
REPORTS

LIMITED EXCAVATIONS AT BIGHORN SHEEP RUIN (42SA1563) CANYONLANDS NATIONAL PARK, UTAH

Susan M. Chandler, Alpine Archaeological
Consultants, Inc., Post Office Box 2075,
Montrose, Colorado 81402

INTRODUCTION

Bighorn Sheep Ruin (42Sa1563) is a late Pueblo II–Pueblo III Anasazi cliff dwelling. The site is in the National Register of Historic Places Salt Creek Archeological District of Canyonlands National Park, southeastern Utah. Bighorn Sheep Ruin has 28 structures along a relatively narrow ledge in a low alcove. Next to Big Ruin, it is the largest cliff site in the park.

Bighorn Sheep Ruin was first recorded in 1930 as LS 14–11 by the Claflin–Emerson Expedition, led by Henry Roberts (Gunnerson 1969). The University of Utah rerecorded the site as 42Sa1563 in 1965 (Sharrock 1966). Nickens and Associates of Montrose, Colorado, performed limited stabilization at Bighorn Sheep Ruin in April 1985, under contract to the National Park Service, Rocky Mountain Region. Todd R. Metzger served as Stabilization Project Director. Susan M. Chandler and Gary M. Matlock directed the limited archaeological excavations conducted at the site as part of the stabilization effort. Reports detailing the stabilization activities (Eininger and Chandler 1986) and excavation results (Chandler 1988) are on file at the National Park Service, Midwest Archeological Center, Lincoln, Nebraska.

SITE DESCRIPTION

Bighorn Sheep Ruin (42Sa1563) is a cliff site on the left bank of Salt Creek, above its confluence with Horse Canyon (Figure 1). The site is constructed along a relatively narrow ledge in a low,

southeastern-facing alcove above the floor of the canyon. The vegetation of the surrounding area is characteristic of the Upper Sonoran life zone. Desert shrub and piñon–juniper vegetation communities dominate the landscape. Riparian species grow along the Salt Creek drainage. The Salt Creek drainage is a natural corridor for travel. It also contains both plentiful water and deep alluvial deposits suitable for agriculture. It is thus not surprising that there was a significant agriculturally-oriented occupation of Salt Creek during late Pueblo II to early Pueblo III times (cf. Anderson 1978:32, 58).

The Bighorn Sheep Ruin alcove is one of the few alcoves in the area large enough to allow the construction of substantial structures. The alcove is shallow, measuring roughly 95 m long and 1 m to 6 m wide. The site has 28 structures, including habitation, storage, and granary rooms and plazas (Table 1; Figure 2). Although there is no clearly defined kiva, one or more of the large habitation rooms may have served dual habitation/ceremonial functions. Intact cultural deposits are present within open use areas and beneath the rooms as construction fill. Their exposed profiles reveal midden layers, redeposited cultural refuse, and natural debris. This alcove fill is supported by a series of extensive retaining walls along the outer edge of the alcove and was used to level and widen the usable surface area of the ledge. Most of the structures rest precariously on this foundation of cultural and noncultural fill. Mortar remnants and fire-blackening on the alcove back are associated with existing structures and also outline structures that no longer exist.

Many pictographs, including anthropomorphs, bighorn sheep, a bird figure, abstract designs, handprints, spray blotches, and mudballs, are present along the alcove back. Petroglyphs are present within Structure 8 and on the boulders by Structure 10. A panel of handprints is present at the base of the cliff. The distinctive, San Rafael Fremont-style pictographs located on the back of the Bighorn Sheep Ruin alcove are anthropo-

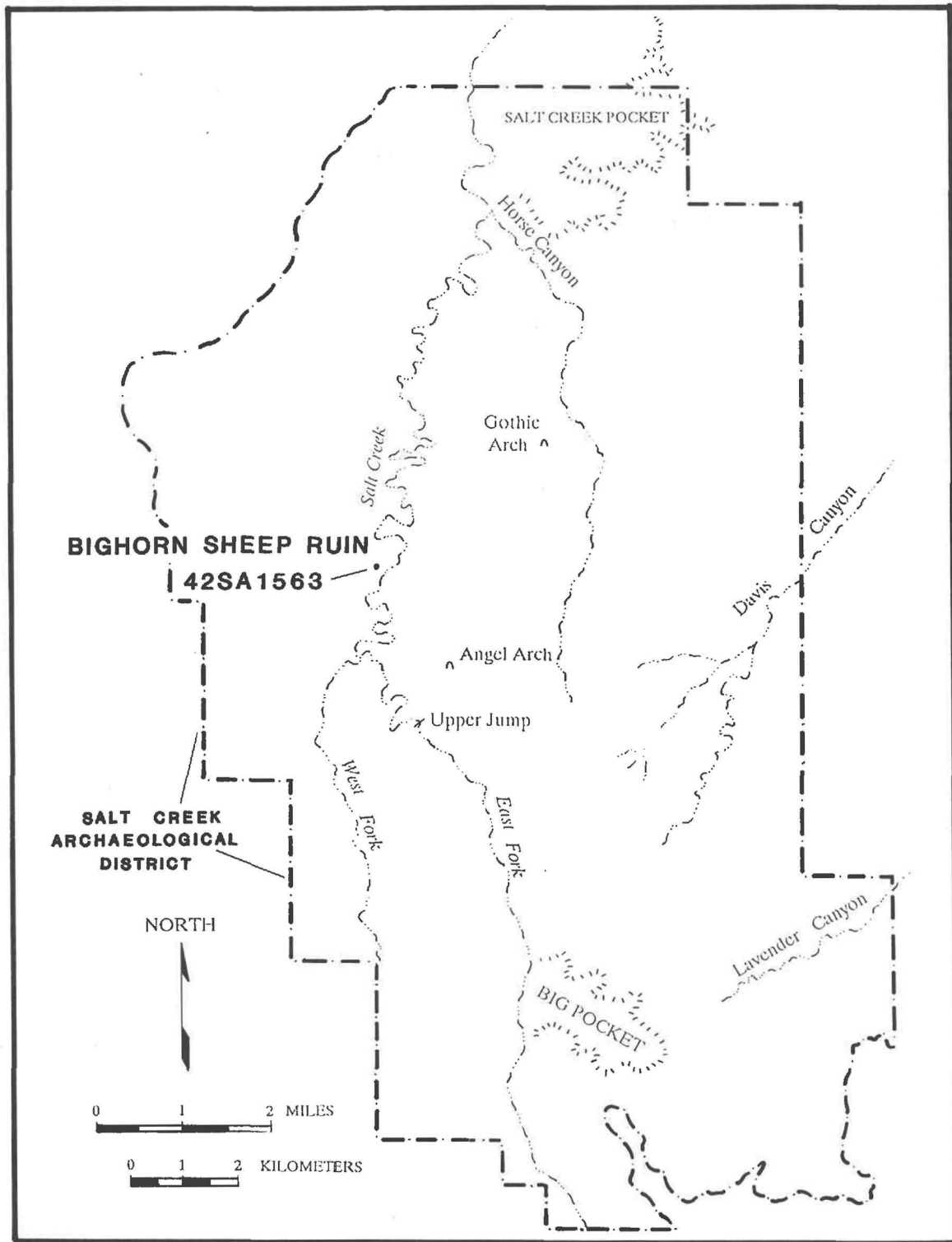


Figure 1. Location of Bighorn Sheep Ruin in the Salt Creek Archeological District of the Needles District of Canyonlands National Park, Southeastern Utah (source: Chandler 1988).

Table 1. Bighorn Sheep Ruin Structure Descriptions*

Structure	Shape	Construction	Dimensions (m)	Floor Area (sq. m)	Floor Features	Interior Wall Features	Function
1	D-shaped	Dry-laid/mudded, semicoursed, single stone masonry forms three walls; west wall is the alcove back.	0.77 x 0.60	0.4	—	Upright slabs for roof beam support.	Storage?
2	Rectangular	South wall is Str. 1's north wall; north wall formed by south walls of Strs. 4 and 25. West wall is the alcove back. No east wall.	?	—	—	None	Storage?
3	D-shaped	Wet-laid masonry incorporating vertical slabs and horizontal coursing form the north and south walls. West wall is the ledge face. No east wall.	1.10 x 0.85	0.9	—	Roughcast plaster on west wall	Storage
4	D-shaped	Wet-laid, single stone masonry forms a continuous north, east and south wall. West wall is the alcove back.	0.87 x 0.72	0.6	—	None	Storage
5	?	Dry-laid/mudded, single stone south wall remnant. West wall is the alcove back.	?	—	—	None	Storage?
6	oval	Upright slabs and wet-laid, semicoursed single stone masonry.	1.8 x 1.4	2.1	Dish-shaped floor plastered with a 3-4 cm thick layer of mortar.	Niche in the NE corner.	Storage unit filled with cultural trash behind retaining wall to level and widen ledge.
7	?	Two dry-laid stones stacked beneath a large monolith.	?	—	—	—	Unknown

Table 1. Bighorn Sheep Ruin Structure Descriptions* (Continued)

Structure	Shape	Construction	Dimensions (m)	Floor Area (sq. m)	Floor Features	Interior Wall Features	Function
8	oval	Dry-laid/mudded and wet-laid, semicoursed single stone masonry incorporating a monolith and bedrock face.	2.85 x 2.02	5.4	East half excavated. Plastered floor, which has been destroyed by rodents in the NE quad. Slab-lined hearth with adobe collar (F1). Elliptical, shallow depression directly in front of ventilator.	Roughcast	Habitation
9	oval	Subterranean cist with straight-sided walls formed by wet-laid masonry, an upright slab, and sterile fill.	1.02 x 0.78	0.6	Fractured bedrock. Mortar used to fill cracks. No floor features.	None	Storage. Reused as a trash pit and latrine. Two bent-stick fasteners SW of the pit may have held a light over it.
10	rectangular	One dry-laid masonry wall along the outside; mortar remnants and fire-blackening on the alcove back. No east or west walls are apparent.	4.8 x 3.5	15.0	Stratified, use-compacted surfaces. "Use Surface 2" forms the floor in most of the room, with patches of earlier and later surfaces above and below. Slab-lined firehearth (F1) and slab-lined cist (F2).	Fire-blackening on alcove back defines the extent of the walls. A plaster sawtooth design is applied over fire-blackening but extends beyond it. Two boulders with petroglyphs on the west side may have once been part of the west wall.	Habitation. Possible use as a plaza/open use area.
11	curvilinear	Dry-laid, uncoursed to semicoursed masonry. Single stone and compound.	Extends the length of the site.	—	—	Entryway (87 cm wide) located between Str. 14 and Str. 15.	Retaining wall.

Table 1. Bighorn Sheep Ruin Structure Descriptions* (Continued)

Structure	Shape	Construction	Dimensions (m)	Floor Area (sq. m)	Floor Features	Interior Wall Features	Function
12	sub-rectangular	Wet-laid and dry-laid/mudded, single stone semicoursed masonry forms three walls; the north wall is formed by the face of a siltstone ledge with 2-3 courses of masonry on top. The south wall is built atop the retaining wall.	2.75 x 3.25	7.6	West half excavated. Plastered floor. Slab-lined, hexagonal hearth (F1); subfloor cist lined with upright slabs (F2); shallow, ash-filled depression in front of vent (F3); small posthole (F4); small slab-lined depression near the hearth (F5).	Roughcast covers the face of a siltstone ledge forming north wall. Vent opening in south wall. Bench/shelf formed by two masonry courses atop siltstone ledge in NW corner. Small niche in east wall.	Habitation
13	?	Dry-laid stack of stone five courses high. North wall is the alcove back.	?	—	—	—	Storage?
14	rectangular	Dry-laid/mudded, semicoursed, single stone masonry forms three walls; north wall is formed by face of a siltstone ledge. South wall is built atop the retaining wall.	3.15 x 2.2	5.3	South half excavated. What little remains of the floor is plastered. Shallow depression with compact fill (F1) in front of the vent. Shallow hearth (F2).	Roughcast and fire-blackening on south wall. Vent opening in the south wall.	Habitation
15	rectangular?	West wall is the east wall of Str. 14; north wall is face of siltstone ledge. South wall is dry-laid, single stone masonry. No east wall.	?	?	—	Entry through retaining wall (Str. 11).	Open use area
16	D-shaped	Dry-laid/mudded, single stone masonry forms three walls. North wall is alcove back.	1.06 x 0.77	0.8	—	Shallow bench formed by stepped bedrock on alcove back.	Storage

Table 1. Bighorn Sheep Ruin Structure Descriptions* (Continued)

Structure	Shape	Construction	Dimensions (m)	Floor Area (sq. m)	Floor Features	Interior Wall Features	Function
17	D-shaped	Dry-laid/mudded, single stone, semicoursed masonry forms three walls. North wall is alcove back.	1.72 x 0.87	1.5	—	None	Storage
18	sub-rectangular	The north wall is formed by the face of a siltstone ledge; west wall is formed by a monolith; south wall is dry-laid masonry; east wall is represented by a 3.2m long juniper beam.	3.4 x 4.5	13.5	West half excavated. Plastered floor with loom anchors. Circular hearth with mortar collar (F1). Upright slab deflector. Shallow oval depression between vent and deflector (F2).	North, west, and south walls are plastered. Vent opening in south wall.	Habitation room, with possible ceremonial function.
19	D-shaped	Dry-laid/mudded, single stone masonry forms three walls. North wall is alcove back.	1.72 x 0.90	1.5	—	None	Storage
20	D-shaped	Dry-laid/mudded, single stone masonry forms three walls. North wall is alcove back.	1.07 x 1.6	1.7	—	None	Storage
21	D-shaped	East, south, and west sides are formed by a continuous, semicircular masonry wall, which has dry-laid/mudded basal courses and wet-laid upper courses. The north wall is formed by the face of a siltstone ledge.	4.0 x 3.75	10.6	North quarter not excavated. Plastered floor with loom anchors. Pit in floor—possibly a noncultural break (F1). Subfloor cist (F2). Firehearth with mortar collar (F3). Clay-lined depression (F4) in front of vent. Slab deflector.	North wall has plaster atop fire-blackening. The other three walls are fire-blackened. Vent opening in south wall. Niche/recess in west wall above Feature 2 cist.	Habitation room, with possible ceremonial function.

Table 1. Bighorn Sheep Ruin Structure Descriptions* (Continued)

Structure	Shape	Construction	Dimensions (m)	Floor Area (sq. m)	Floor Features	Interior Wall Features	Function
22	D-shaped	Dry-laid/mudded, single stone, semicoursed masonry forms three walls. North wall is alcove back.	1.4 x 0.7	0.9	—	—	Storage
23	D-shaped	Dry-laid/mudded, single stone, semicoursed masonry forms a continuous, semi-circular wall on three sides. North wall is face of siltstone ledge.	2.4 x 2.1	4.0	Vent at floor level along south wall.	Roughcast plaster. Fire-blackening.	Habitation
24	D-shaped	Wet-laid masonry	0.8 x 1.2	1.0	—	None	Storage
25	?	Wet-laid, single stone masonry south wall. West wall is the east wall of Str. 4.	?	—	—	Roughcast plaster on west wall.	Storage?
26	?	Wet-laid, single stone masonry north wall. West wall is ledge face. Mortar remnants indicate the former location of the south wall.	1.04 x 2.00	2.0	—	—	Storage
27	irregular	Dry-laid and dry-laid/mudded slabs.	—	—	—	—	Stairway
28	rectangular	Two small remnants of wet-laid masonry north and south walls. West wall, the bedrock face, has mortar remnants. No east wall.	0.93 x 0.94	0.8	—	—	Storage

*Structures in bold type were excavated.

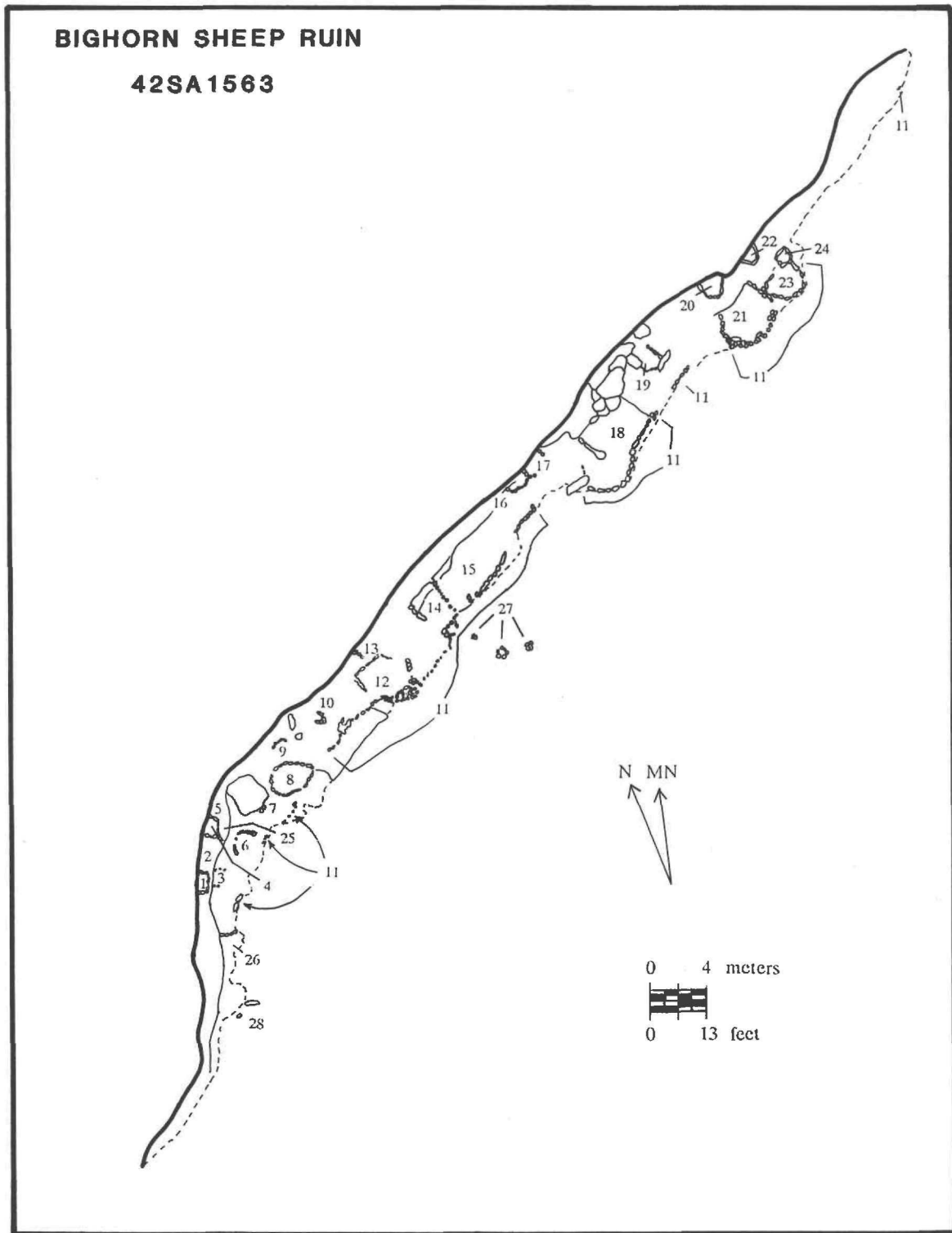


Figure 2. Planview map of the alcove structures at Bighorn Sheep Ruin.

morphic figures without appendages and with complex headgear, facial decoration, and necklaces, traits which are also characteristic of Fremont figurines (Gunnerson 1969:150; Schaafsma 1971:51-42, Figure 52). Noxon and Marcus (1982), however, classify the pictographs in the Salt Creek Archeological District as the "Faces Motif." They attribute the Faces Motif to Anasazi imitation of either the Barrier Canyon style rock art or Fremont culture rock art (Noxon and Marcus 1982). Sharrock also attributes the anomalous situation of the apparent association of late Pueblo II-early Pueblo III Anasazi architecture and artifacts with Fremont rock art to borrowing of Fremont design motifs by the Mesa Verdeans without distinguishable population interchange (Sharrock 1966:62). Ambler (1970) believes, however, that the presence of Fremont-style rock art in the area south and east of the Colorado River where there is little evidence of Fremont occupation indicates seasonal use of the region by Fremont hunters, predating or contemporaneous with the Mesa Verde occupation.

EXCAVATIONS

Fieldwork conducted at Bighorn Sheep Ruin before stabilization included detailed architectural and rock art documentation, planview and profile mapping of the site alcove and structures, surface artifact collection, and testing of cultural deposits and removal of structural fill.

The limited excavations at Bighorn Sheep Ruin were undertaken from the standpoint of site preservation. Excavations were restricted to disturbed or endangered middens and structural fill. Areas with unthreatened cultural deposits were avoided. This approach enabled a large amount of data to be retrieved from the site that would have otherwise been lost through deterioration, yet preserved additional deposits *in situ* for future excavation and research efforts. Because of this focus on preservation, however, archaeological data recovery was often incomplete. For example, intact floors were not excavated to examine subfloor features, and only half of each hearth was excavated.

Three test units were excavated in areas of deteriorating cultural deposits. A fourth was excavated along the exterior west wall of Structure 21. In addition, fill was cleared from the interior of eight structures: Structures 6, 8, 9, 10, 12, 14, 18, and 21. All fill was screened through ¼-inch (6 mm) mesh. Excavation within the structures was restricted to half of the floor area in all but four instances. Structures 6, 9, and 10 were completely excavated, and three quadrants of Structure 21 were excavated. The area excavated was dictated by the need to define the limits of the structure and the disturbance within before developing the stabilization plan. Most of the rooms excavated were habitation rooms because these rooms are located at the edge of the alcove and so are more subject to deterioration.

MATERIAL CULTURE

Ceramics

The ceramic types identified are predominantly Mesa Verde, Pueblo III types (Breternitz et al. 1974). Most sherds have crushed rock temper. Mancos Black-on-white, which dates from A.D. 900-1150 in the Mesa Verde Region (Breternitz et al. 1974), and Mancos Gray, which dates from A.D. 900-950, were the earliest ceramic types found at the site. Only four Mancos B/w sherds and one Mancos Gray sherd were recovered, however. The remaining 305 sherds are Pueblo II/Pueblo III ceramic types, most of which are unidentified PII/PIII corrugated sherds. McElmo Black-on-white sherds, which date from A.D. 1050 to 1300, and Mesa Verde Black-on-white sherds, which date from A.D. 1200 to 1300, were found in nearly equal numbers. Three intrusive Pueblo III Kayenta sherds were found: one Tusayan Black-on-white and two Moenkopi Corrugated. There was no discernible intrasite variation in the distribution of the various ceramic types. The proportion of bowl sherds (44%) to jar sherds (52%) is almost equal in the Bighorn Sheep assemblage. Most of the bowl sherds are slipped, but most jar sherds are not. The vessel forms suggest that the predominant activities involving ceramics at Bighorn Sheep Ruin were short-term storage, food preparation, and serving.

Several unfired clay artifacts were recovered from the Bighorn Sheep Ruin excavations. The clay is untempered and is a pink color. Six unfired clay human figurine fragments were found, including one head and five terminus fragments. Twenty-two unfired clay items that may be debris from on-site figurine manufacture were also recovered.

The figurine head (Figure 3) was recovered from the deeply disturbed area in the southeast corner of Structure 14. This context suggests the artifact predates the final occupation of Bighorn Sheep Ruin. The figurine head from Bighorn Sheep Ruin resembles Fremont-style figurines, of which the best described are the Pillings Figurines found in Range Creek in west-central Utah (Morss 1954) and those from the Old Woman Site (Taylor 1957) in central Utah. The eyes are represented by shallow indentations, and the nose by a pinched ridge. The chin is the "disengaged chin" typical of Fremont-style figurines; that is, there is a marked separation between the lower plane of the face and the plane of the torso (Morss 1954:4). A series of concentric bands around the neck apparently indicate a necklace. This ornamentation resembles the neck decorations of the anthropomorphic "Faces Motif" pictographs found on the Bighorn Sheep Ruin alcove and elsewhere in Salt Creek.

As is typical of Fremont-style figurines, the figurine from Bighorn Sheep Ruin was intended to be viewed from the front only (Morss 1954:5). The dorsal surface is flat and stippled, suggesting that it may have been placed on a piece of sandstone while wet. No hair bobs are evident; however, the artifact is too fragmentary to speculate whether it represents a male or female.

The figurine terminus fragments are all of the "handle terminus" variety (Morss 1954). One such figurine base, which was collected from the alcove surface on the ledge south of Structure 1, is incised to indicate an apron or breechclout (Figure 4). A tiny land snail shell was incorporated into the clay and is visible in the broken end of this artifact. The other terminus fragments are undecorated.

Archaeologists have found many unfired clay figurines and figurine fragments at Anasazi sites in the Glen Canyon area of southeastern Utah.

Gunnerson found figurines at several Kayenta or Virgin Pueblo II and Pueblo III sites in the Escalante drainage. He describes these figurines as being markedly different from the very elaborate Fremont figurines from Range Creek and from the Old Woman Site (Gunnerson 1959:10). Lipe (1960:144-146) found unfired clay figurines at the Hermitage Site and at Benchmark Cave, twelfth century Kayenta sites with Virgin influence located along the Colorado River. Twelve unfired clay figurines and figurine fragments were recovered from three Pueblo III Anasazi sites in Moqui Canyon (Lipe et al. 1960:168-169). The Moqui Canyon figurines are described as resembling the smaller and cruder "so-called Fremont figurines" of central and northeastern Utah. Because no Fremont pottery or artifacts were present, the Glen Canyon figurines were ascribed to local, Pueblo III manufacture. They are attributed to either a backwash of ideas from the Fremont area or persistence of the Anasazi Basketmaker II figurine-manufacturing tradition (Lipe et al. 1960:169-170). The same conclusion can be applied to the Bighorn Sheep Ruin figurines.

Chipped Stone

The chipped lithic assemblage from the Bighorn Sheep Ruin alcove consists of 916 pieces of chert, chalcedony, quartzite, and siltstone collected from excavated contexts at the site. It is characterized by a high percentage of complete flakes; low numbers of broken flakes, cores, and bifacially retouched artifacts; and moderate amounts of flake fragments and debris. The site occupants were evidently practicing an intensive core reduction technology, whereby flakes were produced for use with little or no modification. Such a technology is characteristic of permanently occupied pueblo sites (Sullivan and Rozen 1985:763). Although some bifacial tools were manufactured at Bighorn Sheep Ruin, most chipped stone "tools" appear to have been of an expedient variety. Large, complete flakes were apparently produced for short-term use as cutting, scraping, and whittling implements.

Six projectile points were recovered from the Bighorn Sheep Ruin excavations. One is a unifacially flaked, corner-notched point or knife

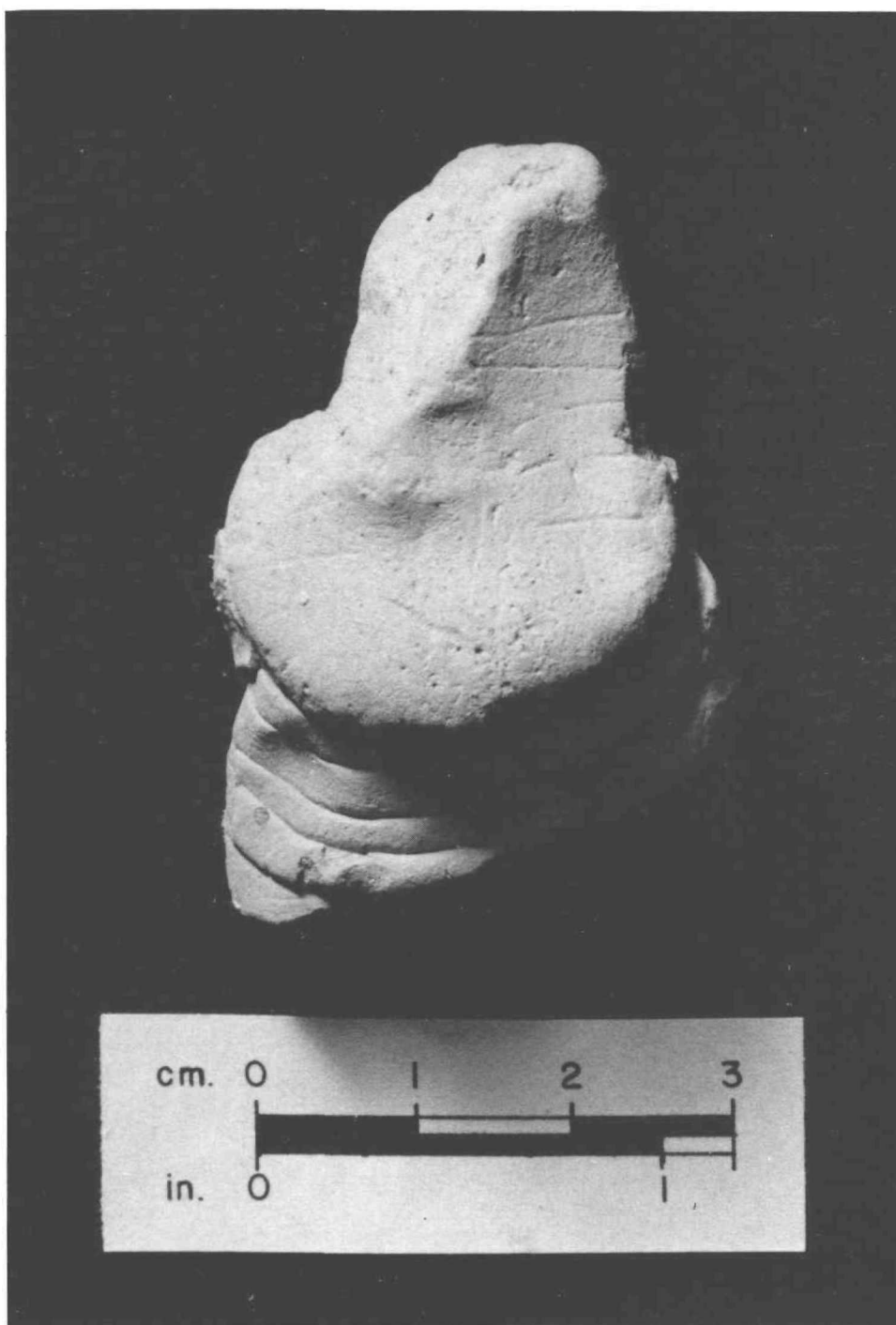


Figure 3. Unfired clay figurine fragment (Catalog Number 192) recovered from Structure 14 at Bighorn Sheep Ruin.

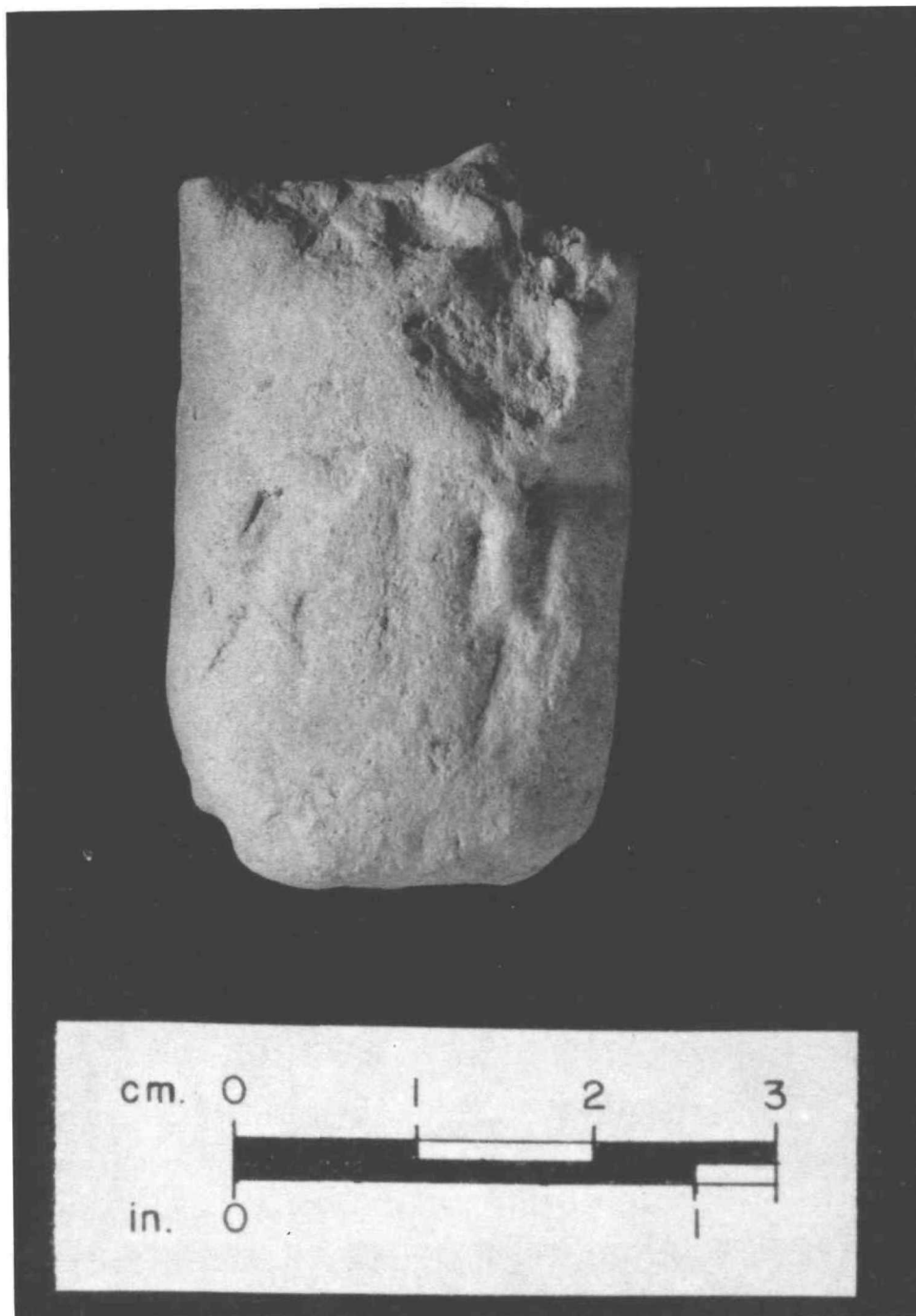


Figure 4. Unfired clay figurine terminus fragment (Catalog Number 418) recovered from the vicinity of Structure 1 at Bighorn Sheep Ruin.

with a basal notch (Figure 5e) that resembles an Elko Eared style point. The other stemmed point or knife is side notched and resembles a Northern Side-notched style point (Figure 5f). Four unstemmed projectile points were recovered from the NW quadrant of Structure 18, in and above the roof fall. The proximity and similar style of these artifacts suggests that they were cached in the structure's roof. These projectile points resemble Bull Creek points (Figure 5a-d), which are found at sites dating between A.D. 1100 and 1250. Sites with Bull Creek points typically have high percentages (80%) of Mesa Verde ceramics, low percentages (20%) of Kayenta ceramics, and no Fremont ceramics (Holmer and Weder 1980:61-63).

The only other prepared tools recovered from the excavations at Bighorn Sheep Ruin were three chert biface fragments. Eight chert cores, three of which were found on the surface, were collected from the alcove. All of the collected cores that retain cortex have tabular cortex, which indicates they were obtained from a primary geologic source. Over 20% of the flakes retain cortex, most of which is also tabular. It is concluded that most of the raw material types were probably obtained locally, from the Cedar Mesa formation.

Ground Stone

One small troughed metate fragment, a two-handed mano, a mano corner fragment, and nine pieces of miscellaneous ground stone were recovered from various proveniences in the site alcove. Twelve bedrock grinding surfaces are also present in the site alcove. Ground stone artifacts are fine-grained sandstone or quartz sandstone, from the Cedar Mesa formation. Two pieces of ground stone were identified as dunite, an olivine-rich intrusive rock that forms in sills and dikes.

Faunal Artifacts

Bone artifacts recovered from excavated structures at Bighorn Sheep Ruin include a bead, a splinter awl, a finely sculpted bighorn sheep head

pendant (Figure 6), a mammal rib with three holes punched in the side, and a cut and polished long bone fragment. Several leather fragments, including leather cordage, knots, and hide fragments, were recovered from excavated rooms at the site. Numerous pieces of cordage wrapped with feathers and quills were found. These presumably represent fragments of feather blankets.

Modified Vegetal Artifacts

Modified vegetal artifacts are abundant and typologically diverse. They include such items as basketry, cordage, sandals, cloth, quids, arrowshafts, worked wood, a painted squash rind pendant, and perforated corn shanks. The following parts of 13 taxa of plants were used by the site occupants in the manufacture of modified vegetal artifacts: dogbane (*Apocynum*), yucca, grass, and cotton fiber; squash pericarp; Dicotyledoneae, cottonwood, and willow wood; Gymnospermae resin; juniper bark; reed (*Phragmites*) and sedge culm; and various corn parts (Matthews 1988).

Fiber artifacts are the most common type of vegetal artifact. Yucca cordage is ubiquitous, and all stages of manufacture, from leaves to quids to cordage, are represented at the site. Evidence of cotton weaving is also present at Bighorn Sheep Ruin. Cotton seeds were recovered from the fill of rooms, cotton cordage is common, and two pieces of cotton cloth were found. Loom anchors in Structures 18 and 21 and spindle whorls are further indications of on-site textile manufacture.

DATING

Both dendrochronological and radiocarbon samples were collected from Bighorn Sheep Ruin for chronometric dating. The wood (complacent piñon and undatable juniper) was found to be unsuitable for tree-ring dating, however. Four radiocarbon ages were obtained (Figure 7). These were calibrated by the method outlined in Stuiver and Becker (1986; University of Washington's Quaternary Isotope Laboratory 1987).

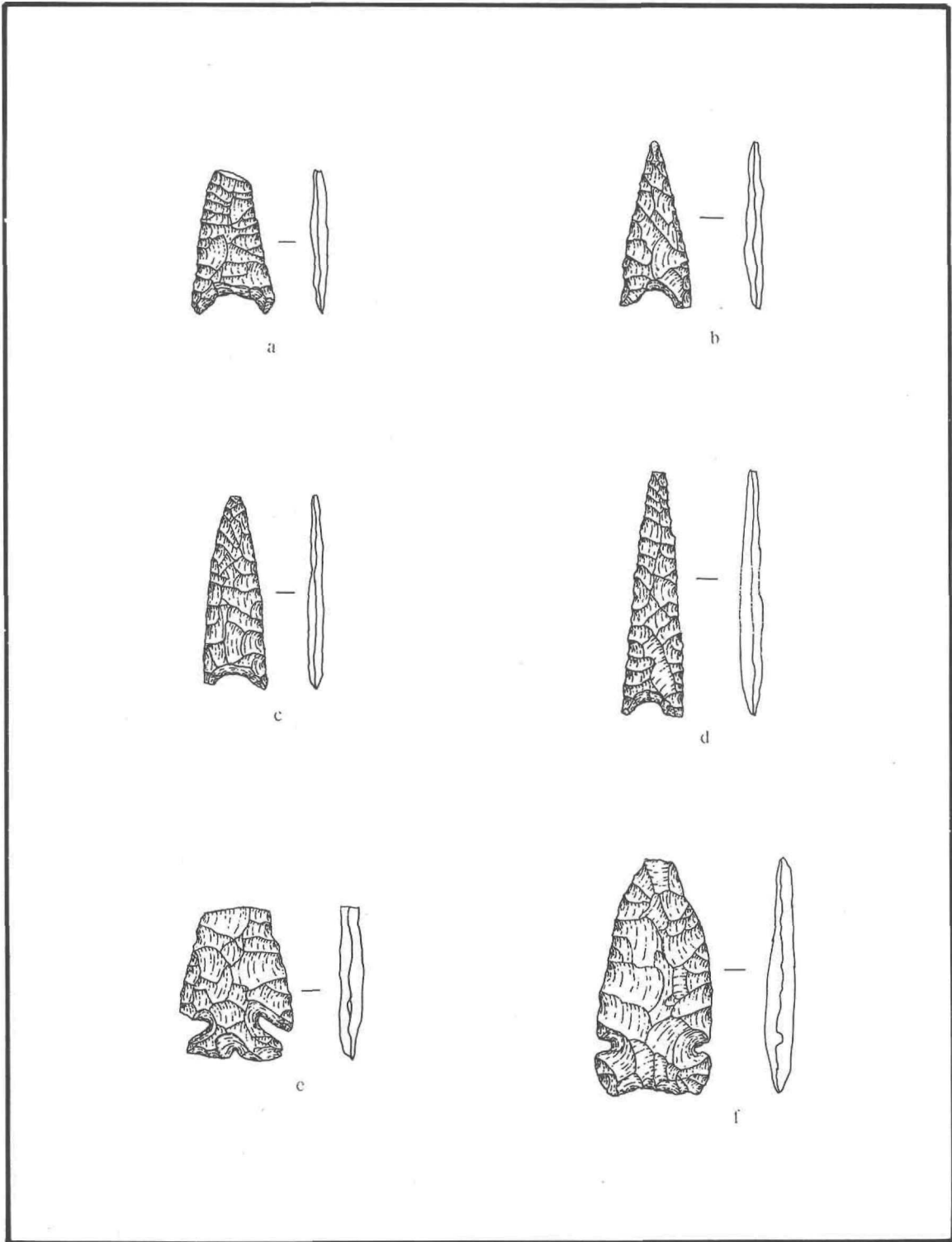


Figure 5. Projectile points: (a)–(d), Bull Creek style points (Catalog Numbers 244–a, b; 247–c, d); (e) Elko Eared style (Catalog Number 185); (f) Northern Side-notched style (Catalog Number 296). Artifacts are actual size.



Figure 6. Bighorn sheep head pendant (Catalog Number 386) from Structure 21 at Bighorn Sheep Ruin. This pendant was carved from the second phalange of a bighorn sheep (*Ovis canadensis*).

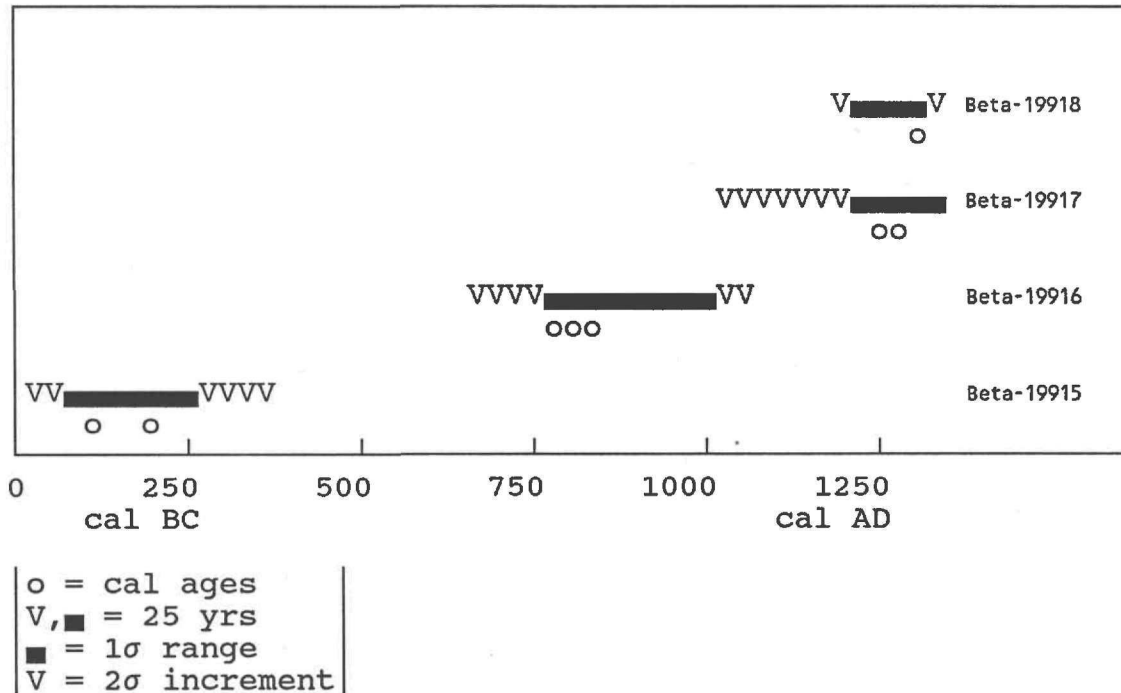


Figure 7. Radiocarbon dates.

The two samples from Structure 18 resulted in what are presumed to be anomalous dates. Beta-19915, charcoal found adhering to a large chunk of roof mortar in the room fill, produced a radiocarbon age of 1840 ± 70 BP (two sigma calibrated range A.D. 3–378). Beta-19916, charcoal from the hearth fill, produced a radiocarbon age of 1180 ± 60 BP (two sigma calibrated range A.D. 680–990). These dates are earlier than either Structure 18's architecture or artifacts.

Beta-19917, charcoal collected from a 5 cm thick stratum of charcoal and ash in the south half of Structure 12's hearth, produced a radiocarbon age of 800 ± 60 BP (calibrated date A.D. 1243; two sigma calibrated range A.D. 1041–1280). Beta-19918, charcoal collected from the fill of Structure 10's hearth, produced a radiocarbon age of 760 ± 50 BP (calibrated date A.D. 1263; two sigma calibrated range A.D. 1163–1300).

The average calibrated age for the two samples from Structures 10 and 12 is A.D. 1260 (two sigma

calibrated range A.D. 1164–1282). These dates fall within the late Pueblo II–III period of Anasazi prehistory and correlate well with the late Pueblo II–Pueblo III ceramic types as well as with projectile points dating from A.D. 1100–1250.

ETHNOBOTANICAL ANALYSES

Several ethnobotanical analyses were conducted on remains from Bighorn Sheep Ruin (Clary 1988; Gish 1988; Matthews 1988; Toll 1988). Preservation of botanical remains is excellent because of the site's sheltered location. There is a wide array of taxa and a large quantity of materials, including plant parts that normally are not preserved without carbonization.

Bulk soil samples were collected from various site proveniences for flotation analysis of macrobotanical remains. Pollen samples were also collected during excavation. Vegetal remains and modified vegetal artifacts were recovered from the

surface of unexcavated structures as well as from excavated contexts throughout the alcove. A sample of coprolites found in structures at the site was also submitted for ethnobotanical analysis. Unlike other lines of information about prehistoric diet and plant use, coprolites provide direct evidence of foods actually eaten by the site's inhabitants. According to Toll (1988), an individual coprolite manifests ingestion over about one day, and presumably several eating episodes. It thus reveals the occupant's preferences at one time in the year rather than the general diet over an annual cycle. Conditions of plant specimens in coprolites also indicate food preparation techniques.

The remarkable preservation of perishable remains from Bighorn Sheep Ruin provided the opportunity for a thorough analysis of subsistence patterns. A full range of resource plants was identified at Bighorn Sheep Ruin. Domestic, pioneer, wild, and woody species were represented in the assemblage. Corn, beans, and squash were consumed by the site's inhabitants. These crops, as well as cotton, were probably grown in nearby fields on the floodplain below the alcove. Weedy annuals appear to have been the dominant pioneer plant food consumed at Bighorn Sheep Ruin. Goosefoot, seepweed, purslane, groundcherry, and tansymustard seeds were all found in coprolites. The pollen and macrobotanical analyses also indicate exploitation of pigweed, beeweed, and Indian ricegrass seeds. It is likely that the greens of many of these species, particularly beeweed, were also consumed. Wild plant seeds represented include squawberry, sedge, and prickly pear cactus. The presence of sedge in the macrobotanical and pollen records indicates minor use of riparian species, presumably obtained from Salt Creek.

FAUNAL ANALYSIS

The faunal component of the diet at Bighorn Sheep Ruin appears to have consisted of a variety of small mammals as well as bighorn sheep and, possibly, deer (Matlock 1988). The small mammals were probably snared near the site. Cottontail rabbit bones were abundant in the faunal assemblage, and rabbit hides were also recovered from the site. These rabbits may have been

frequenting agricultural fields and so would have been easy prey. The coprolite analysis provides indisputable evidence of human consumption of small rodents, probably prepared in stews (Binford 1988). Few bird bones were recovered, but feathers (presumably turkey) and feather-wrapped cordage were well represented in the artifact assemblage.

ARCHITECTURE

The masonry architecture at Bighorn Sheep Ruin is of uniform style. It consists of single course walls built with unshaped stone laid in copious amounts of unprocessed mortar. The sandstone used as building stone was acquired from the local Cedar Mesa sandstone outcrop, which produces an abundant supply of colluvial debris in sizes appropriate for masonry. Minimal shaping or dressing of the building stones apparently was conducted only when various stone sizes were needed. Mortar for laying stone and for plastering walls was mined from the interbedded siltstone deposit of the Cedar Mesa formation. The abundance of inclusions indicates that little effort was made to modify the sediments before use. Although a fairly consistent, sandy loam mortar was used throughout the site, the variety of mortar types present suggests that there was little concern for color.

The nature of the construction at Bighorn Sheep Ruin has been termed expedient because of (1) the use of locally available building materials that exhibit very little processing or modification before use, (2) the randomness of the overall application of the masonry and mortar, and (3) the lack of patterning with regard to the structure size and shape. There is little or no architectural elaboration in the overall construction, such as quality stone finishing, use of specialized or unique mortars, or application of decorative chinking. The resulting structures do no more than meet basic living requirements. Minimal time investments in the initial construction and subsequent maintenance would have allowed for more time and energy for food procurement. Dry-laid/mudded masonry walls are the most common type of construction. This type of masonry entails laying stones atop one another with no mortar between. Mortar is then

used to fill the voids between stones. It is not uncommon, however, to see both wet-laid and dry-laid/mudded techniques used within one wall. Masonry walls are predominately single course in cross section. Double course walls occur only where a single stone was too small to span the width of the wall. The walls exhibit little or no coursing pattern. Wall construction appears to consist of random stacking rather than masonry laid in even, horizontal rows.

The configuration of the alcove was a factor limiting the types of structures that could be built at Bighorn Sheep Ruin. There is no one distinct structural size or shape. Likewise, there is no standardized pattern of building with the exception of the placement of the smaller granaries along the alcove back and the placement of large habitation and, possibly, ceremonial structures along the alcove edge.

The construction sequence of Bighorn Sheep Ruin is unclear. Rooms appear to have been built one at a time. Each structure is an independent construction unit with little or no sharing of walls or natural features between other structures. The only commonly shared features include the retaining wall, the alcove back, and the natural ledges or shelves within the alcove. Because of this independence, it is not possible to determine the construction sequence based on bonding and abutment patterns.

The presence of mortar outlines on the alcove back that do not correlate with the existing rooms and the presence of construction debris within the fill of the retaining wall beneath the existing structures indicate at least one major renovation episode. Differences in mortar color are evidence of multiple repair episodes ranging from major repairs to miscellaneous patching. The alcove provided excellent protection from the weather. As a result, the site's maintenance requirements were probably greatly reduced.

The retaining wall is the most distinct architectural feature at Bighorn Sheep Ruin. Although retaining walls are common construction features within the Mesa Verde and Kayenta Regions, they may be an anomaly in Canyonlands.

Big Ruin is the only other recorded site in Canyonlands known to have such a high-energy investment architectural feature. The retaining wall is significant because it provides a foundation for many structures while also creating greater working and living space within the alcove.

There are many stylistic similarities between Bighorn Sheep Ruin and other sites in the Cedar Mesa and Glen Canyon areas, both of which were expansion areas utilized at different periods by the Mesa Verde and Kayenta Anasazi. This is not to suggest that Canyonlands was inhabited or influenced by Kayenta peoples. It does imply, however, that the expedient style of architecture is a reflection of similar subsistence patterns and a lifestyle oriented more toward food procurement than elaborate architectural refinements.

Room function was determined on the basis of size and interior features. Artifactual assemblages were of limited utility in discerning room function because domestic refuse is present throughout the alcove. Population estimates (see below) were made on the basis of floor area of habitation rooms, employing Clarke's formula of $P = 1/3F$ (population equals one-third the total floor area), derived from the modern Cochiti Pueblo (Clarke 1974). Size of Bighorn Sheep Ruin habitation rooms ranges from 4.0 m² to 15.0 m², with an average of 8.8 m² (Table 1). The total floor area of the seven Bighorn Sheep Ruin dwellings is 61.4 m², which equates to a total 20 persons, or an average of 2.9 persons per room. It is interesting to compare this figure to Hill's figure of 2.8 persons per room, derived from population figures at the modern Hopi villages. The habitation rooms at Bighorn Sheep Ruin closely approximate the average Hopi room size (Hill 1970). Structures 18 and 21 are the largest rooms. Both have loom anchors, which are often found in kivas. These rooms may have served dual habitation/ceremonial functions.

SUMMARY

Anasazi horticulturists occupied Bighorn Sheep Ruin in the thirteenth century A.D. The site location was selected on the basis of a large alcove suitable for construction, the presence of arable

land and water in the Salt Creek drainage, and the local availability of raw materials and wild plant and animal resources. The vegetation at the time was similar to the modern environment. The substantial storage, habitation, and possibly ceremonial structures at Bighorn Sheep Ruin suggest that the site was a permanent residence for a small group of people. A population estimate based on floor area of the seven dwelling rooms at the site indicates that as many as 20 persons may have lived at Bighorn Sheep Ruin. During the period of occupation, a major renovation took place. Several storage rooms along the alcove back were dismantled, a labor-intensive retaining wall was constructed and filled with cultural refuse and construction debris to widen and level the alcove ledge, and additional structures were built behind this retaining wall. The major renovation episode at the site appears to have taken place within one main period of occupation. No underlying earlier occupation of the Bighorn Sheep Ruin site alcove was identified by the excavations.

The site occupants cultivated corn, beans, squash, and cotton. Pioneer and wild plant species and wild game were also a major part of their diet. A wide range of domestic activities took place at Bighorn Sheep Ruin, including manufacture of vegetal, lithic, and possibly ceramic artifacts. Hunting of large game is indicated by the presence of arrowshafts, projectile points, and bighorn sheep bones. Ritual activities are represented by pahoos, gaming pieces, and figurines, as well as by structures that may have served dual habitation and ceremonial functions. Except for evidence of borrowing of Fremont design motifs for figurines and rock art and the presence of Kayenta ceramics, there is little to indicate extra-territorial relationships.

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