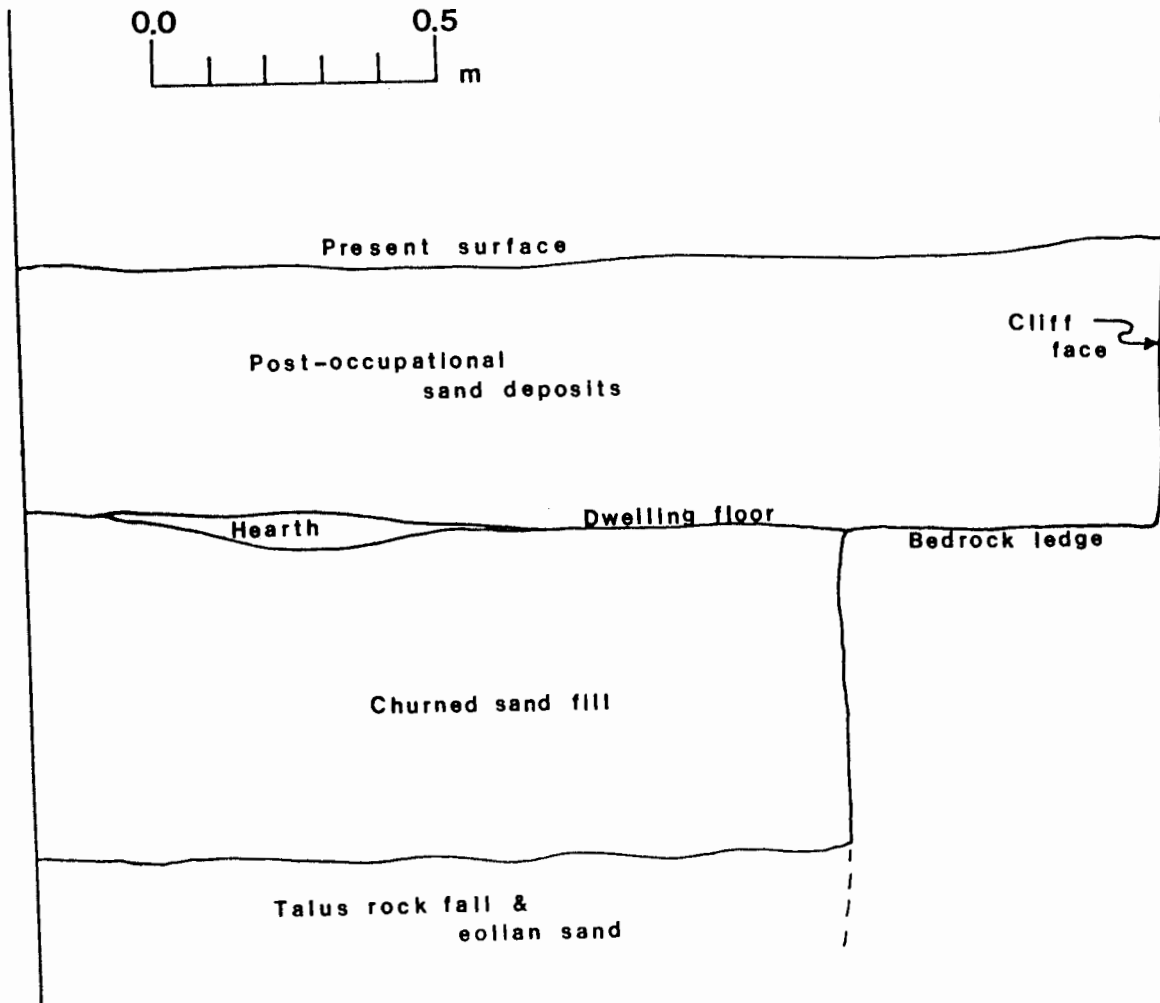


Figure 8 - Cross-section of dwelling structure fill.

are a maximum of 1.2 m in height (80 cm above the structure floor). No openings such as doors or windows were evident in the walls, but a concentration of ash and compact sand directly east of the fire hearth along the east wall suggests that a doorway may have been placed in this area. Maximum dimensions of the structure across the floor are 2.70 m N-S (extending under the over-hanging slump-block of the west) and 2.50 m E-W.

Floor

The floor consists of use compacted red eolian sand prepared by leveling the interior of the structure. In the vicinity of the central fire hearth, it is heavily stained by ash and charcoal. This ash staining and compaction extends east from the fire hearth to the wall. Elsewhere, ash staining and compaction are minimal and the floor is difficult to discern. Other than the central fire hearth, no internal features such as post-holes or subfloor storage pits were detected. Lithic debris, two manos, and 11 sherds of Tusayan Corrugated pottery were recovered from floor contact.

Fire Hearth

The centrally located fire hearth consists of a shallow ash and charcoal filled basin 60 cm in diameter and 8 cm at its deepest point. No fire pit preparations such as a clay lining or rim or sandstone paving were present. Charred plant macrofossil from the hearth include corn, Chenopodium/Amaranthus, two types of grass (dropseed and Indian rice grass, and juniper seed. The hearth is centered 1.54 m from the cliff face and 1.24 m from the north wall.

Fill

The structure fill consists of culturally sterile layers of eolian and slope wash deposited sand extending 43 cm above the floor. The sterile nature of the fill suggests that site abandonment was coincident with abandonment of the structure.

Roof

The lack of internal support features suggests the roof of the structure consisted of logs laid horizontally across the walls and possibly butting into the slump-block overhang and the rear cliff face. These logs were probably covered with branches and mud or earth.

STORAGE STRUCTURE - I

Structure I is a masonry walled storage structure built on top of a large slump-block between the Dwelling Structure and Storage Structure II (see Fig. 4 and 5 for relationship to other features at the site). Both the fill of the structure and the structure itself were seriously disturbed by natural causes and modern relic hunting activities. What little remains of the structure suggests it was constructed of unshaped variably sized sandstone blocks (10 to 85 cm maximum diameter) irregularly set in a mud mortar matrix. The stone is not coursed and the construction techniques are unlike that of the dwelling structure. The cliff face forms the rear west wall of the structure, a second large sandstone slump-block forms the south wall, and the masonry construction

forms the east and north walls. These masonry walls conform to the outer edges of the slump-block on which the structure rests (Fig. 9).

The structure is roughly rectangular and is 1.7 to 2.2 m N-S by 1.9 m E-W. Average wall width is 40 cm. Neither entry features or roof characteristics could be determined from what little remained of the structure. The floor of the structure is very irregular; two 40 to 50 cm wide ledges run along the cliff face at the rear of the structure and a debris filled crack averaging 25 cm wide runs north-south between the cliff face and the slump-block.

Disturbance of the structure originated from a variety of causes. Most significant of these was the relic hunting which completely disturbed the structure fill. Two burials and a variety of artifacts were removed. However, it appears that a significant amount of disturbance to the fill materials was caused by wood rats. Much of the recovered bone and artifacts were coated with amber-rat; a crystalline substance found in wood rat (*Neotoma* sp.) nests. It appears that the wood rats built nests under the rock fall in the fill and seriously disturbed the burials. The partial disarticulation of the skeletal material may be a product of these wood rats. There is also the suggestion that the walls of the structure may have been partially destroyed during the burial process. It appears that the upper portion of the walls were pushed in over the burials once internment occurred.

The original function of the structure is difficult to determine, but it probably served as a storage structure. However, it may have served as a work area or even a dwelling since there is some evidence of a fire hearth on one of the ledges. A roughly circular concentration of ash and charcoal (ca. 60 cm diameter) occurs on the lower edge centered about 60 cm from the cliff face and 40 cm from the southern wall. It appears that this hearth was used prior to the filling in of the structure, and it may be associated with food preparation and/or habitation. Burned bone from the structure fill, identified as mule deer (*Odocoileus hemionus*), may be related to this hearth. Skeletal material from the fill was unburned.

Burials - It is clear that the secondary function of the structure was as a burial crypt. The scattered skeletal remains of two juveniles (see Appendix II for description and discussion) and associated grave goods including a whole ceramic bowl, two sheep horn tools, four projectile points, a string of shell beads, moccasins, and a fragment of a leather garment or pouch were removed either by relic hunters or in an attempt to save the materials from the relic hunters. A description of the burials provided by Mike Murrey, one of the students involved in the original investigation of the site, suggests that they had been partially disarticulated by rodents, but that they were probably buried on their backs in a flexed position with their heads to the north. No additional information could be gleaned from the excavation of the structure. Cause of death could not be clearly determined, but there is indication of a hip problem in both children related to congenital and/or growth disturbances which may be associated ultimately with the mortality of these individuals.

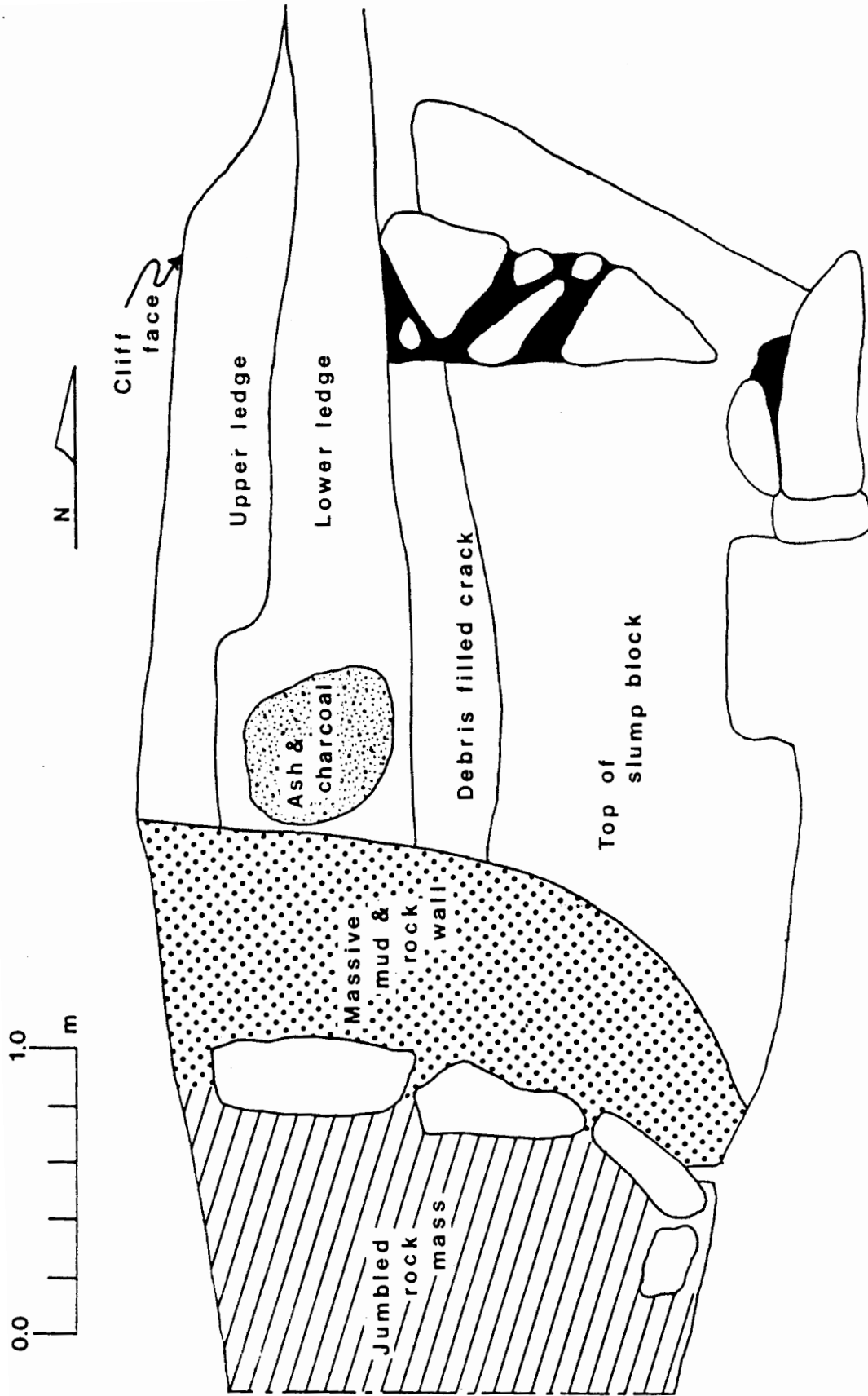


Figure 9 - Plan map of Storage Structure I (right) and possible Storage Structure II (left).

STORAGE STRUCTURE II

A third possible structure at Ticaboo Town Ruin was mapped but not excavated since it was undisturbed. The structure lies south of the storage structure (see Fig. 4, 5, and 9 for relationships to other features at the site) on the upper surface of another, higher, large slump-block. Only the northern wall, adjacent to the structure is clearly of human construction. It consists of a massive (more than 1 m thick) concentration of mud and chunky sandstone blocks which extend east from the cliff face 2 m. The fill of the structure consists of a jumble rock mass derived from recent disturbance, aboriginal destruction, or natural rock-fall from the steep slope on the southern edge of the site. There is a distinct possibility that is not a structure at all, but that the thick mud/rock wall was simply constructed to prevent the fall of rock into Structure II. Other dimensions and the nature of the fill were not determined.

ARCHITECTURAL SUMMARY

Two structures and a possible third were identified at Ticaboo Town Ruin. One functioned as a dwelling, another probably as a storage bin and possibly as a habitation, and the third, if it is a structure, probably as a storage area. The limited midden suggest they were only briefly occupied. Burials in Storage Structure I were probably interred at the time of abandonment or later. Architectural styles fit readily into types produced by PII Kayenta Anasazi groups such as those identified in the Glen Canyon area (Sharrock et. al. 1960; Jennings 1966). The masonry technique used in the dwelling structure most closely resembles the type referred to as "Mesa Verde" while the storage structures were built with "Kayenta" style masonry techniques (Martin and Plog 1973). However, it should be noted that these "styles" are not restricted to these areas and that they grade extensively into each other. Based on dated pottery at the site, it is probable these structures were built about 1100-1150 A.D.

ARTIFACTS

A total of 335 artifacts, including 159 human skeletal elements, were recovered from the excavations at Ticaboo Town Ruin. The majority of these artifacts were recovered from in and around the burials in Structure II, by local Ticaboo residents. While their provenience cannot be exclusively demonstrated, the sketch provided by Mike Murrey and the description provided by Roy May do strongly suggest that these materials are grave goods associated with the interment of the bodies. Provenience of these items are listed in Table I.

The variety of the artifacts at this site clearly demonstrates the difficulty in identifying ethnicity from material cultural items. Grave goods associated with the burials include items commonly found in Fremont "culture" context, items commonly associated with Kayenta Anasazi, and items that occur in both contexts. The association of these diverse

TABLE 1

Provenience of Ticaboo Town Ruin Artifacts

	Tusayan Corrugated	Black Mesa B/W Shato Variety Vessel	Bull Creek Points	Large Corner-notched Biface	Large Triangular Un-notched Biface	Crude Biface Blade	Core/Hammerstone	Primary Flakes	Secondary/Finishing Flakes	Two-sided Mano	One-sided Mano	Palette	Microtine Rodent	Deer (<u>Odocoileus hemionus</u>)	Human	Sheep Horn "Wrenches" (<u>Ovis canadensis</u>)	Shell Beads (<u>Olivella</u> sp.)	Worked Wood	"Fremont" Moccasin	Leather Fragment	TOTALS	
Dwelling Floor	11			1	1		1		13		1		1									
Fill	1		1			1	2	2	32	1		1										
Outside Fill	1								2													
Structure II Fill							1		17					4								
Probable Burial Association		1	3					1	6						153	2	60	1	1	1		
Provenience Unknown									4						6							
TOTALS	13	1	4	1	1	1	4	3	74	1	1	1	1	4	159	2	60	2	1	1	335	

materials with these burials leads directly to the questions of who these individuals were - "Fremont" or "Kayenta Anasazi"? It becomes readily apparent that such a question is rather ridiculous in this context, but if so, why would not the question be equally strange in context further north or south in areas further removed from the Anasazi/Fremont "interface"? These questions have yet to be clearly addressed, let alone explained.

CERAMICS

A partially restorable Black Mesa B/W, Shato variety, bowl and 13 Tusayan Corrugated sherds were recovered from the site (Fig. 10). The bowl was associated with the burials in the Structure II fill, and the sherds were all derived the dwelling structure. Dating of these two pottery types, based on denrochronology, is 1000-1280 A.D. for the Tusayan Corrugated and 1080-1130 for the Black Mesa B/W, Shato variety bowl (Breternitz 1966). Together with the architectural styles, these dates indicate that the site was occupied during mid-Pueblo II times.

Black Mesa B/W Shato Variety Bowl

This bowl, with exterior corrugation and interior painted design, is 10.4 cm deep and has an external diameter of 23.7 cm.

LITHICS

A small variety of finished tools and a relatively large number of un-utilized flakes were recovered from the excavation of Ticaboo Town Ruin. Four Bull Creek points (Fig. 11, a-d) were identified. This point style is common to both Kayenta Anasazi and San Rafael Fremont contexts and date to about 1000 to 1300 A.D. (Holmer and Weder 1980). Three of these Bull Creek points were associated with the burials and one was recovered from the fill of the dwelling structure. Two large bifaces, which probably served as hafted knives, were recovered from the floor of the dwelling structure (Fig. 11, e-f). One is corner-notched and the other has no identifiable elements. The corner-notched specimen is usually identified as Elko corner-notched in Fremont contexts, but is not usually referred to by a given name when found in Anasazi contexts. A single unique implement is a crude triforce, roughly triangular in cross-section (Fig. 11, g.). Its function is unknown. Seventy-seven unretouched flakes and three core/hammerstones were also recovered. The core/hammerstones exhibit battering and flake removal and may have been used for either or both purposes. Only three of the 77 flakes show any weathered cortex, and it is apparent that most of the tool production at the site was based on the reduction of partially worked materials imported to the site. The stone type is a chert/chalcedony that ranges from a variegated pink to white. The predominant type is known commonly as "Pidgeon Blood Agate".

Bull Creek Points

Dimensions and material type of the four points are: Fig. 11, a. - length = 6.4 cm, basal width = 1.3 cm, thickness = 0.3 cm, weight = 3.1



Figure 10 - Black Mesa B/W, Shato variety bowl (a); Tusayan Corrugated sherds (b-c).

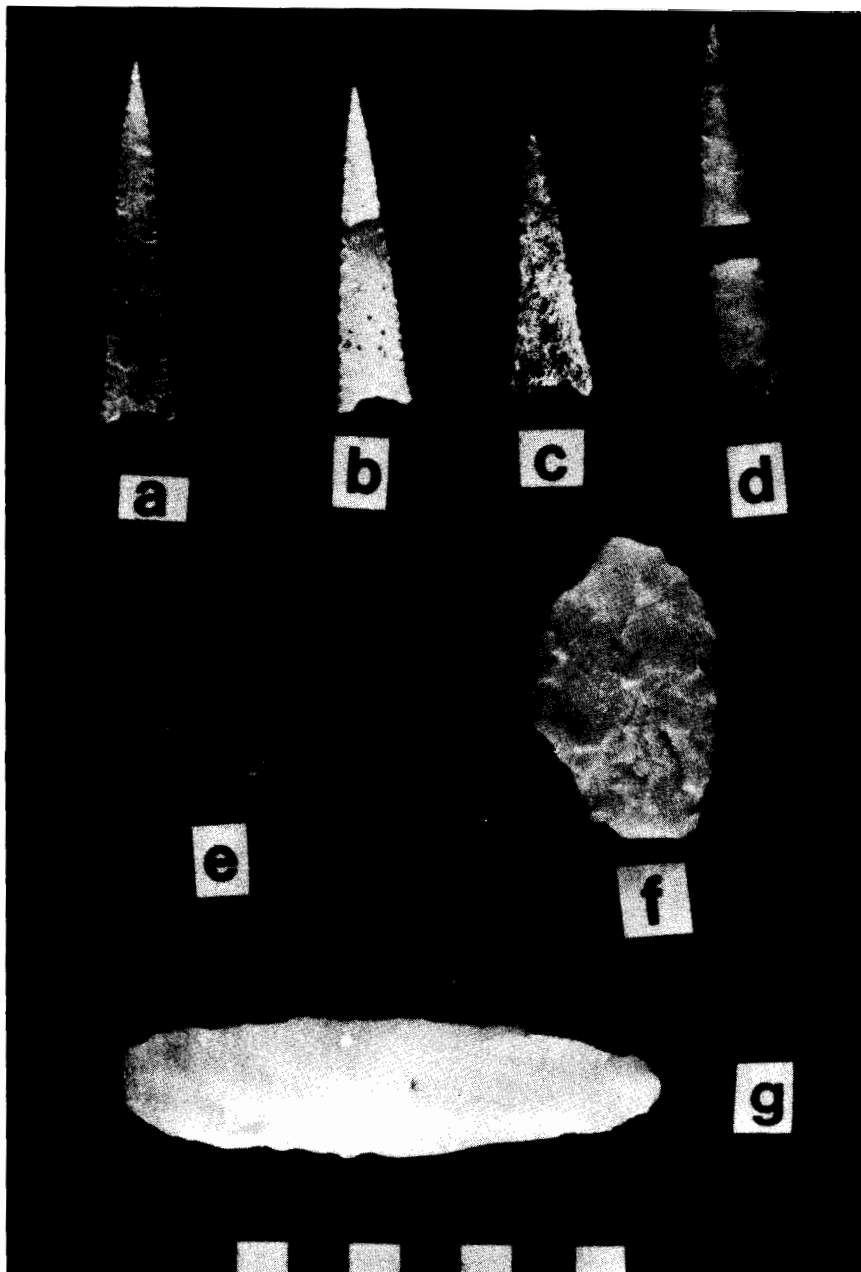


Figure 11 - Bull Creek points (a-d); large corner-notched biface (e); large un-notched biface (f); crude triface (triangular in cross-section) (g).

g, material = chert/chalcedony; Figure 11, b. - length = 5.6 cm, basal width = 1.4 cm, thickness = 0.3 cm, weight = 3.1 g, material = chert/chalcedony; Fig. 11, c. - length = 4.6 cm, basal width = 1.5 cm, thickness = 0.3 cm, weight = 3.0 g, material = chert/chalcedony; Figure 11, d. - length = 6.2 cm, basal width = 1.3 cm, thickness = 0.2 cm, weight = 3.2 g, material = chert/chalcedony. Comparative specimens: Holmer and Weder (1980), Figure 9, v-x.; Jennings and Sammons-Lohse 1981, Figure 35, s-z.

Large Corner-notched biface

Dimension and material type are: basal width = 1.9 cm, neck width = 1.45 cm, maximum blade width = 2.5 cm, material type = chert/chalcedony. Comparative specimens: Sharrock et. al. 1961, Figure 84, m.; Jennings and Sammons-Lohse 1981, Figure 35, g.

Crude triface

The dimensions of a large crude triface with three bifacially worked cutting edges and three relatively flat surfaces are: length = 9.5 cm, width = 2.4 cm, thickness = 1.6 cm, material = chert/chalcedony.

GROUND STONE

Two manos and a stone palette were recovered from the floor and fill of the dwelling structure (Fig. 12, a-c). Both manos are of sandstone and both are of the one hand variety. The whole specimen is made from a small unshaped sandstone block and is ground on two opposing faces. The other specimen is broken and has been shaped for use. It has only one flat grinding surface. The palette consists of a small, flat sandstone slab on which a red pigment, probably hematite, has been ground into a powder. It is otherwise unmodified.

Dimensions - Two sided mano - maximum length = 12.1 cm, maximum width = 8.7 cm, maximum thickness = 6.3 cm, grinding surfaces are 8.7 x 6.2 and 10.4 x 6.3 cm; One sided mano - maximum width = 8.4 cm, maximum thickness = 2.8 cm; Palette - maximum length = 9.0 cm, maximum width = 8.3 cm, maximum thickness = 1.2 cm, grinding surface is 5.7 x 4.7 cm.

BONE - WORKED and UNWORKED

The bone from Ticaboo Town Ruin is limited, consisting of 159 elements of human skeletal material, four elements of deer (Odocoileus hemionus), an element from an unidentified microtine rodent, and two horn-core elements from mountain sheep (Ovis canadensis). All the human material appears to be related to the two burials; the deer bone is burned and originated from the fill of Storage Structure II. It may well be related to the possible hearth in that structure. The rodent element is derived from the hearth in the dwelling structure. However, it is unburned and may be intrusive. The human bone is described separately in Appendix II.

The two sheep horn-core elements (Fig. 13, a & b), have been worked in different ways. The complete specimen has been ground flat on its proximal end. Striations occur perpendicular to the long axis of the

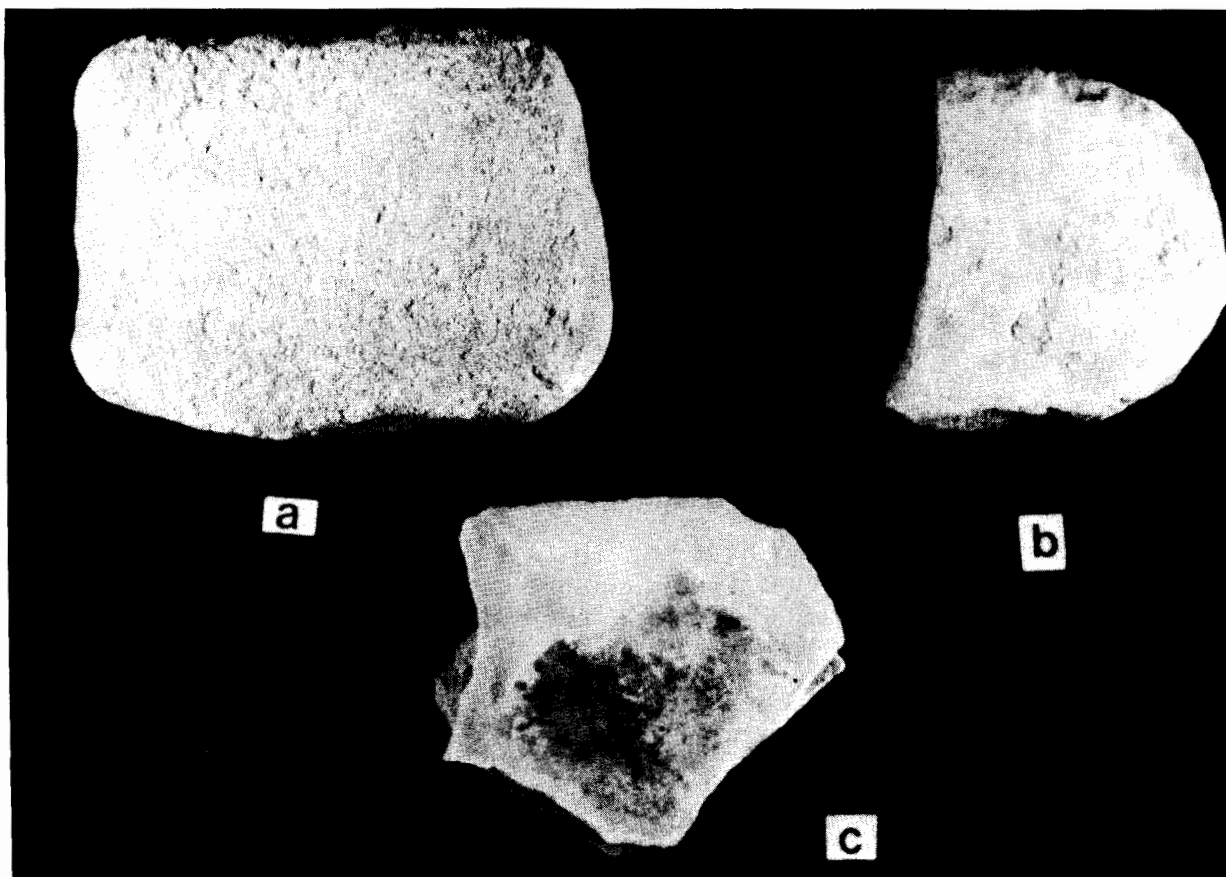


Figure 12 - Two-sided mano (a); One-sided mano (b); Palette (c).

horn and a distinct polish occurs on the convex curve of the horn in the area adjacent to the striations. It appears the horn was used as a smoothing tool of some kind, with relatively soft materials such as leather, sinew, and plant fiber drawn across the outer curved edge and across the flat working surface of the horn. I am aware of only one similar specimen in Anasazi contexts from Cave Du Pont (Nausbaum 1922), although that specimen was polished on its concave edge. A poorly described specimen from a Fremont cave deposit near Fruita appears to be similar (Morss 1931). The fragmentary specimen is unworked except for a small area in the center of the horn which has been ground smooth and is impregnated with a red pigment. It appears to have served as a palette in the production of pigments such as hematite. Both sheep horn specimens are associated with the burials and the fill of Structure II.

SHELL

A necklace of at least 60 ground shell beads occurred in association with the burials (Fig. 14). Drawings provided by Mike Murrey suggest the necklace was around the neck of the older individual. The beads are threaded on six-ply fiber cord composed of six 2-ply strands. The

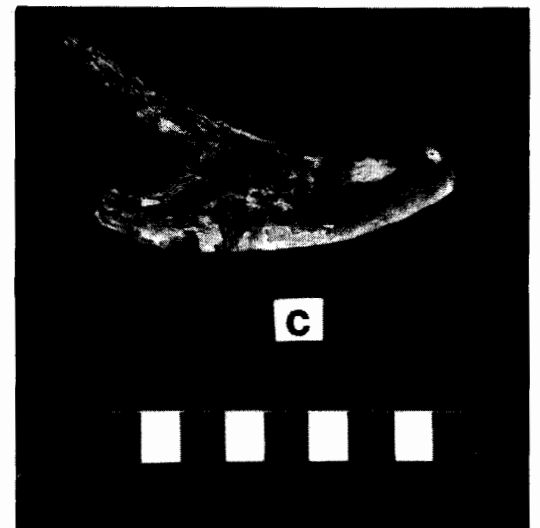
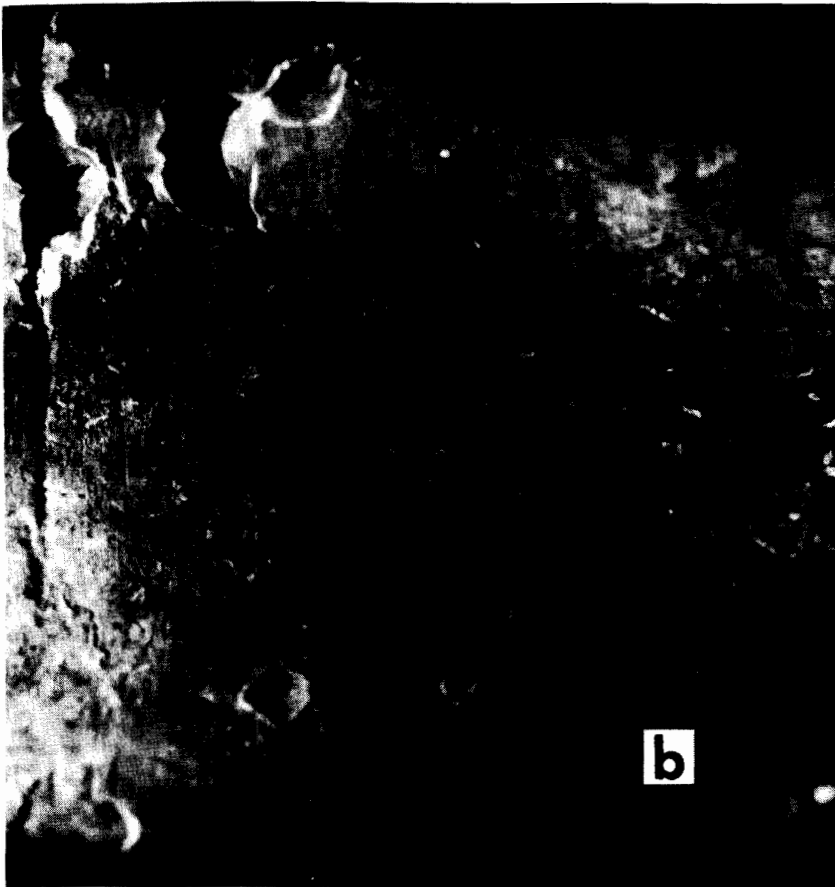
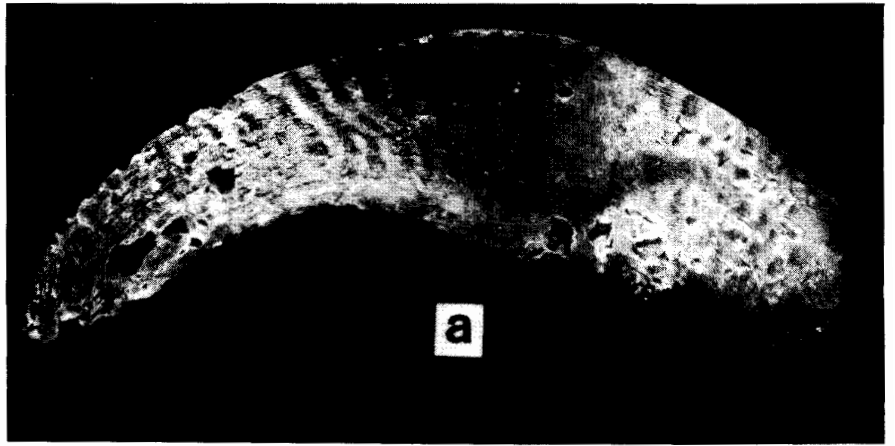


Figure 13 - Sheep horn "smoother" (a); close-up of polish and striation on "smoother" (b); sheep horn palette - note area of ground pigment in center of blade (c).

individual two-ply strands have an s-twist and the over-all cord has a z-twist. The fiber appears to be of plant fiber, possibly Yucca, but this cannot be positively determined. The shell beads have been constructed by removing both the proximal and distal portions of Olivella sp. shells. The ends as well as the outer surfaces have been ground, smoothed, and polished. Average diameter of the beads is 0.5 cm, average length is 0.5 cm. The use of these shell beads may be related to the shell industry and trade centering in the Hohokam area of central Arizona (Haury 1976; Dungan 1982).

MOCCASIN and LEATHER

One of the most distinctive characteristics of Fremont vs. Anasazi material culture items is the use of leather moccasins by the Fremont and woven fiber sandals by the Anasazi. I am aware of only one moccasin in an Anasazi context, and it is described as a "possible Fremont-type moccasin" (Osborne 1980). I know of no woven sandals in Fremont contexts. However, the moccasin recovered from Ticaboo Town Ruin does not fit into the classic Fremont style of leather footgear. Fremont moccasins are characterized by a piece of leather which crosses the top of the foot, wraps over the toes and forms about half of the sole. This is attached to another piece, often containing the dewclaws of sheep or deer, which serves as the sole beneath the heel (Morss 1931; Aikens 1970). The moccasin from the burial association at Ticaboo Town Ruin is more like a modern shoe, however. It has a flat sole composed of two pieces; a large piece serving as the primary sole and a second small



Figure 14 - Olivella sp. shell bead necklace.

piece directly under the heel (Fig. 15, 16). The upper portion of the moccasin consists of three pieces stitched to the outer edge of the sole. Two forward pieces are stitched together lengthwise at the top of the foot running from the toes to the ankle. The remaining piece runs around the back of the heel and is stitched vertically to the two forward pieces just in front of the ankle. The sole of this specimen has been patched along the outer edge of the foot. The stitching is a simple running stitch throughout. The hide (at least the upper pieces) is from deer (Odocoileus hemionus), with the hair side out. Stitching is both leather strips and z-twist plant fiber twine.

LEATHER FRAGMENT

A piece of thin, well prepared leather with knotted leather cords attached was also found in association with the burial (Fig. 16). The material appears to be too thin to have been suitable for moccasin construction, and it may be derived from a garment or pouch.

WOOD

Two fragments of wood of an undetermined plant type exhibit some evidence of wear. The wear could easily be the result of natural wind and/or water erosional processes or may be the result of cultural use. However, the pieces are too fragmentary to determine possible functions. Both were derived from the burial association or the fill of Structure II.

ARTIFACT SUMMARY

There is a broad array of artifacts from Ticaboo Town Ruin despite the rather limited total number. Pottery, worked bone, shell beads, projectile points, ground stone, and leather garments together should provide a rather substantial interpretive base. Unfortunately, the nature of these artifacts confuses rather than clarifies many problems. The pottery is common to the south in Kayenta Anasazi sites during PII times (roughly 900-1150 A.D.); moccasins are found in Fremont contexts to the north from A.D. 700-1200, Bull Creek points are found in both Fremont and Kayenta contexts from A.D. 1050-1300. Moccasins are virtually non-existent in Anasazi contexts. The pottery is totally "Anasazi", no "Fremont" types were recovered. Given these varied associations, who then were the individuals buried at Ticaboo Town Ruin? Are they "Fremont" or are they "Anasazi"?

SUMMARY AND INTERPRETATION

An interesting phenomenon emerges when reviewing the literature of the general area around Ticaboo Town Ruin. Sites are categorized on the basis of selected artifact types as being occupied by "carriers of the Fremont culture tradition" (Fowler 1963:33) or "the ceramic complex shows the primary occupancy of the plateau to have been the result of a direct northward extension of Kayenta culture bearers..." (Fowler and Aikens 1963:8). This despite the presence of "Anasazi" artifacts in the Harris Wash area of the former and the presence of "Fremont" artifacts in the Kaiparowits Plateau area of the latter. This is not seen as a problem,

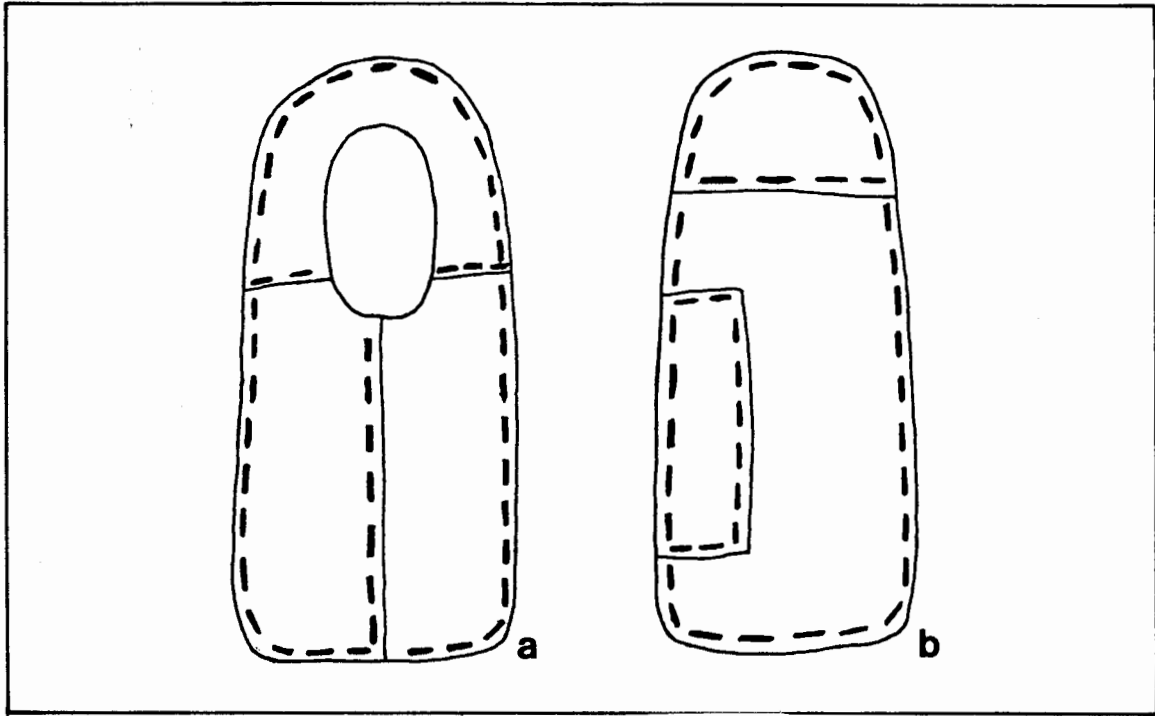


Figure 15 - Moccasin construction pattern; top view (a); bottom view (b).

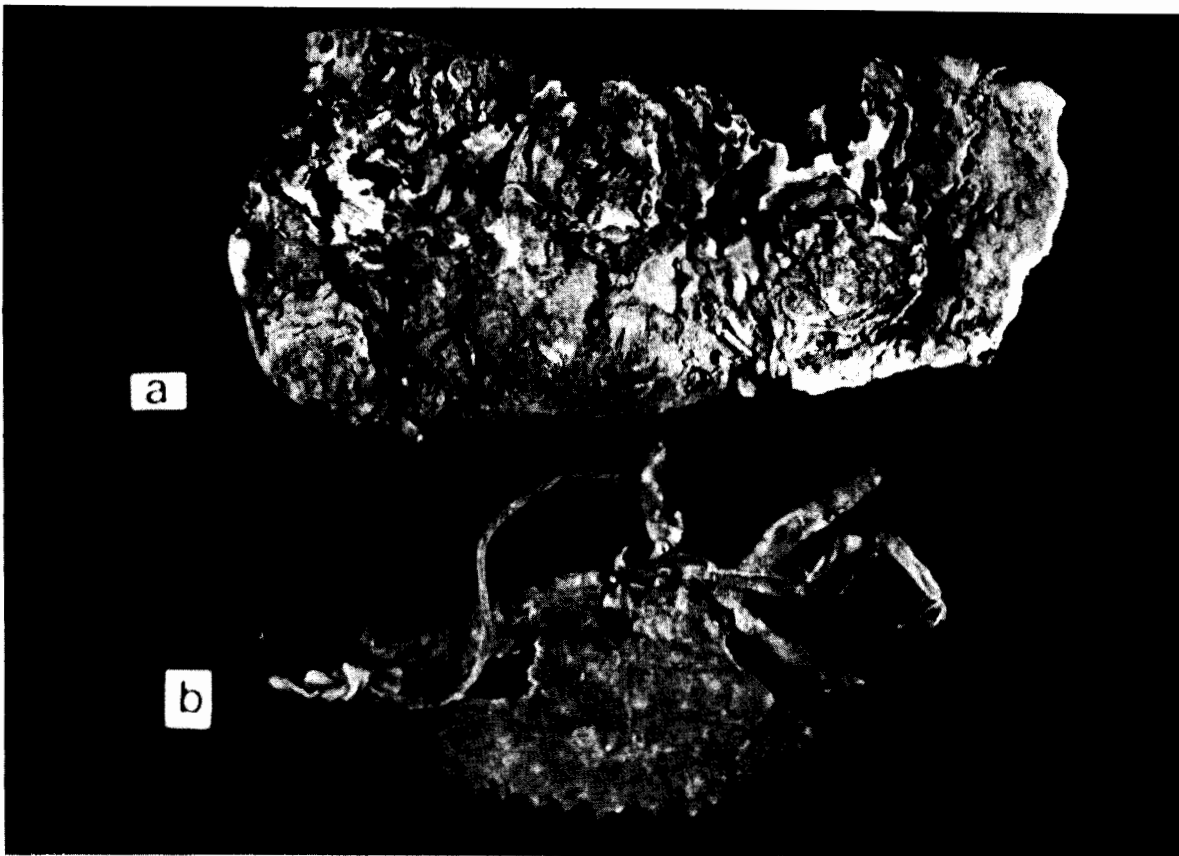


Figure 16 - Moccasin (a); leather garment or pouch fragment (b).

however, since these foreign artifact types can be ascribed to trade or that "...these sherds indicate at least visits to the plateau by Fremont Culture bearers, and considering proximity, this seems likely" (Fowler and Aikens 1963:11-13). This interpretation is characteristic of a cultural/historical approach that attempts to classify archeological "culture" in time and space by grouping particular traits and identifying them, at least implicitly, as ethnically definable groups. It is implied, if not stated outright, that these material culture items occur as the result of depositions by genetically and linguistically identifiable groups with specific histories.

This approach is sometimes useful in terms of organizing data, and it is inappropriate to castigate investigators working 20-30 years ago, but in the end the approach is of limited utility and in particular situations, can lead to an interpretive morass such as the Ticaboo Town Ruin or the Bull Creek sites (Jennings and Sammons-Lohse 1981). These sites, several of which were dominated by "Anasazi" ceramics and architectural features, were all blithely identified as "Fremont". From the published material, it is impossible to tell why this occurred, and I can only assume that it was primarily because the excavators of the sites were primarily "Fremont" archeologists. The unfortunate aspect of the designation of these sites as "Fremont" is that the real problem is avoided. If one simply makes a choice and assigns the site to one or another cultural group, one avoids the problems of how and why such designations are made in the first place and what they mean. It is quite obvious at the Bull Creek sites, as well as Ticaboo Town Ruin, that on the basis of material traits, the sites could be either Fremont or Anasazi or both. What then is the utility of making such a designation at sites like these? What questions are answered? What explanations given?

The problem is crystal clear in sites like Ticaboo Town Ruin. Given a grave containing Fremont moccasins, Anasazi pottery, points common to both complexes, just what were the individuals in the grave; Fremont? Anasazi? perhaps Freazi or Anamont? The problem is not clarified with the presence of complexly manufactured artifacts such as basketry as suggested by ADOVASIO (1980). His suggestion that any population that makes "Fremont" basketry must per force be Fremont, may or may not be valid, but had such a basket been interred with the Ticaboo burials, would that make them Fremont?

In sum, I do not know whether Ticaboo Town Ruin is a "Fremont" or an "Anasazi" site. What can be determined is that it is a small habitation site containing one dwelling and two probable storage structures. One of these storage structures was subsequently utilized as a burial chamber for two juvenile individuals whose demise may be related to hip problems. Artifacts at the site include moccasins, Bull Creek projectile points, Tusayan Corrugated and Black Mesa B/W Shato variety pottery, worked mountain sheep horn, and ground stone implements. It is unlikely the site was associated with the production of domesticated crops despite the presence of corn macrofossils. It is likely it is associated with the collection of wild crops such as dropseed and Indian rice grass.

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APPENDIX I

Macro-floral Remains from 42Ga2295
at Ticaboo, Utah

By

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INTRODUCTION

One-half of the fire hearth contents (top to bottom) within the dwelling structure was collected during excavation for retrieval of macro-floral remains. In the laboratory this sample was processed using a froth-flotation water technique to separate the organic materials from the inorganic soil matrix. The sample was placed in a bucket of water which was agitated with water pulsing from a wide-spray nozzle and then stirred. This enabled the organic materials, which have a specific density less than water, to float to the top. These materials were scooped off and removed to dry. Later these organic remains were placed through a graduated screen series with mesh of: .0787 per inch, .03331 per inch, and .0165 per inch. The size-sorted sample was then scanned under a binocular dissecting microscope at powers between 10x-70x, and identifiable botanical and bone remains were extracted. Table I presents a list of recovered items.

DISCUSSION

The purpose of extracting botanical remains from the fire hearth is to examine some clues about plant use and diet of prehistoric Indians. What we recover is, of course, biased information in several ways. Foods eaten raw and "greens" are generally eliminated from a hearth sample. The items with the greatest chance of preservation are those too small to be noticed or worth retrieving when they fall into the fire. Those seeds not crushed during the grinding process can escape onto the floor of the room and subsequently be swept up and deposited with light trash in the hearth. Chance and nature both play a role in determining what seeds or plant parts are charred just enough for preservation but not enough to incinerate and destroy the material.

It is tempting to consider all botanical remains from archaeological soil samples as being of economic importance either as food, fuel, or various other uses. However, it would be a mistake to unconditionally make this assumption. Rodents also like to eat and store seeds, so that any uncharred seed materials recovered could indicate either rodent or human activities. For this reason when sampling loci other than obvious caches of seeds found in vessels, many ethnobotanists (Keepax 1977, Minnis 1981) prefer to deal only with charred botanical remains, assuming this condition indicates human manipulation. Where rodent activity is evident, this approach is essential even though in some instances it could lead to an error on the side of conservatism. At 42Ga2295 there is abundant evidence of rodent disturbance and nesting materials throughout the site and also within the hearth sample itself in the form of rodent bones. The bones may indeed represent part of the prehistoric diet, but other telltale signs of rodent tunneling within the rooms make it necessary in this report to disregard uncharred botanical remains as non-cultural intrusives.

This injunction against uncharred remains actually only applies to one item extracted from the sample: Oryzopsis hymenoides (Indian rice-grass). Eight indurate lemmas, parts which protect the floret and seed, were found. A help in specific identification of the lemmas was the oblique callus which is a distinctive trait of O. hymenoides. Their

TABLE I

PLANTS

<u>Scientific Name</u>	<u>Common Name</u>	<u>Plant Part</u>	<u>Charred</u>	<u>Amount</u>
<u>Zea mays</u>	corn	kernel (endosperm)	yes	one (fragment)
cf. <u>Juniperus scopulorum</u>	juniper	seed	yes	one (fragment)
cf. <u>Sporobolus</u>	dropseed (grass)	seeds	yes no	approx. 3000+ one
<u>Oryzopsis hymenoides</u>	Indian rice- grass	lemmas	no, may possibly be parched	eight
<u>Chenopodium/ amaranthus</u>	goosefoot/ pigweed	seeds	yes	fourteen (includes some fragments)
<u>Miscellaneous</u>				
cf. Gramineae	grass	charred mass with 3 seeds cf. Gramineae and other side with leaf impression		
cf. Gramineae	grass	charred mass with 1 seed cf. Gramineae		
cf. Gramineae Cheno/AM	grass, goose- foot, pigweed	fused charred seeds, 2 cf. Gramineae, 2 cf. Cheno/am		
unknown	unk.	fused charred mass with unidentifiable seeds		

BONES

rodent	caudal jaw fragment	no yes	two
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condition is difficult to determine because the hairs and awn are no longer present. This may denote either normal deterioration or perhaps light parching of the seeds to separate them from the palea and lemma. O. hymenoides is a highly nutritious grass seed favored by Indians when it was available (Castetter 1935). It is therefore possible that O. hymenoides could represent a portion of the prehistoric human diet, but we will consider it as a rodent intrusive since the lemmas are not charred.

The remainder of the botanical material consists of charred seeds with two exceptions. These are one uncharred seed each of cf. Sporobolus and Chenopodium/Amaranthus, both of which are represented by many other seeds that are charred.

Several thousand seeds of grass similar to the genus Sporobolus (Dropseed) were extracted from the hearth. This type of grass was often utilized by historic and prehistoric Indians (Castetter 1935, Whiting 1939, Doebley 1976, Bohrer 1975, Adams 1980) because it is not only nutritious, but the seeds will easily drop free from the plant when it is lightly hit thus making collection simple.

A third type of grass seed found in the sample is a cultivated one: Zea mays (corn). This plant is represented by one kernel fragment with the endosperm intact but the scutellum partially destroyed. Both the Fremont and Anasazi Indians of Utah were horticultural people whose main cultivated crops consisted of the corn, beans and squash triad. This complex was often supplemented by locally available wild plants many of which are found in our sample.

A frequently utilized group of plants are the Chenopodiums (Goosefoot) and Amaranths (Pigweed). It is often not possible to distinguish between them by only their seeds because they are so closely related to each other and so will hereafter be referred to as Cheno/ams. They are disturbance habitat plants and are usually found growing on trash heaps or in cultivated fields. When young, the leaves are gathered as "greens", but they are also valued for the numerous small but tasty seeds they produce. Ethnographic reports document use of Cheno/ams by Zuni (Stevenson 1915), Acoma and Laguna (Swank 1932), Papago (Castetter and Bell 1942), Navajo (Standley 1911) and Hopi (Whiting 1939) tribes. The last single seed-type extracted from the sample is difficult to identify but is most likely from a Juniper tree. It was probably charred as part of a branch fueling the fire. The remaining materials are all fused and/or massed seeds in a matrix of unidentifiable matter. This matrix could either be other seeds or perhaps part of the ground-seed meal. It is interesting to note that in many cultures around the world, it is customary to offer a pinch of meal to the gods when preparing or eating food.

It is difficult to say much about seasonality of occupation given the limited sample and recovery from the site. This is compounded by the presence of storage structures which can extend the duration of availability of plant materials. However, a brief inspection of the harvesting periods, especially of the wild plants, shows a dominance of late summer - early fall types. O. hymenoides, the possible intrusive seed, is the only item with a distinct late spring - early summer collection period. The Cheno/ams have a shifting seasonality depending on local environments. Under conditions of high moisture their seeds may be available from spring through fall. Z. mays is generally harvested in

late summer/early fall. Sporobolus spp. is in seed from late summer through fall also.

The botanical remains extracted from the fire hearth at Ticaboo indicate that part of the diet of the prehistoric inhabitants consisted of Zea mays (corn), a Sporobolus-like grass seed (Dropseed), and seeds of Chenopodium/Amaranthus. It is also possible that when rodents were caught, they were eaten since some bones were found in the sample.

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APPENDIX II

Gross Analysis of Two Human Skeletons Recovered
from
Ticaboo, 42Ga2295
Garfield, Utah

By

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INTRODUCTION

Two juveniles were recovered from a granary from the Ticaboo site (42Ga2295) in the southeastern quarter of Utah.

42Ga2295-1

The first juvenile was nearly complete, missing only a portion of the posterior cranium, a few maxillary and mandibular teeth and several bones of the hands and feet. Bone condition was excellent with mummified skin still attached to the sternum, the posterior left ulna, and part of the proximal hand joint.

Age of this juvenile, based primarily on the dental eruption, was 8 years + 24 months (Ubelaker 1978:112). All of the deciduous teeth had erupted with primary dentine exposure of the recovered teeth. Erupted permanent maxillary teeth included only the left and right first molars with slight enamel polishing. Fully formed unerupted maxillary teeth included the central and lateral incisors. In addition, buds of the second maxillary left and right molars were present. Erupted permanent mandibular teeth included both central incisors and both first molars, all showing slight enamel polishing. Erupting teeth included only the lateral incisors. Like the maxillary dentition, buds of both second molars were present (Fig. 1). Independent aging of the long bones indicated the youth to be 5.5-6.5 years with a tendency to be more towards 6.5 years (Ubelaker 1978:48-49). Measurements are shown on Table 1. Cranial measurements for this individual appear on Table 2.

Anomalous, non-metric traits, useful to assess biological distance and genetic relationships as well as environmental adaptation (Saunders 1978:47), were present in the cranial and post cranial material. Anomalous cranial traits included bilateral counter winging of the maxillary central incisors, shovel-shaping of the central maxillary and mandibular incisors, presence of an accessory lesser palatine foramen, supra orbital notching along with multiple foramina (of both orbits), a trace of a metopic suture (more apparent on the inner table of the frontal bone than the outer table), and a wide 'H' pterion suture pattern (Fig. 1). Post cranial traits included an anterior atlas arch deficiency, doubled cervical transverse foramina, and a retroarticular spur of the atlas vertebra (Fig. 2).

Pathologies were noted in the dentition and an apparent pathology 'in progress' at the base of the skull. Dental pathologies were restricted to the mandibular right first deciduous molar. Located on the distal interproximal neck was an advanced caries with related erosion, or resorption, of the alveolar at the tooth root. Apparent on the base of the skull were two cylindrical growths, one each located next to the posterior third of the occipital condyles measuring approximately 9x9x2 mm (Fig. 1a). These 'growths' had the puffy appearance similar to the puffy appearance one would see at the end of an unfused diaphysis. These 'growths' may be an indication of fusion of the atlas vertebrae (C1) to the base of the skull if the individual had lived. El Najjar and McWilliams (1978) suggests that this type of fusion would occur if there was a congenital absence of the vertebral discs which normally appear in the first month of fetal life. Without the discs, ossification occurs. Further research of this anomaly need to be conducted to determine its



Figure 1 Cranium of 42Ga2292-1
 (Facial width, from zygion to zygion, is 11.20cm;
 Total facial height, from nasion to gnathion, is
 94.50)
 a. cylindrical 'growths'
 b. bilateral counterwinging
 c. multiple foramina of the supra orbital tori
 d. alveolar destruction and consequent resorption

TABLE 1

Long Bone Measurements

BONE	42Ga2295-1		42Ga2295-2	
	left	right	left	right
Humerus	181.mm	180.mm	144.mm	-----
Radius	141.mm	141.mm	-----	112.mm
Ulna	157.mm	157.mm	126.mm	-----
Femur	265.mm	258.mm	188.mm	-----
Tibia	-----	212.mm	155.mm	155.mm
Fibula	-----	206.mm	152.mm	-----

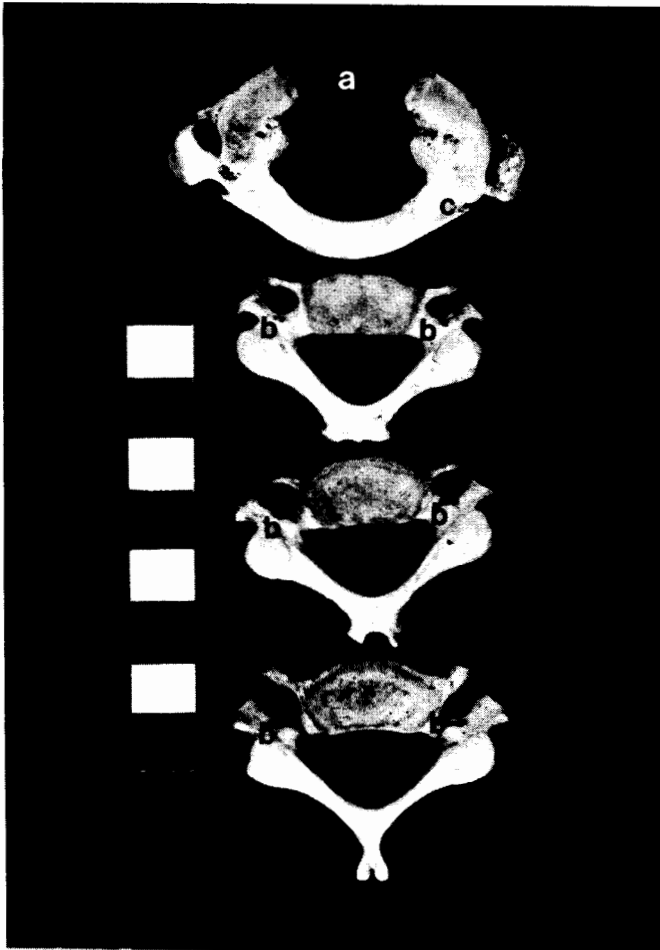


Figure 2
Vertebrae of 42Ga2295-1
a. anterior atlas arch
deficiency
b. doubled cervical foramina
c. retroarticular spur of the
atlas vertebrae (C1)

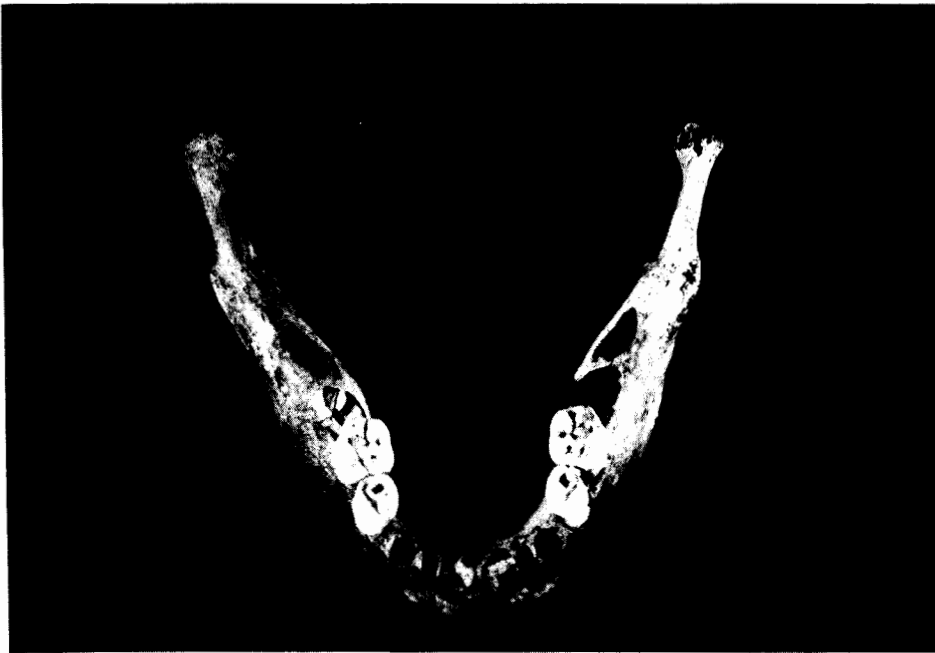


Figure 3 Mandible of 42Ga2295-2
(Mandibular breadth, from condyle to condyle, is
ca 8.55cm)

TABLE 2

Cranial Measurements

MEASUREMENTS	42Ga2295-1	42Ga2295-2
Total facial ht.	94.50	---
Upper facial ht.	57.00	---
Facial width	11.20	---
Nasal ht.	4.10	---
Orbit ht. right	3.40	---
Orbit ht. left	3.39	---
Orbit breadth right	3.60	---
Orbit breadth left	3.70	---
Palate length	3.85	---
Palate breadth	5.80	---
Mandibular breadth	10.30	8.55
Bigonial breadth	8.30	6.90
Symphysis ht.	2.60	2.50

cause. In addition, anteversion of the femoral neck was noted and discussed in the section entitled DISCUSSION.

42Ga2295-2

The second juvenile was less complete than the first. Of the skull, only the right parietal and mandible were recovered. Most of the post cranial material was present; missing were all hand and foot bones, and a third of all the long bones. Like the first youth, bone preservation was excellent.

Based primarily on the eruption of the mandibular teeth, age of this juvenile was 5 years + 16 months (Ubelaker 1978:112). All of the deciduous teeth had erupted and showed primary dentine exposure, but to a lesser degree than the first juvenile. Erupting teeth included only the permanent central incisors. Unerupted teeth included both fully formed first permanent molar crowns. In addition, the empty sockets of the permanent second molars were present, indicating these mandibular teeth were still buds (Fig. 3). Independent aging of the long bones indicated this juvenile to be 3-3.5 years (Ubelaker 1978:48-49). Measurements are shown on Table 1.

The presence of shovel-shaping of the permanent mandibular central incisors was the only anomolous trait observed for this juvenile. In addition, this youth displayed the same sort of anteversion of the femoral neck that was observed for the first juvenile.

Recovered along with the human skeletal material were fragmented faunal bones. Using the comparative collection at the University of Utah, Kenneth Juell identified the burned fragments of a sub-adult mule deer (Odocoileus hemionus). These bones included the distal right femoral diaphysis and epiphysis, and the right proximal tibia epiphysis and diaphysis.

DISCUSSION

Interestingly, both of these individuals displayed anteversion of the femoral neck. Anteversion of the femoral neck is measured by relating the long axis to the femoral neck of the bicondylar axis of the femur (Miles 1975:11). The angle of anteversion in current adult population (Indian and Caucasian) is 18° to 20° . Any angle over 25° in the adult is considered abnormal. For infants, present day normal anteversion ranges from about 25° to 30° with an angle slightly over 30° not considered abnormal (Fredricks, personal communication; Wong, personal communication). The angle of anteversion decreases with growth. The angle of anteversion of the older youth (8 + 24 mos.) was approximately 37° . The angle of the younger juvenile (5 + 16 mos.) measured approximately 36° .

An abnormally high angle of anteversion is indicative of a hip problem (Miles 1975). The causes of this anomaly may be 1) prenatal in origin or 2) the result of growth disturbances.

Current medical studies show a high rate of congenital dislocation or dysplasia of the hip in several modern Indian populations (Miles 1975:7). The causes of this are multifactorial: influenced by genetics, hormonal factors, and environmental factors. The problem is further complicated by the practice of cradle boarding which causes immediate and full extension of the infant's hip (Miles 1975:7). Unfortunately, cradle boarding, most apparent by the observation of the skull, could not be determined from the skeletal remains for either individual as the diagnostic skull bones were not recovered. Cradle boarding, however, was known to occur in this area. Thus, it is possible that if these two juveniles were born with a congenital hip problem, it may have been further worsened by the practice of cradle boarding noted by the high degree of anteversion which was present for both individuals. This interpretation is based on scanty evidence and further research on the subject relating the degree of anteversion of congenital dysplasia to cradle boarding in prehistoric times need to be conducted before a more definitive diagnosis can be made.

The second cause of a hip problems, as previously mentioned, may be due to growth disturbances. The disturbances in growth are said to be caused by disease and trauma (Miles 1975:11). If disease related, it would be most devastating in a fetus where the greatest rate of growth occurs. The trauma related cause would be dislocation of the hip not related to congenital dislocation or dysplasia of the hip. As radiographs were not taken for either juvenile, it is hard to determine if the anteversion was caused by disease, trauma, or prenatal factors.

In addition to the anteversion, slight anterior bowing was evident in the lower limb bones of both juveniles. This was most apparent in the fibulas. This bowing may be related to the anteversion, or may be the result of dietary deficiencies (Miles 1975; Brothwell 1965). Exact cause of the bowing is difficult to accurately determine without accompanying radiographs. It would be interesting and enlightening to radiologically study both of these skeletons to determine causes for all the quirks noted through the gross analysis.

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