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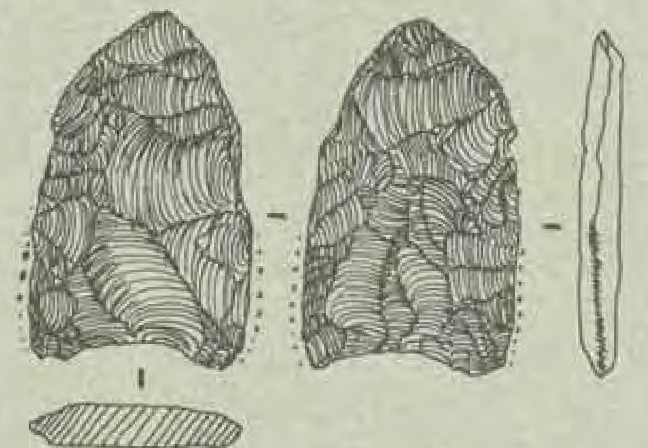

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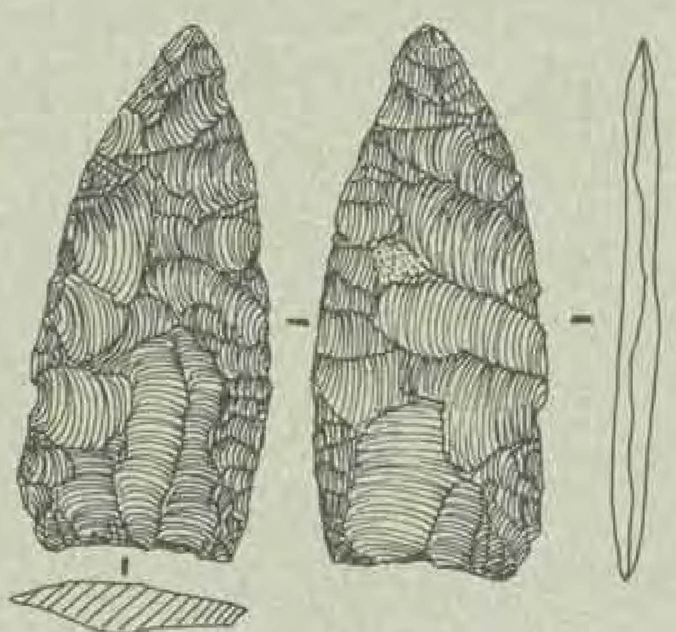

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VIRGIN ANASAZI SETTLEMENT AND ADAPTATION ON THE GRAND STAIRCASE

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The Virgin Anasazi, although generally considered to be a single cultural entity, occupied a number of discrete geographical areas in southern Utah, northern Arizona and southern Nevada. One of the more varied and distinctive was the Grand Staircase section of the Colorado Plateau (Stokes 1977). Settlement data, based on recent intensive inventories, is presented and analyzed in terms of local adaptation to the Grand Staircase environment. High densities of architectural sites are located in a variety of different arable settings between 5,000 ft and 7,000 ft (1524 m to 2134 m) - the zone of prehistoric agriculture. These site clusters are interpreted to be dispersed communities that were occupied, probably discontinuously, from the early Basketmaker period into Pueblo III times.

On the level of the individual site, Virgin architectural layouts and internal structure reflect a tendency to be complex and long lived; they were however, frequently abandoned and reoccupied. Rather than separate and unrelated occupations, these episodes are demonstrated to be part of the Virgin settlement pattern. It is suggested that this unique "Virgin pattern" reflects a specialized adaptation to the Grand Staircase. A model of residential mobility is proposed as a formal strategy that permitted shifting between multiple agricultural locales in response to climate change.

INTRODUCTION

The Virgin Anasazi culture area is generally considered to extend over portions of southern Nevada, northwestern Arizona, and southern Utah. Although this distribution spans a wide range of environments and encompasses a variety of settlement patterns, similarities in artifacts and architecture have been, and remain, the primary basis for assigning cultural affiliation. While the validity of the Virgin Tradition remains a subject of debate, it is most often treated as the taxonomic equivalent of other distinctive Anasazi cultures: the Mesa Verde, Chaco, and Kayenta.

Aikens' (1966) landmark assessment of Virgin and Kayenta relationships is largely responsible for establishing the Virgin Anasazi as a separate cultural entity. Influenced by *Archeology as Anthropology* (Binford 1962), Aikens used ethnological categories, rather than individual artifacts, to compare the "overall lifeways" of the two"cultural systems" being investigated. Considering site patterning, subsistence related technology, ceremony, recreation, dress, and ornamentation, he concluded that prior to A.D. 900 there was little difference between material culture traits in the two areas and consequently both the Kayenta and Virgin were considered participants "in a uniform cultural pattern and sociological sphere" (Aikens 1966:55). By the end of the Pueblo I period however, there was an "increased degree of formal differentiation," particularly in terms of architectural style, that indicated the two groups had become"separate sociocultural populations" (Aikens 1966:55). As Fairley has pointed out, Aikens did not discuss the "processes responsible for this regional differentiation" (Altschul and Fairley 1989:103) - he did state, however, that "local environmental adaptation was not a strong force making for differentiation of the subculture" (Aikens 1966:54). My thesis assumes that it is precisely the forces of adaptation that best account for the distinctiveness of the Virgin Anasazi -

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particularly the variation noted in pueblo architectural style.

At the outset, it should be pointed out that there is still no agreement among researchers as to whether the Virgin Anasazi should be considered the taxonomic equivalent of the better known Anasazi cultures. Ambler, for instance, has suggested the Virgin area could actually be further subdivided into the Kanab, Virgin and Moapa Branches. These districts are proposed as having separate ethnic and linguistic status (Ambler 1996). On the other hand, Euler has stated "Certainly by now it should be clear that any attempt to rigidly draw fixed boundaries between the Kayenta and the Virgin Anasazi is an exercise in futility and in reality not intellectually productive" (Euler 1994:101). In a recent synthesis of the regions prehistory, Lyneis has cautiously subdivided the area into geographical districts rather than into cultural units. Lyneis appropriately reasons that "In this region, where relatively little excavation or detailed artifact analysis has been undertaken, it is difficult to know how well our cultural concepts relate to any prehistoric sense of ethnicity or boundedness" (Lyneis 1996:12).

My approach to the dilemma of assigning cultural affiliation is not with artifact analysis, nor solely with excavation data. It is essentially ecological; I will describe settlement patterns, through time, as they relate to the environment of the Grand Staircase physiographic section (Figure 1). Site types, their distribution, and most importantly, the internal site formation processes that set them apart from other Anasazi groups, are characterized as part of a distinctive"Virgin pattern." The distribution of this pattern over the landscape effectively "bounds" the archeological record if not a prehistoric "sense of ethnicity."

If the "Virgin Pattern"of settlement defines the archeological record on the Grand Staircase and sets it apart from the Kayenta, how should it be interpreted? The following observations are relevant: Virgin architectural sites almost invariably have a high capacity for storage, from Basketmaker II through late Pueblo II/PIII times; residential sites are distributed over a variety of arable niches on the Grand Staircase but they are not found outside the zone of agriculture; and most importantly, excavation data indicates that episodes of site occupation, abandonment and reoccupation were a common practice on the Grand Staircase throughout the sequence. The adaptive implications of these practices are intriguing: the Virgin pattern is not simply an idiosyncratic tendency towards multicomponent sites, it represents mobility. In the context of the geographically diverse and temporally variable Grand Staircase environment, residential mobility may be viewed as part of an adaptive strategy that permitted the Virgin Anasazi to practice agriculture in an environment subject to a variety of short-term environmental fluctuations. I argue that the episodes of occupation evident in the Virgin archeological record do not simply represent multicomponent sites, but are the result of a specialized cultural practice on the Grand Staircase, and possibly a hallmark of the larger Virgin Tradition.

Inventory Methods and Interpretive Concepts

If "the answers are in the dirt" for the excavator of an archeological site, for the Bureau of Land Management (BLM) archeologist, the answers lie in the inventory data. The distributional data for this study relies on over 650 routine clearance inventories carried out on the Grand Staircase, the Kaiparowits Plateau to its east, and the high plateaus to the north. Many of these surveys involve hundreds of acres, one involves tens of thousands. Two large-scale sample inventories also contribute to our understanding of site types and their distribution, although they have added little direct knowledge of Virgin settlement patterning. The most informative inventories were initially carried out as part of a BLM inhouse effort to simply document and protect sizable areas known to have high densities of vulnerable architectural sites. Expanding the inventory boundaries in these high density areas served to identify clusters of sites which are now interpreted as communities, or portions of them.

The identification of settlement patterns, that is, recognizing how sites are distributed across the landscape, should be an objective of Cultural Resource Management (CRM) as well as the study of prehistory. The Grand Staircase is a

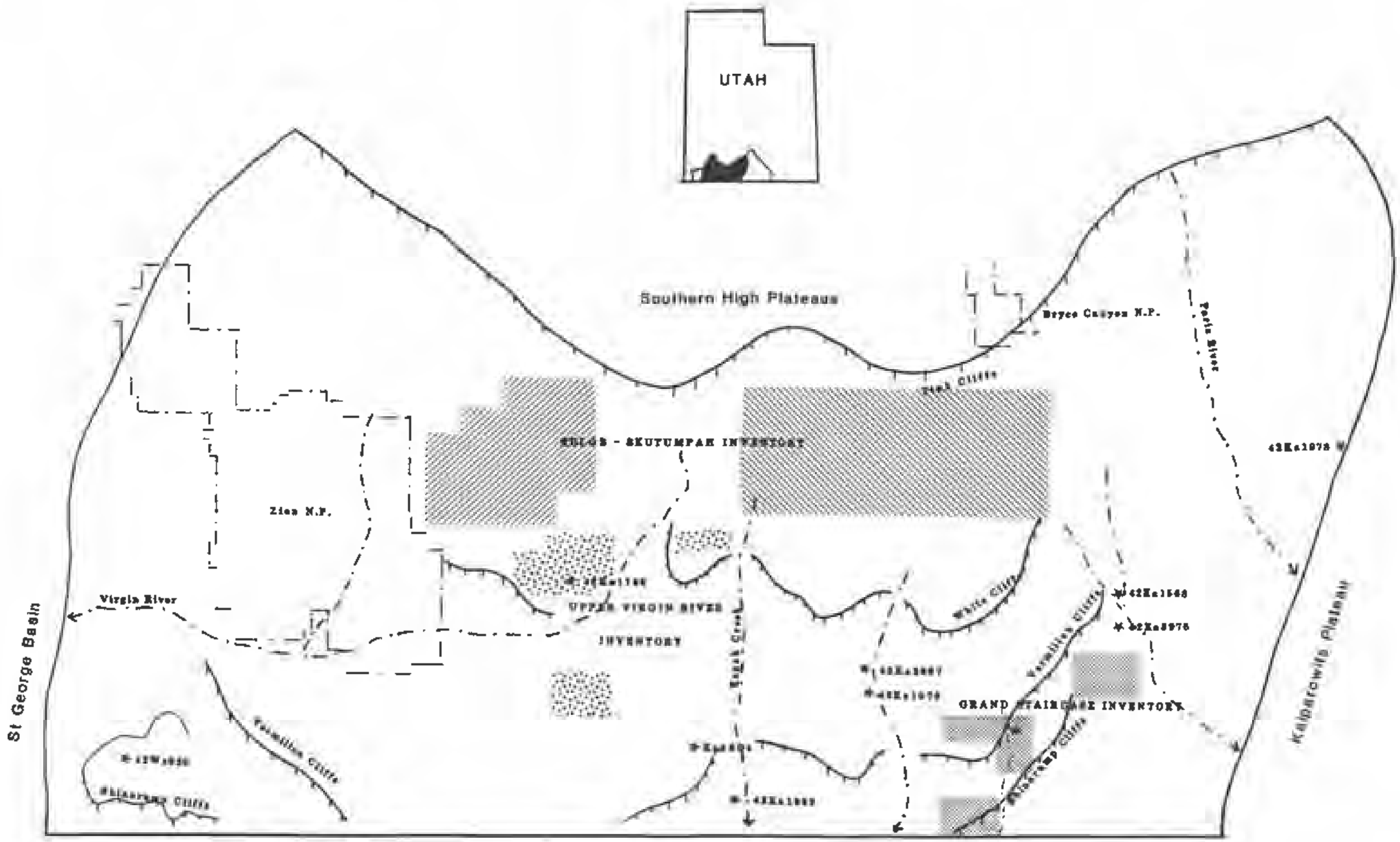

Figure 1. The Grand Staircase physiographic section with major inventory areas and selected sites.

natural laboratory for investigating the human ecology of the Virgin Anasazi and relevant questions arise quite naturally from the survey data. Did the natural environment affect Virgin site distribution? Were specific strategies required to farm in this marginal environment? Is Virgin culture a specialized Anasazi adaptation?

These questions are admittedly a departure from more traditional concerns with sorting out social and cultural relationships based on material traits, but I would argue that specialized adaptations could also reflect an ethnic reality. Unlike material culture traits, the adaptive strategy of a prehistoric group, as a behavior, is not easily "blended" as are pot sherd designs and architectural styles. The Darwinian, or selectionist, approach to understanding the significance of cultural traits and features found in the archeological record attempts to define cultural practices that are contingent upon both the group's history, as well as its environmental setting (O'Brien and Holland 1992:37). If distinctive Virgin traits found on the Grand Staircase, such as storage architecture and residential mobility, have the requisite histories, i.e., if they were "selected for" as a result of a practice that enhanced adaptation on the Grand Staircase, we have a basis for considering the Virgin separately from the Kayenta Anasazi.

If the Virgin Anasazi are viewed simply as participants in an "Anasazi stylistic zone and interaction sphere" (Glassow 1980:32), where similar material culture traits could be mobilized to different ends, a specialized Virgin adaptive strategy might be demonstrated to organize and shape Virgin culture in unique ways. Such an underlying behavior might crosscut the economics of subsistence to affect the social and ideological subsystems of Virgin culture—systems of descent, belief, mortuary practices, and means of land tenuring— a sort of "indigenous orchestration" (*sensu* Sahlins 1985) of culture could result that gives Virgin culture its distinctiveness.

THE GRAND STAIRCASE ENVIRONMENT

"... a succession of high cliffs, dropping step by step to lower and lower formations, like a great stairway."
Clarence E.Dutton (1882)

The Grand Staircase (Figure 1) is one of sixteen physiographic sections that characterize the varied geomorphological environments found on the Colorado Plateau (Stokes 1977). Each provides a potentially useful framework in which to consider local adaptation, particularly formative adaptations. The Grand Staircase extends from the Grand Canyon northward 80 miles (130 km) to the High Plateaus subdivision; from the Kaibab monocline on the east where it borders the similar but much dryer Kaiparowits Plateau, westward 70 miles (113 km) to the Hurricane fault which marks the abrupt transition to the lower Sonoran desert of the St. George basin (Figure 1). My focus is restricted to the Utah portion of the Grand Staircase which is characterized by the great cliff lines and terraces that begin at about 5,000 ft and 7,000 ft (1524 m and 2134 m) and, in tread-and-riser-like fashion, climb to an elevation of over 9,000 ft (2,743 m) near Bryce Canyon National Park. Although best known for the spectacular cliff lines themselves—the Shinarump, Vermilion, White, Gray and Pink— it is the intervening benches that create a series of elevational thresholds within this cold desert environment. Each offers a slightly different niche for the exploitation of floral and faunal resources and, most important, varying micro-climates that offer different degrees of opportunity and risk for the prehistoric agriculturalist. These natural subdivisions conveniently allow structuring of the inventory data into discrete zones permitting the investigation of site types, density, and period of occupation in terms of their local environment.

In many of the Anasazi sub-regions, particularly the Four Corners area, modern dry farming is routine (Petersen 1987:75). This is not the case on the Grand Staircase where modern agriculture is marginal at best. As Herbert Gregory pointed out, "With deficient spring rains and great fluctuations in July rains, agriculture without irrigation is profitable

Table 1. Climatic data from the Grand Staircase area.

Elevation	Station	Annual Precip. (In.)	Frost-Free Days	Evaporation Rate	Growing Degree Days
7,915	Bryce Canyon Nat. Park HQ	15.47	75	41.20	2058
7,040	Alton	16.93	110	44.15	2579
5,460	Orderville	15.48	134	53.0	3517
4,950	Kanab	13.31	171	54.82	3900
4,673	Fredonia, Arizona	9.65	NA	NA	NA
4,100	Big Water/Church Wells	6.92	189	57.15	4338

*Compiled from Ashcroft et al. (1992).

only in a few favored places and in exceptionally good years. Many dry farms have been abandoned" (Gregory 1950:31). Even so, localities that are the most favorable today for agriculture are also those with the highest architectural site densities. This simple correlation of architectural sites, supported by subsistence data, is taken to infer that the Virgin Anasazi were also agriculturalists, subject to similar vagaries of weather, and that they too had to abandon their farmsteads on occasion.

Agricultural Zone

The vast majority of upland Virgin sites occur in dry farm situations that are solely dependent upon precipitation. Within the zone characterized by architectural sites, modern rainfall on the Grand Staircase ranges from an annual high of 16 in (41 cm) in the west at 6,000 ft (1829 m) to just under 11in (28 cm) on the east at 5,400 ft (1646 m) (Kanab BLM files). Assuming the Hopi annual average of 10 in (25 cm) (Dozier 1970) to be close to the minimum for agriculture, precipitation throughout the Grand Staircase is adequate, although, influenced by topography as well as elevation, it can be quite variable. The adjacent Kaiparowits Plateau annual average, based on 14 rain guage stations, is only about 8 in (20 cm) (Kanab BLM files) - an amount similar to the St. George Basin where agriculture is restricted to perennial streams ideas. With notable exceptions, occurring in special circumstances, dry farm agriculture was probably restricted to the Grand Staircase in this portion of Utah.

The second critical variable for assessing agricultural potential is length of growing season. The minimum growing season requirement for maize is usually considered to be 110-120 days (Adams 1979:291). The range of frost-free and "growing degree days" (Ashcroft et al. 1992) on the Grand Staircase (Table 1) varies inversely with precipitation. Suitable soils for agriculture, although highly variable, occur throughout the Grand Staircase. Soil type does become critical, as we will see, in the context of certain microenvironments within the Grand Staircase.

All recorded architectural sites on the Grand Staircase fall within the elevations between 5,000 ft (1524 m) and 7,000 ft (2134 m). Assuming that the presence of architecture is a proxy for the practice of agriculture, we can infer that Virgin Anasazi adaptation on the Grand Staircase involved its accommodation to the zone of arable land bounded on the lower extreme by a long growing season but with the risk of deficient precipitation, and characterized on the upper end by abundant moisture tempered by the threat of killing frosts. We also assume that the optimal agricultural zone varied according to both short and long term climate fluctuations; accordingly, we can expect Virgin site distributions to be responsive to these changes.

THE INVENTORY DATA

Both random sample and Bureau of Land Management "intuitive" inventories of large tracts provide the primary data for this study. They are grouped into three separate geographical areas of the Grand Staircase physiographic province for purposes of analysis (Figure 1): the Grand Staircase unit (GS), east of Kanab and drained by Kanab Creek and the Paria River, 5,000 ft (1524 m) to 7,000 ft (2134 m); the upper Virgin River unit (UVR), east of Zion Park (East Fork Virgin River drainage), 5,000 ft (1524 m) to 7,000 ft (2134 m); the Skutumpah & Kolob Terrace units (SKT), located stratigraphically above both the GS and UVR inventories and below the Pink Cliffs, 6,000 ft (1829 m) to 7,400 ft (2256 m).

Combined, these inventories constitute a database that spans the Grand Staircase from east to west, as well as from north to south, sampling each of the major terraces. The environment and inventory results of each area are briefly summarized below.

The Grand Staircase Unit Inventories

Four tracts covering a total of 7,900 acres have been intensively surveyed east of Kanab resulting in 459 recorded sites. Extending from the Arizona/Utah border northward, the tracts include portions of the area below the Shinarump Cliffs, the unnamed terrace above the rim, the area extending out from the base of the Vermilion Cliffs, and the Wygaret Terrace above the Vermilion Cliffs. These inventory areas provide a north-south transect that demonstrates the range of elevations and the variety of environments in which architectural sites are found east of Kanab. The span of occupation ranges from Basketmaker to late Pueblo II, with Archaic and Numic sites rare, and Anasazi limited activity sites accounting for only 19 percent of the total. Based on site distributional data alone, this area appears to have never been an important hunting and gathering area either before nor after the Anasazi occupation. The Arroyo Site however, a recently excavated late Pueblo II site near Kitchen Corral Wash, yielded a sizable and varied faunal collection (Nauta 1995) that suggests the possibility that big game hunting might have been based at the residential sites themselves rather than at dispersed limited activity sites. This site also displayed an Archaic level buried under nearly two meters of alluvium. The feature, underlying the Anasazi deposit, is interpreted as a shallow pithouse with a milling slab on the floor. Two calibrated dates indicate the site dates to about 1700 B.C.

Test excavations of formative sites in the area east of Kanab have produced ^{14}C dates that range from ca. A.D.300 at a large pithouse/storage cist site (42KA2780) bearing only plain grayware ceramics and Rose Spring projectile points, to A.D.1100 and later on at sites with late Pueblo II room block architecture (42KA3328, 42KA3976). There is also evidence of both an earlier aceramic occupation with substantial architecture, and a similar distribution pattern (Basketmaker II), as well as the persistence of the late Pueblo II pattern into the thirteenth century (Morley 1993).

Even though much of Aikens' (1965) early excavation work that defined Virgin material culture took place east of Kanab Creek in Johnson Canyon, some contention remains as to whether this area should be considered Virgin (Ambler 1996; Euler 1994; Metcalfe 1981). More recent excavations however (Walling and Thompson 1988; Westfall 1985) confirm a long sequence of occupation displaying Virgin projectile point, ceramic, and architectural stylistic attributes similar to those found west of Kanab Creek.

Viewed as a transect ranging in elevation that affected both precipitation amounts and its effectiveness, a variety of agricultural opportunities are apparent in the GS unit: sandy loam soils were favored in spite of poor water retention if they had north aspect exposures that reduced evaporation (Figure 2); less permeable soils with higher clay content and better moisture retention capabilities were exploited at the base of the Vermilion Cliffs where runoff enhanced soil moisture; and additional opportunities occurred in a variety of alluvial situations along drainages of various sizes (Figures 3 and 4). In tandem with shifts in elevation and aspect, there seems to be an attempt at balancing soil type, soil depth, and precipitation catchment-enhancement opportunities offered by the terrain. In sum, Virgin agricultural practices involved seeking out a wide range of arable micro-environments. Notably, no water or soil control features have yet been identified that could have modified these natural environments. This could simply indicate that natural field locations were preferred, but it also suggests a willingness to abandon depleted or damaged fields and move on when necessary.

Dozier (1970), discussing the difficulties of farming among the modern Western Pueblos, cites low annual rainfall (average 10 in, 25 cm), both early and late frosts, and torrential summer rains as potential hazards, problems also faced by the prehistoric Virgin Anasazi. His description of modern tactics that reduce the risk of crop failure are worth consideration in the context of the Grand Staircase:

> To insure a crop against these odds, the Western Pueblo farmers plant two or three fields distributed so that full advantage is taken of the type of soil and kind of terrain in which the seeds are sown. Alluvial fans, flood plains, and flat sandy areas are preferred. By planting in all of these areas, it is hoped that despite inclement weather, one of the plots will produce a harvestable crop [Dozier 1970:128].

As described above, the Virgin Anasazi also sought out a variety of arable situations. On the Grand Staircase however, it appears that residential sites are usually located immediately adjacent to the fields they farmed , as opposed to being centrally located among several. Virgin sites, although fully residential and having large storage capacities, are in effect field houses tethered to specific agricultural plots. For this reason, most Virgin site locations are not conducive to the exploitation of more than one field. But soils do eventually become depleted, insect infested, and eroded; therefore, *if the Virgin Anasazi did use a multiple field system, it is more likely that they were used sequentially, over a period of years, rather than during a single season.*

Considering the "field house" nature of most Virgin site locations, a particularly striking aspect of the Grand Staircase Unit data set is the similarity of site type, density and occupational span for each of the discrete inventory zones (Tables 2, 3, and 4). Clearly, this pattern does not conform very well to occupations reported elsewhere on the Colorado Plateau where colonization/range expansion, seasonal mobility, abandonment, and particularly upland-lowland movement are cited as adaptive responses to climatic variation (Gumerman 1988).

The Grand Staircase east of Kanab Creek was occupied continuously from at least Basketmaker III times (ca.A.D. 300) through late Pueblo II (ca. A.D.1200+) (Figure 5). The continuity and cohesiveness of the occupation, and the interpretation of the locality as a dispersed but long-lived community, is supported by its distinctive ceramic assemblage; the area east of Kanab Creek is the center of manufacture for Shinarump Series grayware, whiteware, and perhaps redware. While the occupation of a single archeological district for a period approaching one thousand years is remarkable anywhere in the Southwest - the simultaneous occupation of each of the diverse agricultural niches, represented by the inventory units, is equally impressive (Tables 2, 3, and 4). This pattern is a salient characteristic of settlement on the Grand Staircase; put another way, the relationship between the Virgin Anasazi and their environment

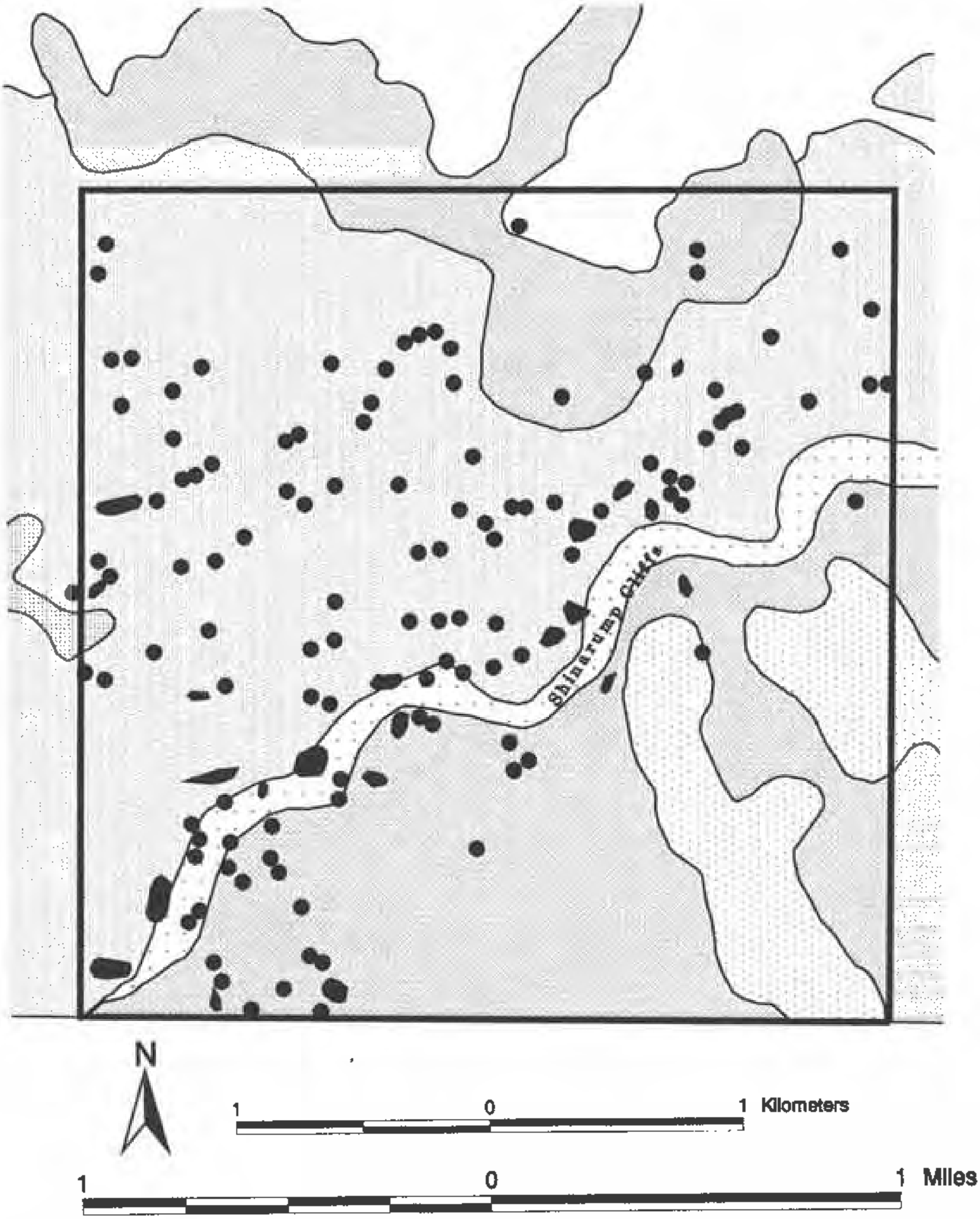

Figure 2. Seaman Wash Inventory, Shinarump Cliffs Tract: Shading (light) depicts high site correspondence with sandy soils on north aspect slope.

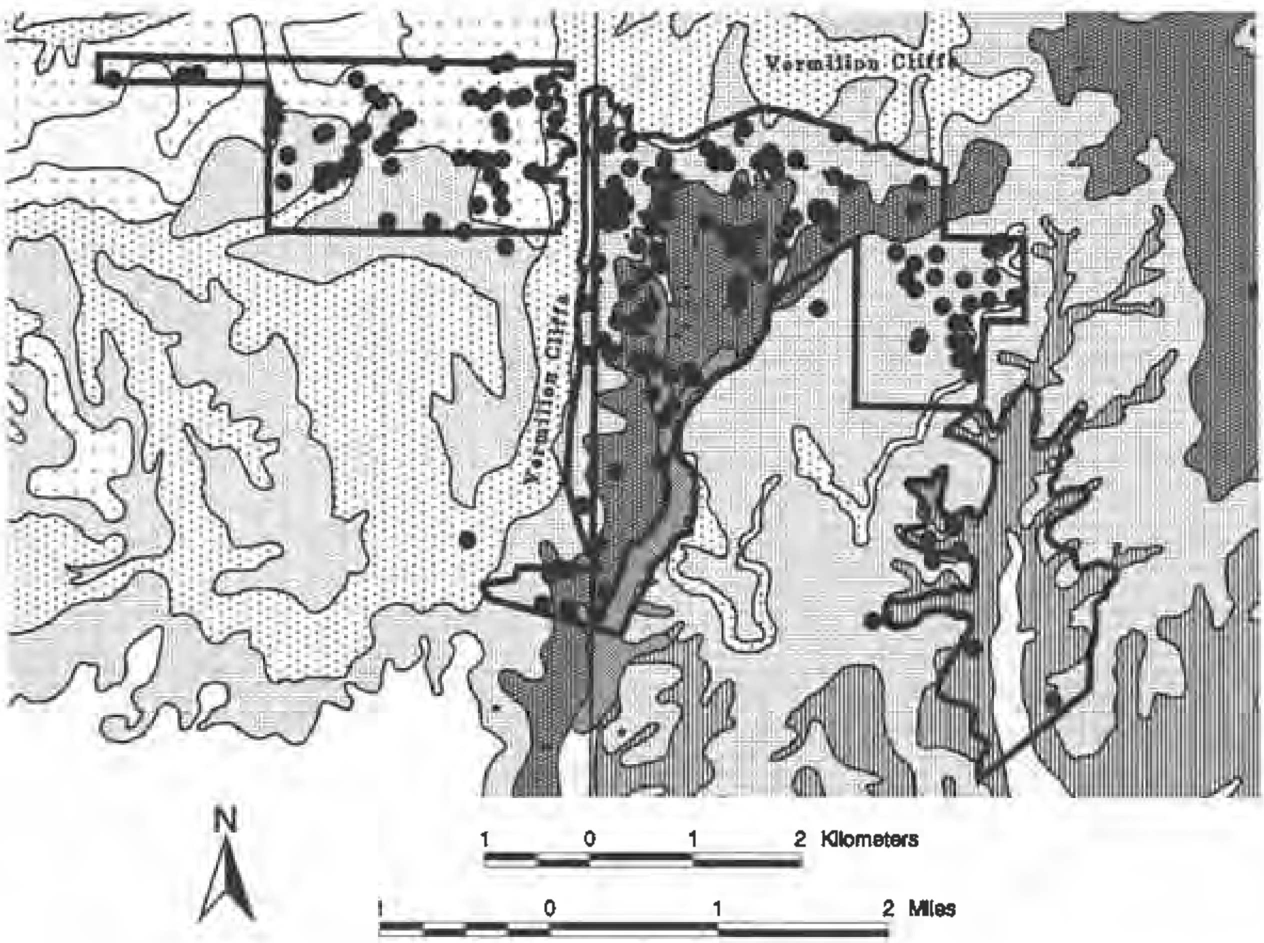

Figure 3. Seaman Wash Inventory, Vermilion Cliffs and Mesa Top tracts: Shading depicts complex soils-site associations.

seems to have differed from that of other agriculturalists in the Southwest. Since agricultural productivity probably varied between the different areas, two subsistence strategies aimed at balancing out potential agricultural shortages are possible; reciprocal exchange of produce between the populations in each area, or actual movement of a single population between areas on an interannual basis.

The Upper Virgin River Inventories

The Upper Virgin River inventory (UVRI) area is located west of Kanab Creek within the East Fork of the Virgin River drainage (Figure 1). All of the inventory tracts are located in the pinyon-juniper dominated cold desert above the rim of the White Cliffs. Although the gentle slopes of these tablelands are not as environmentally diverse as the tracts

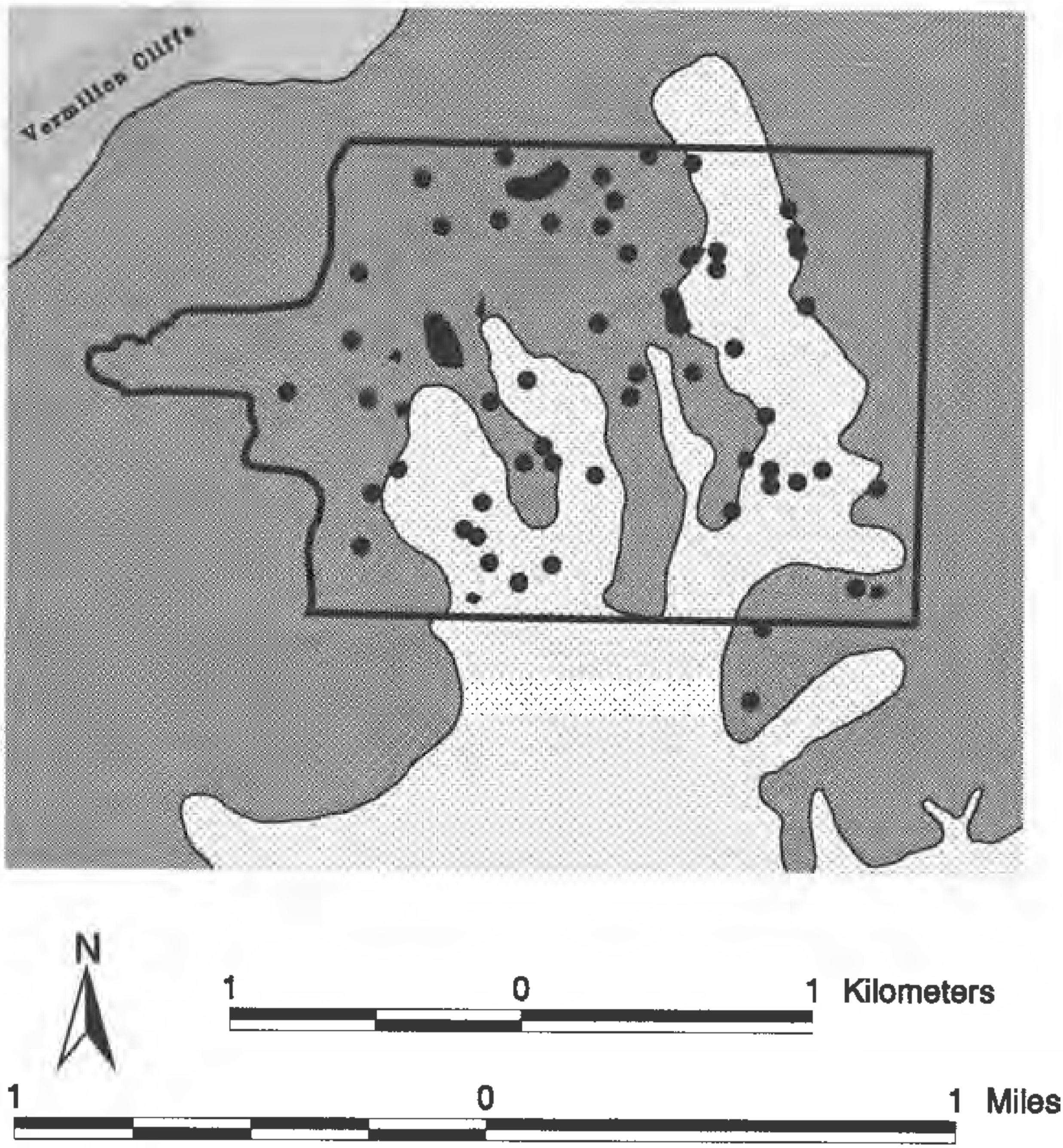

Figure 4. Grand Staircase Tract, Fin Little Inventory: Shading depicts simple assocation of sites with alluvial soils at base of Vermilion Cliffs.

Table 2. Architectural (agricultural) and non-architectural (limited activity) sites by inventory area.

Inventory	Architectural	Non-Architectural
	Grand Staircase Inventories	
Seaman Wash Mesa Top (n = 65)	72% (47)	28% (18)
Vermilion Cliffs (n = 143)	76% (108)	24% (35)
Shinarump Cliffs (n = 146)	92% (135)	8% (11)
Seaman Wash Total (n = 354)	82% (290)	18% (64)
Fin Little (n = 103)	77% (79)	23% (24)
Grand Staircase Total (457)	81% (369)	19% (88)
	Upper Virgin River Inventory	
Twin Hollow (n = 14)	92% (13)	8% (1)
Harris Mountain (n = 42)	83% (35)	17% (7)
Meadow Creek/Mineral Gulch (n = 69)	78% (54)	22% (15)
Barracks Point (n = 40)	82% (33)	18% (7)
Glendale Bench (n = 12)	83% (10)	17% (2)
Zion (n = 22)	86% (19)	14% (3)
UVRI Total (199)	82% (164)	18% (35)
GS/UVRI Total (656)	81% (533)	19% (123)
	Kolob/Skutumpah Inventories	
Kolob Terrace (57)	1% (1)	99% (56)
Alton Tract (96)	0% (0)	100% (96)
Alton Coal Project (263)	0% (0)	100% (263)
K/S Total (416)	<1% (1)	>99% (415)

Table 3. Inventoried acres, site totals and densities on the Grand Staircase.

Inventory	Acres	No. of Sites	Density (sites/sq. mi.)
	Grand Staircase Inventory		
Seaman Wash Mesa Top	1,280	65	33
Vermilion Cliffs	2,520	142	36
Shinarump	2,480	149	39
Fin Little	1,620	103	41
Total	7,900	459	37
	Upper Virgin River Inventory		
Twin Hollow	350	14	26
Harris Mountain	1,600	44	18
Meadow Creek/Mineral Gulch	2,270	70	20
Barracks Point	600	40	43
Glendale Bench	280	12	28
Zion	600	22	24
Total	5,700	202	23
	Kolob/Skutumpah Inventory		
Kane County Class II Kolob Terrace	2,936	57	12
Alton Tract	4,102	96	15
Alton Coal Project	26,625	263	6
Total	33,663	416	11

Table 4. Identified temporal components according to inventory unit on the Grand Staircase.

Site Components	BMII	BMIII	PI	PIII(E)	PII(L)
Upper Virgin River					
Meadow Creek/Mineral Gluch (n = 49)	-	10 20%	24 49%	15 31%	- -
Barracks Point (n = 26)	- -	7 27%	12 46%	7 27%	- -
Glendale Bench (n = 6)	- -	- -	1 17%	5 83%	- -
Zion (19)	- -	- -	12 63%	7 47%	- -
Twin Hollow (9)	- -	- -	2 22%	7 78%	- -
Harris Mountain (n = 30)	- -	- -	13 43%	11 37%	6 20%
UVRI Totals (n = 139)	- -	17 12%	64 46%	52 37%	6 4%
Grand Staircase Inventory					
Seaman Wash Inventory					
Shinarump Cliffs (n = 114) (SWI)	- -	21 27%	5 6%	22 28%	31 39%
Vermilion Cliffs (n = 114) (SWI)	- -	7 6%	9 8%	28 25%	70 61%
Mesa Top (n = 73) (SWI)	- -	5 7%	10 14%	18 25%	40 55%
SWI Subtotal (266)	- -	33 12%	24 9%	68 26%	141 53%
Fin Little (n = 115)	- -	29 25%	15 13%	9 8%	62 54%
Grand Staircase Total (381)	- -	62 16%	39 10%	77 20%	203 53%
All Inventory Total (n = 520)	- -	79 15%	103 20%	129 25%	209 40%

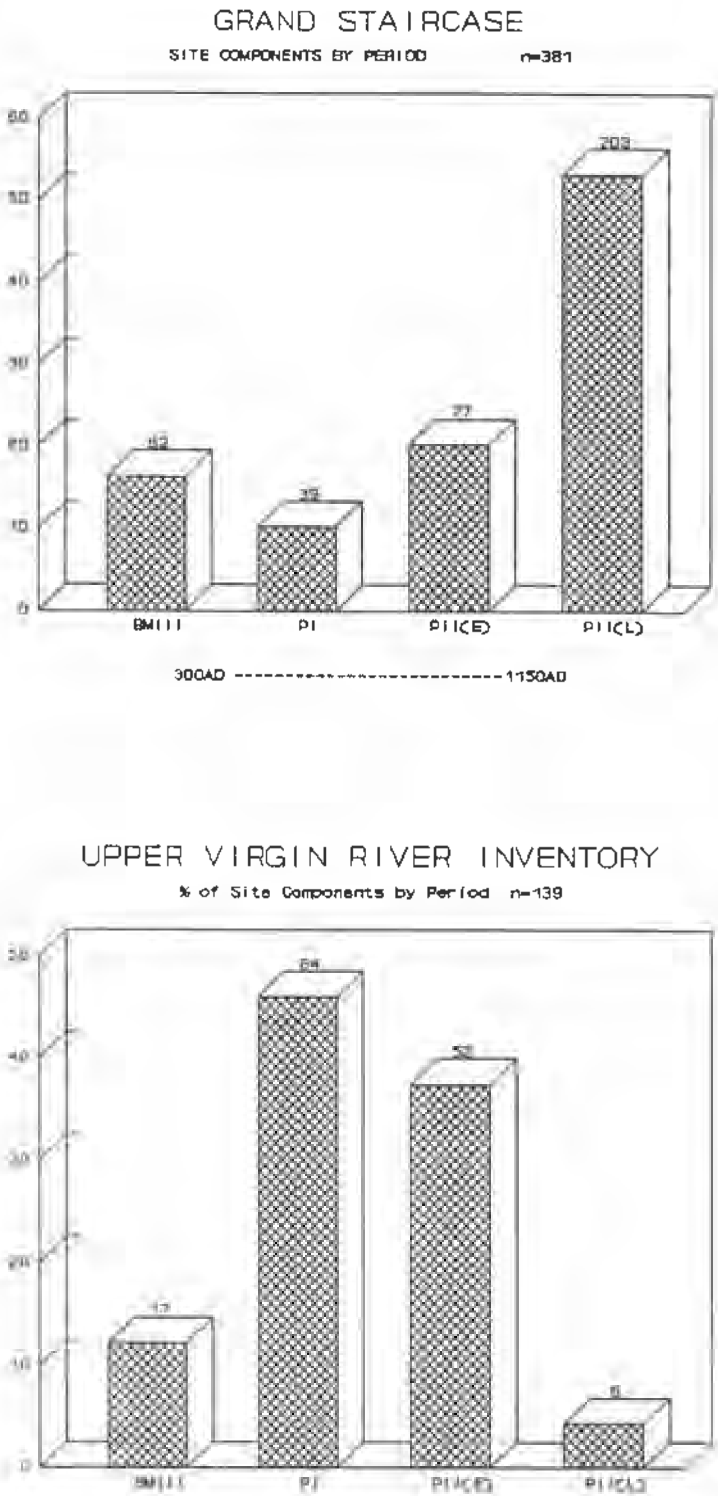

Figure 5. Histograms of site components, expressed as percent of total, for Grand Staircase and Upper Virgin River Inventories.

on the east end of the Grand Staircase, their range in elevation of 5,600 ft (1700 m) to 7,000 ft (2234 m) is similar due to the Sevier Fault which follows the Virgin River. The Hodman-Mespun Association soils found here (Figure 6) consist of loamy fine sand, generally quite deep, but with only a low to moderate capacity to hold water (Kanab BLM files). This limitation is overcome by an annual precipitation average of 16 in (41 cm), the highest for any of the inventory areas within the agricultural zone on the Grand Staircase.

A Case for Abandonment

The six inventories that comprise the UVRI recorded 202 sites resulting in an average site density of 23 per square mile. This somewhat less than the Grand Staircase tracts, but about average by southwest standards (Effland et al. 1981:28). Eighty-one percent of the sites are architectural, the same percent as for the GS tracts. This coincidence in the type and intensity of use suggests that both areas were being used in similar ways; the occupational histories of the two areas however are quite different. The relative population for the Basketmaker III period on the upper Virgin River is similar to that on the eastern Grand Staircase. This moderate population is followed by a rapid increase during the Pueblo I period, a tapering off in early Pueblo II times, and virtual abandonment of the area north of the river prior to A.D. 1100 (Figure 5).

The UVRI chronology is based on the presence of North Creek plain and black-on-gray ceramics as well as the near total absence of later types. It is interesting to note that Shinarump plain, which dominates during this period on the Grand Staircase transect, is absent from the area while Washington and St. George black-on-gray, the Pueblo I and early Pueblo II painted varieties of North Creek, are common in both the UVRI and the Grand Staircase data sets. The total lack of late ceramics on the benches north of the East Fork indicates that even limited use of the area did not occur during late Pueblo II.

The trend to occupy higher elevations (or areas with higher effective precipitation) seems to correspond well with the sharp decrease in precipitation beginning during Pueblo I times (Figure 7) (Gumerman 1988:262). While the highest elevations along the upper Virgin River were occupied prior to about A.D. 1050, the entire area was subsequently abandoned during late Pueblo II when a moister climatic regime returned.

The Upper Virgin River and Grand Staircase tract frequency curves (Figure 8a) show a remarkable inverse relationship between the inventories west of Kanab Creek and those to its east. The increase in Pueblo I density for the UVRI is mirrored by a corresponding decrease on the Grand Staircase tracts, while the subsequent abandonment of the UVRI area during late Pueblo II is matched by a rapid increase in population to the east. Whether or not this reflects actual population movement from the Virgin River drainage to the east is a moot point; what it does suggest is that while the homogeneous environment of the upper Virgin drainage no longer met the needs of those who lived there, the more varied environments and agricultural opportunities noted for the eastern Grand Staircase did.

If all known site components are combined (Figure 8b) for both inventory areas, the resulting total population curve is remarkably similar to that projected by Euler (1988:194) for the entire Virgin culture area as well as most other areas in the Southwest. If this frequency curve for Virgin growth is accurate, the data might be taken to suggest that the UVRI and GS transect groups actually constituted a single population on the Grand Staircase. Such a scenario is possible, but at this point we have need for similar relative population studies from adjacent Virgin locales - particularly downstream where North Creek ceramics predominate.

Kolob and Skutumpah Terrace Inventories

Moving north of both the UVRI and GS inventory areas and rising another level on the Grand Staircase to an elevation ranging between 6,400 and 8,000 ft (1950 and 2438 m), are the Kolob/Skutumpah Terrace units (Figure 1). This data set is a composite of two major inventory efforts: Christensen et al. (1983) reports on the results of a random sample which totaled 7,040 acres and recorded 151 prehistoric sites; Halbirt and Gualtieri (1981) and Keller (1987)

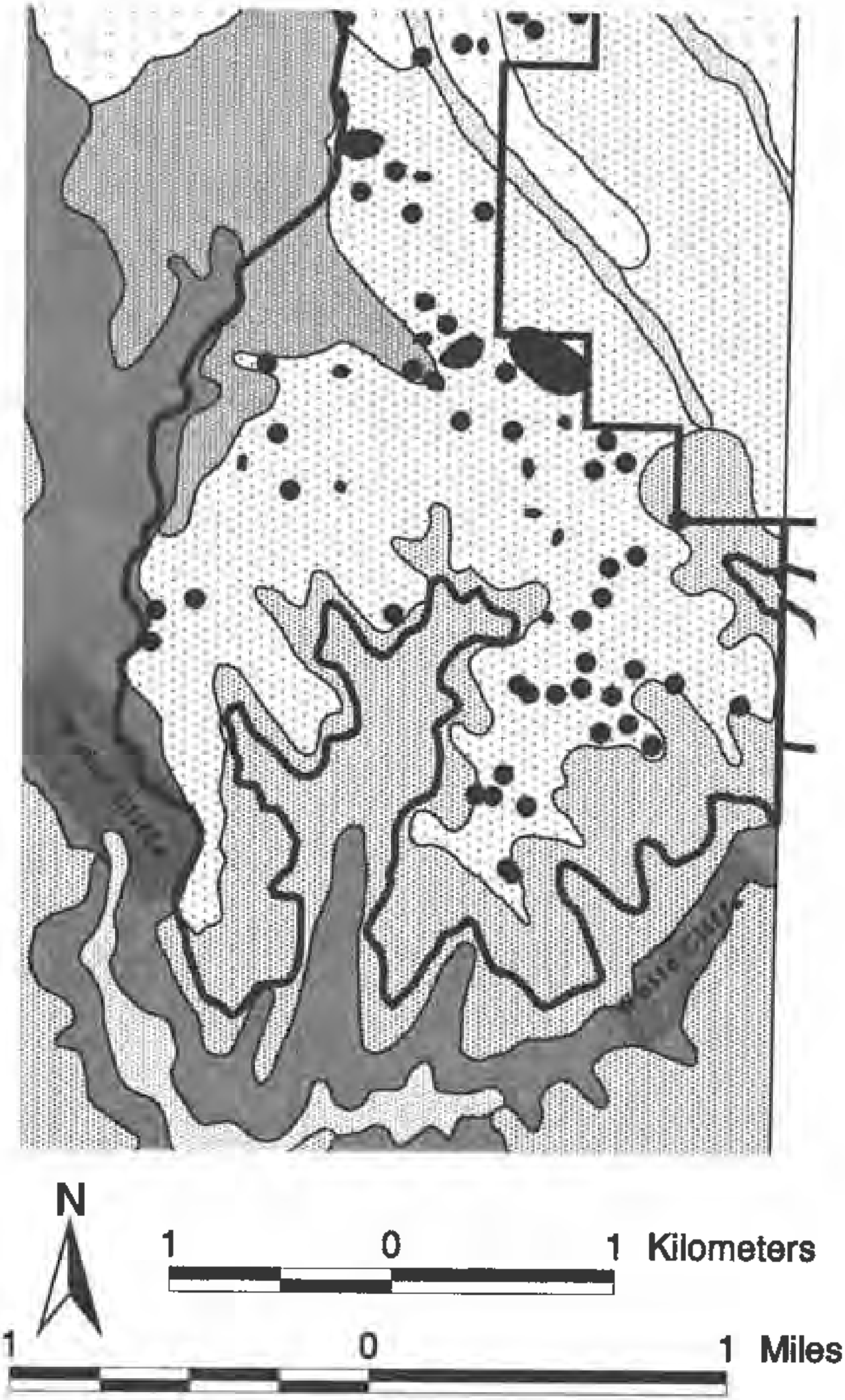

Figure 6. Upper Virgin River Inventory, Meadow Creek/Mineral Gulch Tract: Shading depicts close association with sandy soils and high annual precipitation above White Cliffs.

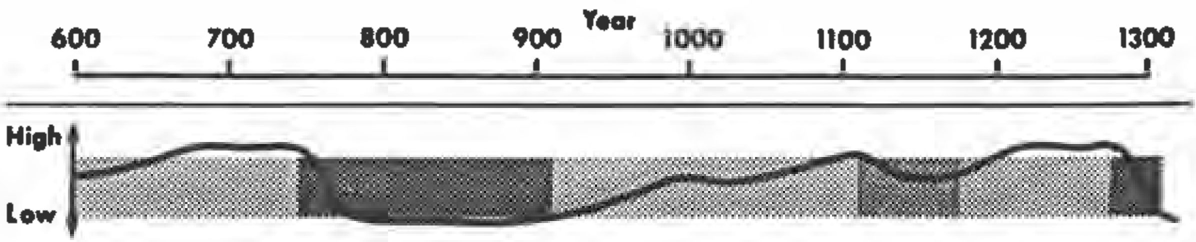

Figure 7. Graph of effective moisture on the Colorado Plateau. Adapted from Plog et al. (1988).

conducted an intensive inventory of 26,625 acres and recorded 263 sites. In addition, a substantial amount of BLM inhouse inventory indicates that these projects accurately reflect both the type sites present and their distribution.

The Skutumpah and Kolob Terraces, although separated by the East Fork of the Virgin River and elevationally displaced by the Sevier Fault which follows the drainage, are both positioned between the top of the White Cliffs and the base of the Pink Cliffs. This unit constitutes a discrete environment characterized by a short growing season (less than 120 days at Alton) and is also subject to cold air drainage from the high plateaus above. Although soils and precipitation are more than adequate, the terraces are at the upper limit of modern agricultural potential and appear to have been unacceptably risky for prehistoric farming.

Of the over 400 sites recorded by these inventories on the upper terraces, all but one are limited activity sites or camps related to hunting and gathering behavior. Keller accurately characterizes the Skutumpah Terrace as a "hunting and gathering zone of major importance during prehistoric times. The recorded sites reflect Desert Archaic, Virgin or Western Anasazi, and Southern Paiute regional occupations" (Keller 1987:16). This one-to-one correspondence between habitation sites and arable environments is a strong indication that residential sites are virtually always associated with agricultural potential, while hunting/gathering sites are more common in the elevated zone where agriculture is not feasible. There seems to be a tendency for the two activities to be mutually exclusive (Figure 9). Given the small number of limited activity sites, it appears that the lower terraces of the Grand Staircase that constitute the agricultural zone either were never as productive for hunting and gathering as those at higher elevations, or what is more likely, *the Virgin procurement strategy for native flora and fauna was based at the residential site(s), and did not involve significant numbers of limited activity sites.*

Based on what he considers to be a representative sample of the entire Alton Project, Keller (1987:87) estimates that about 23 percent of the total sites are Anasazi BMIII-PII (Keller, 1987:87). Christensen (1983:38) cites 20 percent of the combined Kolob/Skutumpah sample as having an Anasazi component. Overall, site density on the Kolob and Skutumpah are only about one half of that observed for the agricultural zone inventories (Table 3). The question is raised, if hunting and gathering sites played a significant role in Virgin Anasazi subsistence, what percent of the total site count would constitute support for a mixed subsistence strategy? Given the expedient and temporary nature of most procurement sites, it seems reasonable that they should far outnumber residential sites. In fact, Table 2 indicates that architectural sites outnumber non-architectural sites by a ratio of 5 to 1. Clearly, distributional data do not indicate that

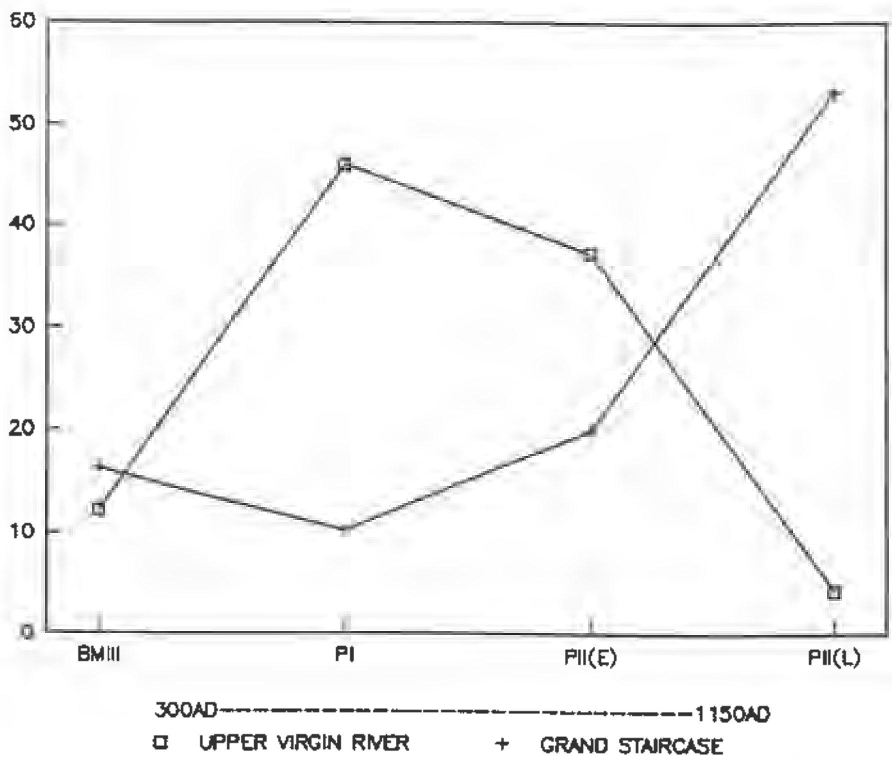

Figure 8a. Frequency of site components by period for Upper Virgin River and Grand Staircase Inventories.

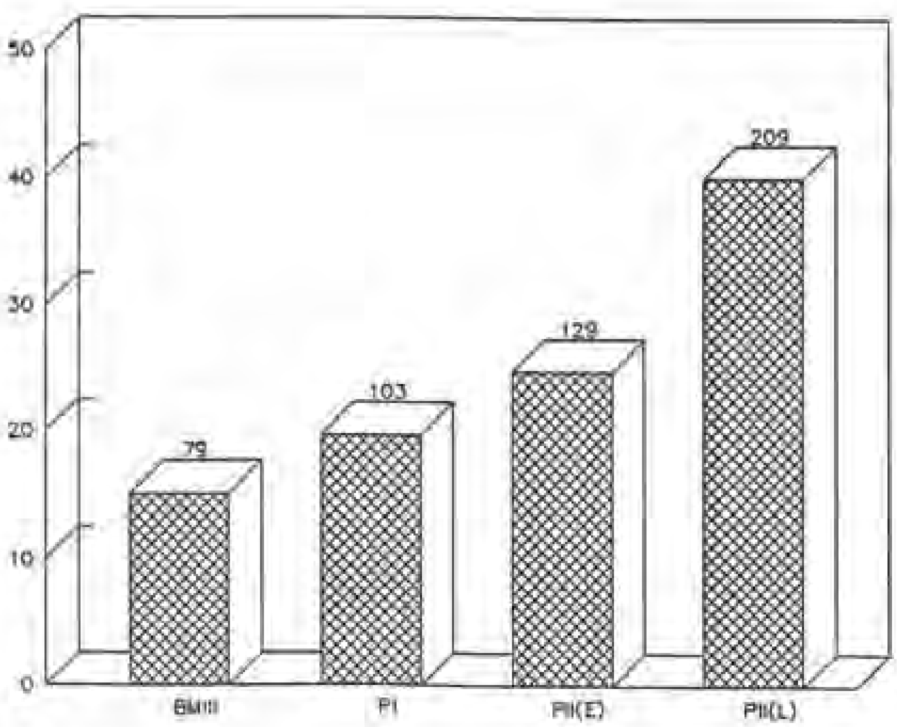

Figure 8b. Histogram of combined Upper Virgin River and Grand Staircase site components (n=520).

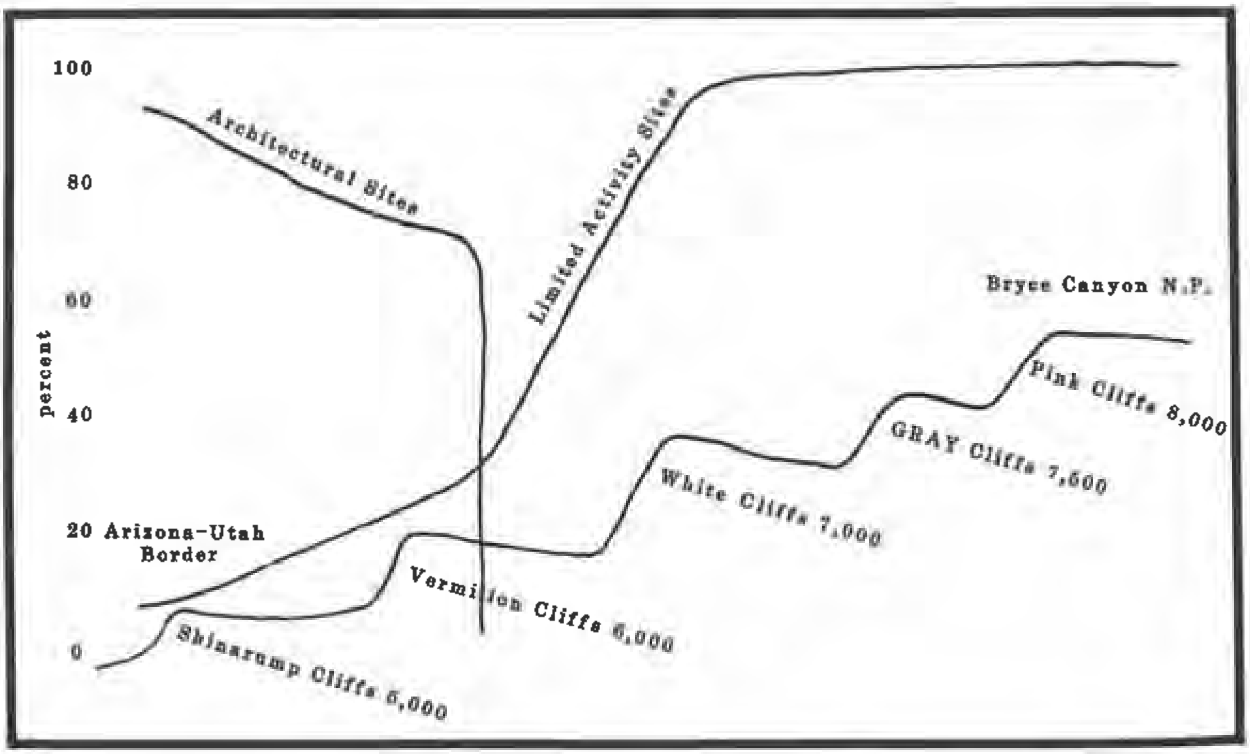

Figure 9. Frequencies of architectural and limited activity sites according to elevation on the Grand Staircase Inventory Tracts (n-711).

hunting/gathering sites were an important part of the local Virgin adaptive strategy. This is not to say that wild foods were not important at times, but that other options were available for their procurement. One possibility is that, given frequent residential moves, the farmsteads themselves could have functioned as base camp/processing stations for a form of garden hunting/gathering (Emslie 1981) carried on in the vicinity of the residence.

VIRGIN SETTLEMENT PATTERNS

Social Organization

Recently, Virgin social organization has come to be seen as increasingly complex. The lowland Virgin Anasazi at Lost City in Nevada have been portrayed as participants in a "series of complex political and economic relationships with other Southwestern polities linked in a Pan-Southwestern trading system" (Rafferty 1990:3). Based on pueblo room count data and storage to-living room ratios, Rafferty suggests that the lowland Virgin Anasazi had a three-part social hierarchy representing a complex chiefdom. Lyneis has effectively challenged this position with a detailed analysis of burials from the Main Ridge site (1992a). The analysis of mortuary data provided no support for a ranked society and actually strengthened the argument for a simple egalitarian society.

On the Grand Staircase itself, the late Pueblo II/PIII manifestation has been interpreted to include "several large pueblo villages with more than 50 habitation rooms and 100 storage rooms..." (Larson et al. 1996:232). Assertions of kiva architecture, ceramic diversity, aggregation, trade networks, and increased storage have been also cited as evidence for complexity, but remain to be demonstrated (Larson et al. 1996). Although large sites do exist on the Grand Staircase, there are other processes at work that affect Virgin site size and growth that do not necessarily indicate organizational complexity.

For the majority of sites, and during most of the sequence, Virgin settlements on the Grand Staircase reflect an organizational complexity in agreement with impressions described for other areas of the Virgin Tradition. Along the Muddy River in Nevada most sites are found to be "..scattered independent households" (Lyneis,1992a:82); on the uplands of the Arizona Strip the larger of the unit pueblos are considered "extended family habitations" (Thompson and Thompson, 1982:113). Euler (1994) describes Virgin sites in the Grand Canyon as "occupied by an extended family or two" Lyneis (1992a:81) suggests use of the following null hypothesis when examining organizational complexity of the Virgin Anasazi. It is worth repeating in its entirety:

> The least complex form of social organization that one might propose for the lowland Virgin Anasazi is nonhierarchical, and would include the following characteristics: small, politically independent hamlets with a hamlet or lineage headman in which the occupants are members of one or several lineages of similar social status, with individual hamlets linked to others through marriage and kinship ties and reciprocal exchange relationships among their residents.

The interpretation inferred for social organization on the Grand Staircase is compatible with Lyneis' least complex form, i.e., the majority of sites are considered to be undifferentiated residential units that represent the habitation space for a unit of Virgin social organization. Based on the typical small site, that unit size appears to be congruent with the nuclear or extended family, although some households were undoubtably more complex. These small residential units appear by the Basketmaker III period and persist through late Pueblo II times. Although residential units vary in form through time as architectural and stylistic changes occur, the basic social organization of Virgin society seems not to have changed.

Virgin residential units are not unlike those found elsewhere on the Colorado Plateau (Rohn 1991; Talbot 1990). The architectural sequence describes a straightforward progression from pithouse residences with separate cist storage facilities, through intermediate stages of room block development, and eventually to substantial surface masonry pueblos incorporating both storage and habitation functions (Thompson and Thompson 1982:109; Talbot 1990).

Having recognized the basic nature of the Virgin residential unit and its variation in form through time, we need to consider their distribution in terms of their relationship to one another. On the Grand Staircase, Virgin residential sites have a strong tendency to cluster. Consistent with Lyneis' least complex form of social organization, these site clusters are considered to represent dispersed communities. Perhaps the most intriguing aspect of the Grand Staircase distributional data is a marked tendency for these site clusters to be extraordinarily long-lived and often multi-period, a characteristic that may reflect the continuity of local descent groups.

Subsistence

Recently, evidence for a mixed subsistence economy has been used to support a variety of proposed Virgin adaptive strategies: Westfall (1987:182) suggests seasonal use for the small residential Pinenut site located on the Kanab Plateau; Allison (1990:117) proposes a mobile hunting strategy for the St. George Basin groups with forays to the uplands after the growing season; Larson (1990:243) favors only a late reliance on agriculture for the lower Virgin River population; and Altschul and Fairley (1989:121,135) describe several alternative settlement-subsistence strategies based on seasonal mobility. Most of the evidence cited for mixed subsistence comes from analysis of excavated macrofossil and artifactual material, often without supporting settlement data. The model of adaptation offered in this paper considers both settlement data and excavated material, but suggests that each body of data should not be weighted equally. The model is based on highly consistent settlement patterns within the very structured (i.e. predictable) environment of the Grand Staircase. Corn (*Zea maize*), present at virtually all sites from the earliest periods on, is the most environmentally sensitive (restrictive) subsistence variable and therefore is naturally the dependent variable in the subsistence-settlement equation. Also, occasional evidence of a mixed diet *per se* does not necessarily imply a mixed subsistence economy. Wild foods may be brought to the table in a number of ways and for a number of reasons: garden hunting (Emslie 1981), propinquity, expediency. As a temporary supplement, the importance of wild foods should be assessed in light of the role they played in larger subsistence strategy. *The model favored here suggests a primary reliance on maize agriculture and associated plants for the entire duration of the occupational sequence.*

The earliest well-documented evidence for maize agriculture on the Grand Staircase is found at Cave DuPont (Nusbaum 1922) now securely dated at A.D. 217 (William Robinson, personal communication 1992). BLM testing at the nearby South Fork Site, a similar aceramic alcove, yielded a ^{14}C date of 1670 B.P. +/- 110 (uncorrected A.D.280) and dendro chronological dates of 81 B.C., 3 B.C. and A.D.5 (Kanab BLM site files). Scattered corn cobs in general association with the South Fork Site were all of the 12-18 rowed variety similar to those in Cave DuPont. This variety of maize, probably Chapalote, as well as masses of corn stalks, have been reported from several other Basketmaker contexts on the Grand Staircase (Judd 1926; Kanab BLM files). Admittedly, the inordinate amount of maize corn cobs recorded for Basketmaker sites, more than all other periods combined, is due to the exceptional preservation conditions found in dry alcove sites favored during that period. It is not simply the presence of maize that argues for an early reliance on agriculture, but *its association with substantial storage facilities*. Berry's (1982:33) argument for the all-or-nothing nature of maize agriculture is also relevant here: "It is impossible to sustain a plant that is not self-propagating for any length of time without a total commitment to its planting, maintenance, and harvesting on a year-to-year basis."

While it may be possible to have a less than total commitment to agriculture (as in the case of some Fremont adaptations), casual farming by the Virgin Anasazi seems unlikely. Considering that the function of most architecture on upland Virgin sites is devoted to storage, and that neither the preceding Archaic period storage architecture nor post-formative Southern Paiute storage features have been found on the Grand Staircase, the presence of Virgin storage architecture stands out as unique and we can assume that it heralds a basic shift in the subsistence economy from hunting/gathering to sedentary agriculture.

The presence of wild foodstuffs on many excavated sites does not necessarily conflict with the view that the Virgin Anasazi were primarily agriculturalists. Even though *Chenopodium* spp. seeds are ubiquitous throughout the sequence, they were most likely an ancillary or weedy crop that simply accompanied maize agriculture. At any rate, their environmental range is less restricted than that of maize. If chenopods were basic to the Virgin Anasazi diet, we would expect at least some sites to be located both above and below the zone favorable for maize - in fact we do not.

The presence of Artiodactyla bone, i.e., mule deer (*Odocoileus hemionus*), mountain sheep (*Ovis canadensis*), and pronghorn (*Antilocaprus americanus*) bone are also potential evidence for a "mixed" subsistence economy. Big game bone is occasionally found in large quantity on upland sites (Walling and Thompson 1988; Nauta 1995; Nickens and Kvamme 1981). At least for mule deer, the most economical and congruent explanation for its occurrence is that game corridors, following major drainages that dissect the Grand Staircase, directed migrating animals to the site, rather than vice versa. Mountain sheep and pronghorn probably ranged near some sites. Future studies that focus on the relationship between prehistoric big game distributions and the types of game and carcass parts recovered on residential sites are needed to clarify just how important faunal resources were to the Virgin Anasazi and how far they were willing to travel to obtain big game. The distance traveled to procure game surely affected the number and structure of limited activity sites as well. In his summary discussion of Anasazi subsistence, Jennings pointed out that "...the Anasazi could only survive by continuing to exploit about the same resources as the Archaic peoples did and at about the same rate" (Jennings 1978:153). It is suggested here that, *regardless of dietary mix, it was the practice of agriculture that structured Virgin settlement - not the procurement of game and wild seeds.*

Architectural Variation: the Virgin Sequence

A recent comparative analysis (Talbot 1990:19) finds in the Virgin "an adherence to the broad patterns of regional architectural change." A growing body of architectural data supports this observation. Good examples of Basketmaker III architecture and layout may be found in Schroeder (1955:27) and Baker and Billat (1992). Pueblo I storage architecture is described by Aikens (1965:84) at the Parunuweap Knoll Site and a typical pithouse/storage residential complex can be found in Walling et al. (1986:191). The early Pueblo II pithouse and room block excavated by Nickens and Kvamme (1981) near Kanab is very similar to those at the Little Man cluster near Hurricane (Dalley and McFadden 1988). Late Pueblo II sites (McFadden 1989; Metcalfe 1981) generally incorporated the residence into the room block, but pit structures continued to be used through this terminal period, possibly for special purposes. A break in this simple continuity may occur during late Pueblo II (ca. A.D. 1100) when Kayenta architectural, as well as ceramic and projectile point, influences are recognized to intrude upon the indigenous Virgin population, particularly east of Kanab Creek. While the Virgin pattern does not appear to be supplanted, new site configurations may indicate the introduction of an additional subsistence strategy to the Grand Staircase.

In his review of architectural trends on the Colorado Plateau, Talbot suggests that "while Virgin architecture can and should be studied internally, its regional context deserves as much if not more attention" (Talbot 1990:33). The Virgin Anasazi were indeed participants in the larger Anasazi tradition of the Colorado Plateau, but Virgin adaptation on the Grand Staircase may also be viewed as specific and considered without recourse to external influences. This analysis regards the Virgin architectural sequence as being shaped by a process of natural selection. In this view, architectural change is not necessarily one of evolutionary "progress" but simply reflects a process of increasing fitness within the overall adaptive milieu.

Probably the most salient example of vernacular architecture is the storage unit. Functionally, methods of bulk storage during the formative period change very little through time. The single most consistent Virgin architectural trait is the use of slab or cobble subfloors overlaid by clay to seal the floors of storage units. An effective form of weather and rodent proofing, this technique originated during the Basketmaker II Period (Nusbaum 1922) and is the defining characteristic of storage features through the late Pueblo II period. Also known in the Kayenta area, the technique was not commonly employed there during the later periods. The typical Virgin farmstead, during any given period, is made up of several storage units and a single residence that form the basic "core"of a typical site— e.g. the"Little Man" sites (Dalley and McFadden 1988:290). As an extreme example, Figure 10 (lower) depicts a Basketmaker III site with detail of a pithouse/storage cluster and Figure 10 (upper) depicts a segment of a late Pueblo II room block nearly 700 years later. The slab-lined storage cists and associated pithouse at the Basketmaker III site may be considered the functional equivalent of the room block with paved storage room floors (Rooms 1,3 and 4) and the connected residence (Room 2). Further, and of particular interest, the accretional construction of storage units at each site indicates a lengthy occupational history, with possible hiatuses, for both sites.

Notwithstanding recent interest in the subsistence implications of the pithouse-to-pueblo transition (Gilman 1987), changes in architectural form in the Virgin culture area seem to bear virtually no relationship to their degree of sedentism. Gilman has observed that, ethnographically, pithouse dwellers are more mobile than those who live in surface pueblos and that such mobility indicates a greater reliance on hunting and gathering (Gilman 1987). This does not appear to be the case on the Grand Staircase, or with the Virgin Anasazi in general. In both the uplands and the St. George Basin, early pithouse occupations (ca. A.D.300 - 1050) and Late Pueblo II room blocks (A.D. 1050-1150/1200) have similar distribution patterns and not uncommonly, occupations representing both periods are present on the same site. It appears then, that architectural change in the Virgin culture area bears no relationship with the degree of agricultural intensification.

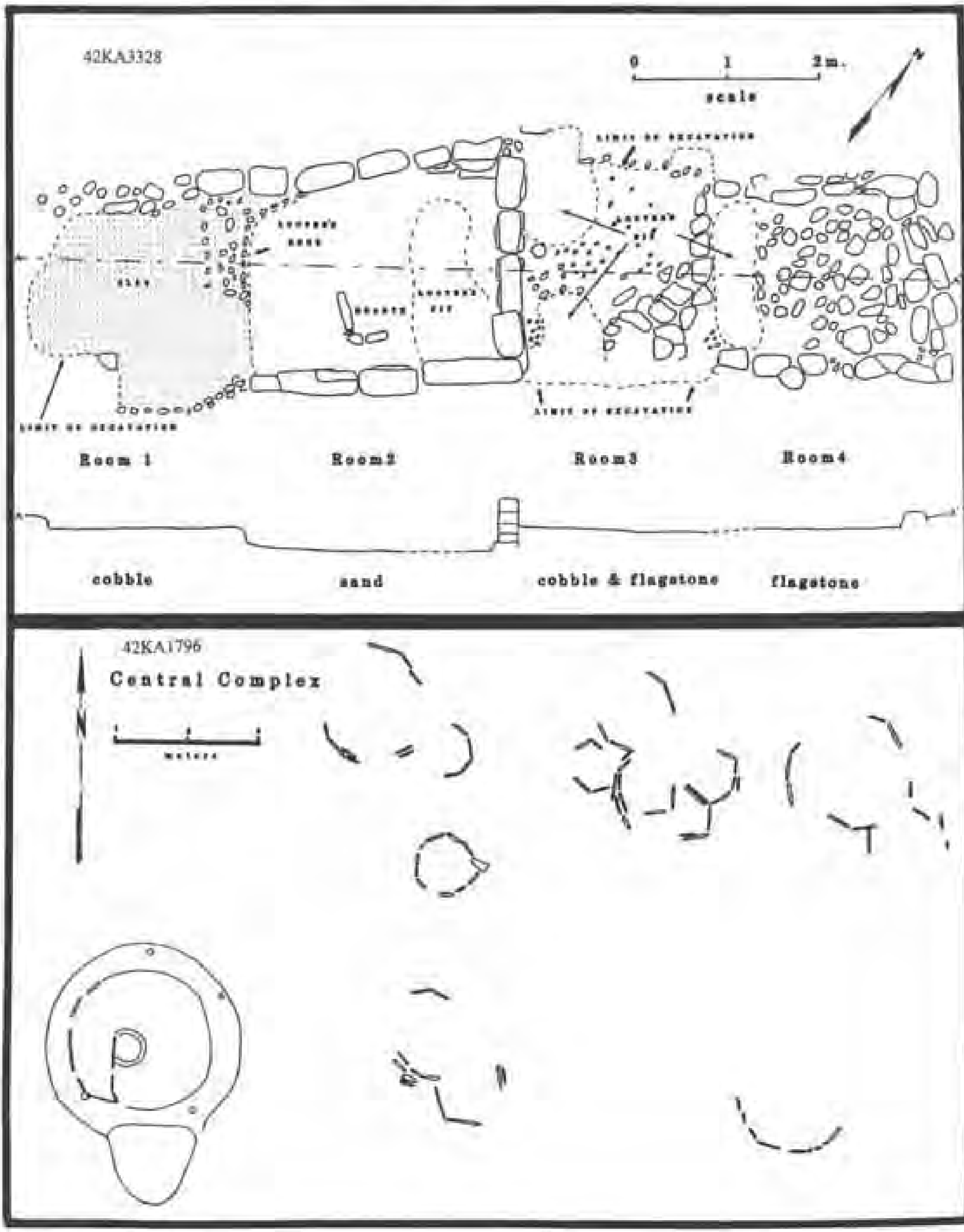

Figure 10. Accretionally constructed storage architecture: the lower is a series of Basketmaker III storage cists with pithouse; the upper, a late Pueblo II roomblock with accretionally constructed rooms.

VIRGIN ARCHITECTURAL ADAPTATIONS

Storage Architectural Variation

Did changes in storage architectural form, construction material, as well as style—subject to selective pressure for nearly a millennium—increase the adaptedness of the maize farming Virgin Anasazi? Or, do the changes simply indicate random drift, i.e., a tendency to accept outside stylistic influences? Relevant to this question is the observation that storage technology remains on a Basketmaker level for the entire Virgin sequence A.D. 300-1200+. It is the sealed storage unit itself that is the actual storage receptacle, rather than vessels contained within storage units, as was common during Pueblo times elsewhere (Wilshusen 1986). The lack of definable floors in the storage rooms in the Structure A room block at the Coombs Site (Lister 1959), is a good example of a non-Virgin storage tactic. The Virgin approach to storage may account for both the lack of storage vessel ceramics on Virgin sites, as well as the practice of constructing several storage units rather than a single large one. Multiple units decrease the risk of catastrophic loss through spoilage or rodent intrusion.

While the potential for enhanced adaptation offered by new architectural forms based solely on increases in efficiency are difficult to quantify, we can make the observation that Virgin architectural trends allowed the use of more widely available construction materials. This in turn, would permit an expansion in range to areas that were favorable for agriculture, but lacked the traditional raw materials with which to construct storage facilities. For example, bedrock cists common to the Basketmaker II period were best suited to excavation into the soft Navajo sandstone; the large sandstone slabs used for deep cists during Basketmaker III and some Pueblo I structures are also geographically limited to certain rock formations. Much less limiting are the cobble floored pavements and jacal, wattle-and-daub, masonry and composite walls more common during the later periods that could be constructed of local materials found almost anywhere. Architectural change then, seems to have offered the potential for increased fitness because it allowed expansion into previously unoccupied or under-populated areas. In this sense, the Virgin architectural sequence appears to be directed towards versatility rather than the specialization common to other Anasazi groups. Determining whether this versatility is truly an adaptive trait requires an examination of its role in the overall settlement strategy. In fact, diversity of architectural form and construction method is a defining characteristic of the Virgin Anasazi. Seen as a type of versatility, it is an adaptive prerequisite to farming the diverse environments found on the Grand Staircase.

Residential Architectural Variation

Using ethnographic data from around the world Gilman (1987) describes the Southwestern pithouse-to-pueblo transition as one of increasing sedentism and agricultural dependence. The earlier pithouse residences accompanied by cist storage are, it is argued, "...winter structures associated with a relatively low dependence on agriculture. Structures are used seasonally, although sites may be occupied year around" (Gilman 1987:560).

The Virgin Anasazi underwent a similar transition with surface masonry and jacal living quarters incorporated into the room block by late Pueblo II times (ca. A.D. 1100). Earlier pithouse architectural variation occurs during the Basketmaker III, Pueblo I and early Pueblo II periods and was accompanied by discernible changes in storage cist architecture, but I suggest, the quantity of storage space per residential unit did not vary significantly over time. This is taken as evidence for continuity of subsistence practices. Further, the large quantities of storage space per residence indicate winter occupation, while their association with arable land suggests it was agricultural surplus being stored. Residential architectural change may have contributed to Virgin adaptation, but it is not particularly relevant here except to note that a variety of habitation types enhances the opportunity to exploit different environmental zones.

Site Structure and Layout

In contrast with the simple single household residential site layouts previously described, large sites, i.e., "pueblos", have traditionally been the focus of Virgin architectural studies. Based largely on survey evidence, Aikens (1965) described the C shaped pueblo, as opposed to the linear or L shape common to the Kayenta area, as a defining characteristic of the Virgin Anasazi. Others (Thompson and Thompson 1982:114; Altschul and Fairley 1989:131) cite Ls,Us,Cs,Vs and Es, even circles and squares, a virtual alphabet soup of styles for the area. Excavations at Southgate, along the Santa Clara River in the St. George Basin (Dalley 1993) have revealed a number of incredibly complex sites. These sites display essentially curvilinear layouts that result from accretional construction and superpositioning that is indicative of complex and long-term site occupations. The largest of these sites, 42WS964, yielded roughly one radiocarbon date per generation (26 years) for a continuous sequence of over 500 years.

The "Mixmaster Site" 42WS920, located on the Grand Staircase about 25 miles (40 km) east of the Southgate sites, displays a similar sequence of occupation ranging from Basketmaker III through late Pueblo II (Barbara Frank, personal communication 1996). Prior to excavation the site appeared as a crescent shaped mound displaying late Pueblo II ceramics. The name "Mixmaster" referred to the frustratingly mixed ceramic assemblage (Richard Thompson, personal communication n.d.), apparently due to recurrent occupations evident in the plan map (Figure 12c).

While the architecture and layout of individual occupations do have "stylistic" attributes that vary through time, the overall site appearance often results from long-term accumulations of residential units and can be misleading. The rubble mounds of early sites often "average out" to be "C" or "U" shaped; later pueblos may take on complex linear shapes due to the construction of new rooms or room block segments, but there is no hard and fast rule other than, seemingly, an attempt at integrating the old with the new.

Aikens' (1965) observation that Virgin room blocks are curvilinear, and Kayenta are linear or "L" shaped, is essentially correct. He considered this variation a stylistic attribute. From the perspective of adaptation, these configurations may also be viewed as resulting from their construction histories, degree of social complexity, and ultimately an underlying adaptive strategy. For example, linear pueblos such as Structure A, Coombs Village, (Lister 1959:12) may house multiple residential units and tend to be constructed as single units over brief time spans; Virgin curvilinear pueblos often consist of temporally discrete household aggregates, accretionally constructed, over a length of time (e.g., Three Mile Ruin; Aikens 1965). Viewed as adaptations, Virgin site configurations should be considered as functional rather than stylistic traits.

The majority of excavated sites on the Grand Staircase document complex and often lengthy histories. Aikens (1965) observed this when he described the pithouse sequence at Bonanza Dune as having been "occupied, abandoned, and re-occupied several times." The Pinenut Site, a small farmstead on the southern edge of the Kanab Plateau in Arizona, is characterized by Westfall (1987:181) as having at least three occupational episodes. Southern Utah University excavations at both Little Creek Mountain and Colorado City, Arizona have revealed sites with extremely complex occupational histories (Barbara Frank, personal communication 1996). At the Kanab Site, Nickens and Kvamme (1981) describe a small early Pueblo II farmstead with an underlying Basketmaker occupation. Pointing out a nearby late Pueblo II site, they suggest that "long-term village stability was not characteristic of the upper Kanab Anasazi populations during the Pueblo II-III era" (Nickens and Kvamme 1981:68) and also that "periodic population movements are reflected in the extant data" (Nickens and Kvamme 1981:70).

The inference that episodes of construction also indicate intervening periods of abandonment is critical to the thesis of this paper. It is largely intuitive and remains to be demonstrated on a site-by-site basis. Physical evidence for an absence of activity in the archaeological record, and a determination of the length of that period, is not easily identified. Aikens' pithouse sequence at Bonanza Dune is a good example of evidence that supports orderly abandonment. In addition to the numerous instances of superpositioning, he noted deposits of sterile sand on the floors of the pithouses that indicated a period of site abandonment prior to their collapse. He goes on to say:

> This shows that the structures had been more or less intact when abandoned and had stood until weathering induced their collapse. The lack of cultural debris inside the abandoned units indicates that the leave-takings were orderly. It suggests also that the whole settlement was evacuated at one time on these occasions, for if certain structures had stood empty while the village continued to be occupied, it seems doubtful that the above floor fill within them would have remained as clean as that found in the excavated structures [Aikens 1965:29].

If multiple site occupations are the result of a culturally patterned adaptive strategy, rather than simply opportunistic reuse, we may expect the ideological subsystem, as well as the economic and social subsystems, to play a role in the sites patterning. For example, it is noted that it is the storage facilities of the Virgin residential unit that are usually reworked; pithouses rarely show evidence of rebuilding. A review of mortuary data indicates that while burials are common in the fill of pithouses, they are rare in the fill, or beneath the floors, of storage units. This observation may indicate an integrative link between Virgin ideology, as represented by mortuary practices, and maintenance of the subsistence strategy; i.e., pithouses were permanently abandoned and were therefore considered to be suitable as burial locations, while the expectation of future use and reworking of storage facilities made them unsuitable locations for burials.

Most previous investigations of multicomponent sites that might inform us about abandonment behavior and mobility strategies have considered them to be idiosyncracies, simply multiple unrelated occupations. In a similar fashion our inventory methodology, quite properly, has stressed recording each occupational locus as a separate site, often resulting in very dense site clusters. While conducting the Grand Staircase inventories it was eventually recognized that sites with room blocks were often not only very closely spaced, occasionally the use of differing construction materials and layouts indicated they were constructed on top of one another. In addition to vertical superpositioning, we also recognize a "horizonal stratification"consisting of, in extreme cases, nearly continuous structural elements with discrete middens that spanned BMIII, PI, Early PII, and Late PII periods. Site occupations ranging over 500 years are not uncommon; if these layouts were considered as a single pueblo, it is no wonder that so many different configurations have been identified.

The Virgin Pattern

If similar patterns of site development occur elsewhere in the Southwest they are not well described in the literature. In contrast with the above, Cordell (1984:313) citing Hantman, notes: ".... that the mean length of occupation for all dated sites on the Colorado Plateaus is 80 years. This mean is biased by the inclusion of many very large pueblos. If only small sites (10 rooms or less) are examined, the mean occupation is 34 years" (Hantman 1983:158-163). The average site on the Colorado Plateau, then, was occupied (apparently continuously) for a generation or two and then abandoned. If we consider the accretional, cumulative nature of the construction for the typical Virgin site as an indication of long-term discontinuous occupation by small groups, rather than short-term population aggregates, we have an underlying pattern that makes Virgin Anasazi settlement unique. Summing up what we might call the "Virgin Pattern" are four variations on a common theme that have been recognized through inventory and excavation: 1) Accretional construction of room blocks/alignments indicating short-term episodes of occupation, as opposed to "unit" construction (Figure 11a,11b); 2) Horizontally separated occupations with multiple room blocks that demonstrate sequential occupations (Figure 11c,11d); 3) Superpositioning of room blocks indicating longer intervals of abandonment (Figure 12a,b,c); and 4). Dense clusters of sequentially occupied sites on the same landform/microenvironment.

These site configurations are proposed as empirically demonstrated components of the overall Virgin settlement pattern on the Grand Staircase. Although there are no ethnographic analogs or archaeological referents to this pattern of settlement, I infer that it reflects a specialized adaptation. A diachronic perspective on the long-term occupation of both sites, and communities, informs us of both the longevity and continuity of Virgin adaptive strategy. While a normative approach to the Virgin settlement data might represent these multiple occupations as essentially unrelated

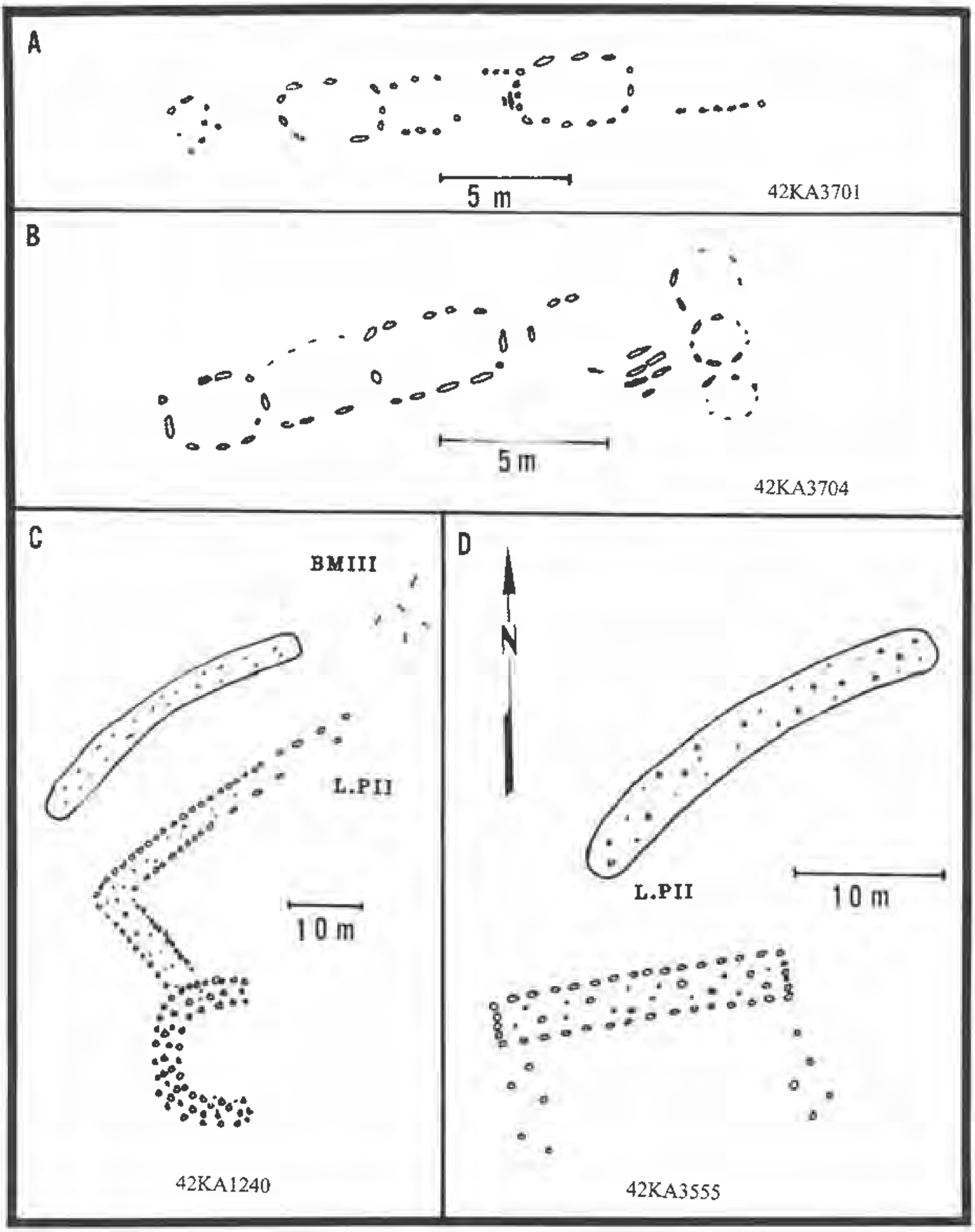

Figure 11. Examples of Virgin pattern site configurations: (a) and (b), accretional constuction of rooms; (c) and (d), sequentially occupied room blocks.

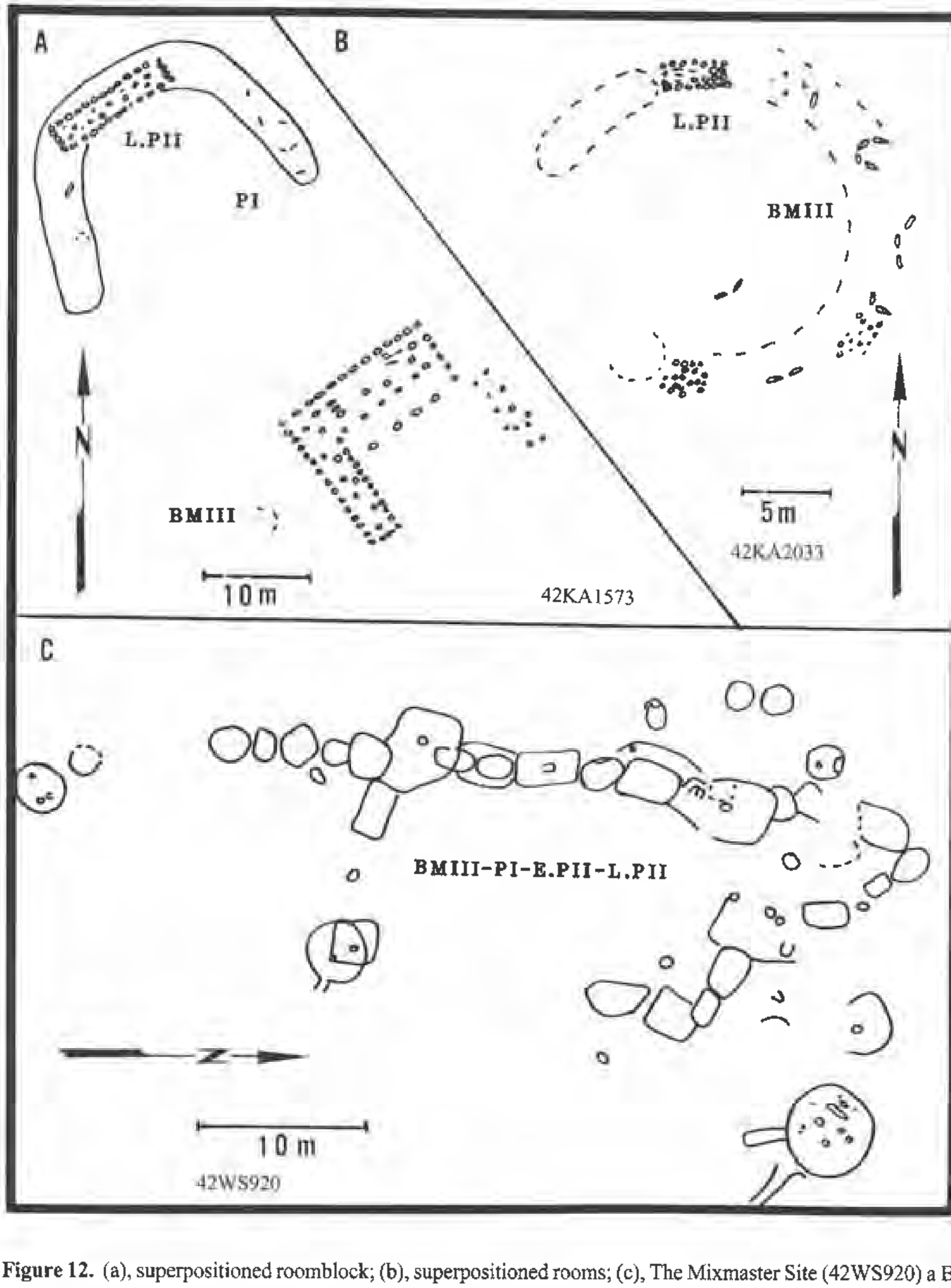

Figure 12. (a), superpositioned roomblock; (b), superpositioned rooms; (c), The Mixmaster Site (42WS920) a BMIII - late PII composite roomblock (Courtesy of Barbara Frank, SUU Field School).

and foreign to one another, I propose we evaluate them as serial occupations by descent groups that describe the underlying means of Virgin cultural continuity—the adaptive strategy.

DISCUSSION

Even though much of the existing archeological record on the Grand Staircase refers to multicomponent occupations, the enigmatic persistence of early ceramics, and the retention of earlier architectural forms on otherwise "late" sites, (e.g. Rudy and Stirland 1950;Aikens 1965; Thompson and Thompson 1982), it is suggested that the significance of the temporal complexity of these sites has not been sufficiently appreciated. Indeed, the "Virgin pattern," like any extensive system of land use, emerges only in the context of large scale inventory efforts, a fairly recent activity made possible by the advent of cultural resource management (CRM) programs. On the Grand Staircase our most recent CRM inventories are the most perceptive: twenty-four percent of the Fin Little Inventory sites are recognized as having been occupied during more than one Pecos period. Considering only late Pueblo II sites, the rate of multiperiod occupancy goes up to 30%. Excavation data would surely raise this figure much higher. The majority of remaining medium-sized sites display evidence of accretional construction within any given period; since Pecos periods can be hundreds of years long, it is likely that these sites are also essentially multicomponent in that they developed as a result of episodes of occupation rather than aggregations of people.

Grand Staircase data sets suggest that two forms of episodic occupation are possible, each with quite different behavioral implications: (1) an essentially continuous occupation with frequent short-term hiatuses due to minor environmental perturbations, and (2) a discontinuous occupation with a lengthy span(s) of abandonment due to long-term environmental/climatic degradation. A good example of this latter situation occurs on the Fin Little tract where a number of quite small sites display both Basketmaker III and late Pueblo II components. Both of these occupations correspond to periods of highly favorable precipitation which apparently made the adjacent fields productive (Gumerman 1988). The reoccupation of these sites after over 400 years implies use of similar agricultural tactics and subsistence practices, but little social continuity. On the other hand, reoccupational episodes within the same period would make logical the transfer of ancestral lands from one generation to the next via some sort of tenuring system based on descent, either fictive or kin based.

Model of Virgin Adaptive Strategy

Given the lengthy occupational history of the Virgin Anasazi on the Grand Staircase, and assuming both the importance of agriculture and consequently the impacts of periodic adverse conditions on that practice, two opposing models of behavior may be drawn from the data that account for the Virgin pattern of settlement. The most conventional might be termed a "tactical" model of unstructured residential shifting that involved expedient agricultural techniques and practices that arose periodically to deal with the challenges of an unpredictable environment. In this normative view, the residential movement is not exactly just "milling about", but it is little more than the opportunistic reoccupation of sites in suitable locations; the impressively long history of this behavior is discounted as having adaptive advantages, but essentially it is random and idiosyncratic.

Favored here, is a "strategic" model that stresses the systematic use of multiple residential homesteads that contributed to Virgin adaptedness (O'Brien and Holland 1992). Viewed as the economic basis for an adaptive strategy, it reflects conscious decisions about where to plant and under what circumstances to move. These decisions are based on a precise knowledge of the natural systems involved that developed over hundreds, perhaps a thousand years of occupation on the Grand Staircase. The trajectory of storage architectural variation spans over 1,000 years of selective pressure, and represents a truly tangible adaptation, one highly visible in the archeological record. Virgin architectural variation drew on both the external pool of traits from the larger Anasazi style zone (Talbot 1990), as well internally via the retention of useful earlier architectural forms (Thompson and Thompson 1982). Storage capability, coupled with the decision-making behavior that is reflected in residential mobility, reflect the key components of the underlying Virgin adaptative strategy.

Even subsistence-level economies like that of the Virgin Anasazi have implications for the ideological and social subsystems of a culture. To be most effective, adaptive strategies require (acquire) integration with, and support of, the social and ideological subsystems. For example, residential mobility between homesteads would have benefitted from, and probably required, some form of socially sanctioned land tenure to insure equitable allocation and maintenance of the system. Systems of descent and lineage would certainly have played a role in the allocation of land. Mortuary practices might also reveal patterns of tenure. As noted earlier, burials (soon to become ancestors) were carefully interred within abandoned habitation rooms on Virgin sites, apparently with the knowledge that while the storage component of the site would continue to be used in the future, the habitations—particularly pithouses—would never be reused. I suggest then, what might otherwise appear to be simply a "multicomponent" site could actually represent serial occupation by some form of descent group.

Testing and Evaluation

This model is a first approximation; testing and evaluation will surely refine or even substantially modify it. The points made here are that: (1) settlement data should be assessed before any attempt to describe a subsistence strategy or social organization is made, and (2) an understanding of local adaptation is a prerequisite for each of the several Virgin localities; local specializations should be analyzed before any attempt at overall Virgin synthesis is made. Apart from the inventory data, excavation data needs include the following: 1) a more sensitive record of paleoclimatic change and corresponding tree-ring dated site occupations; 2) detailed observations on site construction episodes and hiatuses; 3) the creative integration of data drawn from cultural subsystems to support or reject a mobility strategy (mortuary practices, etc.); and 4) the correlation of internal site structure with midden development (content, stratification, location(s)) to assess changes in environment, subsistence, and intervals of abandonment.

CONCLUSION

The "Virgin pattern" of settlement is offered as an empirical construct, a class of data, that describes several types of multicomponent sites found in the archeological record of the Grand Staircase section of the Colorado Plateau. It is *interpreted* here as representing a specialized and long-lived pattern of use. The model developed to account for it hypothesizes occupation of multiple "homesteads" located in a variety of different agricultural niches, each with different characteristics, but all being suitable for agriculture. It suggests that shifts in residence would occur periodically (interannually) in response to short-term climate fluctuations, but also as a result of local environmental deterioration through arroyo downcutting, sheet erosion, lack of winter moisture, summer floods, insect infestation, soil nutrient depletion, or firewood depletion. All could induce the temporary abandonment of fields for unaffected locations nearby resulting in the site patterning described above.

In spite of the formal architectural sequence, which seems mostly geared towards expansion in range and greater efficiencies in construction, the persistence of a basic Basketmaker storage technology and social organization, coupled with a practice of residential mobility seems to have changed very little from Basketmaker times until late Pueblo II. Given nearly 1,000 years of Anasazi occupation on the Grand Staircase, the residential mobility model of settlement describes an adaptation that is both congruent with the archeological record, and quite economically accounts for a great deal of Virgin Anasazi distinctiveness.

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The "inhouse" inventory data, upon which the bulk of this paper is based, was jointly collected with Gardiner Dalley over a decade or more—hopefully we will continue gather more. Also welcome was the assistance of Richard Fike and Julie (Brunsman) Howard, then of the Utah State Office. Apart from appreciating the considerable boot leather expended, Gardiner's keen observations and our running dialog on the nature of the Virgin Anasazi did much to orient this paper. The responsibility for my approach to the subject, and any errors in logic or substance, are of course my own.

This paper is also a direct result of the Cedar City Districts long-term commitment to conducting field inventory based on a philosophy that we need to identify the resource in order to manage it effectively. The Grand Staircase database is a product of the USDI, BLM. It was compiled on ARCHEOCOMPUTE software in support of the Kanab Resource Management Plan. I thank Jo Ann Schreiner of the Kanab Office and Jerry Sempek of the District Office for coaxing the site and soils graphics out of the Bureau's Graphic Information System and especially Kanab Area Manager Verlin Smith for his support of the CRM program and permission to turn a BLM planning document into a monograph hopefully of some use to the archeological community.

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AMS DATING OF PLAIN-WEAVE SANDALS FROM THE CENTRAL COLORADO PLATEAU

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AMS radiocarbon dates on plain-weave sandals from caves of the central Colorado Plateau are reported. The sandals range in age from about 6900 to 3200 B.P. (ca. 5700–1450 cal. B.C.). The findings strengthen a case for both population and cultural continuity during the Archaic period, and support a related argument that middle Archaic breaks in the occupancy of several important shelters such as Cowboy Cave resulted from settlement pattern change and not regional abandonment. The dates demonstrate that living accumulations within some shelters of lower Glen Canyon resulted from Archaic foragers and not Puebloan farmers as previously claimed. Benchmark Cave, in particular, emerges as a site with an important record of hunter-gatherer occupancy during the middle and late Archaic.

INTRODUCTION

During the course of summarizing the radiocarbon record for Archaic occupancy of the Glen Canyon region (Geib 1995), I became interested in attempting to identify sites that might help to demonstrate a continued presence in the region from early through late Archaic periods. I was especially interested in sites that might help fill an apparent 1000-year gap in the radiocarbon record between 6000 and 5000 B.P. (ca. 4880–3780 cal. B.C.) (Berry and Berry 1986; Schroedl 1976). This radiocarbon gap and the evident discontinuation of human occupancy of several significant shelters, such as Cowboy Cave (Jennings 1980; Schroedl and Coulam 1994), may provide evidence for hunter-gatherer abandonment of the plateau (Berry and Berry 1986). Alternatively, the date gap may reflect a sampling problem, deriving both from the limited numbers of Archaic sites investigated and from differential visibility of the archaeological record produced by foragers during the 6000-year-long Archaic period. To investigate whether the date gap is a sampling problem and if settlement patterns may have changed, portions of plain weave sandals from several caves of the central Colorado Plateau (Figure 1) were submitted for accelerator mass spectrometry (AMS) radiocarbon dating. The dating results and their implications for both population and cultural continuity during the Archaic period are reported here.

ARCHAIC SANDAL TYPES

The two principal sandal types (Figure 2) used by Archaic hunter-gatherers of the central Colorado Plateau were open-twined and plain weave (also called coarse warp faced [Lindsay et al. 1968:118] and woven [Lipe 1960:202-204]). Both were described by J. Richard Ambler (in Lindsay et al. 1968:95-97, 120-121; also Ambler 1996) from his excavations at Dust Devil and Sand Dune caves. The sandals were made of unprepared whole yucca leaves; the warp for both types was virtually identical, consisting of leaves folded at the toe of the sandals with the leaf butts and tips at the heel. What

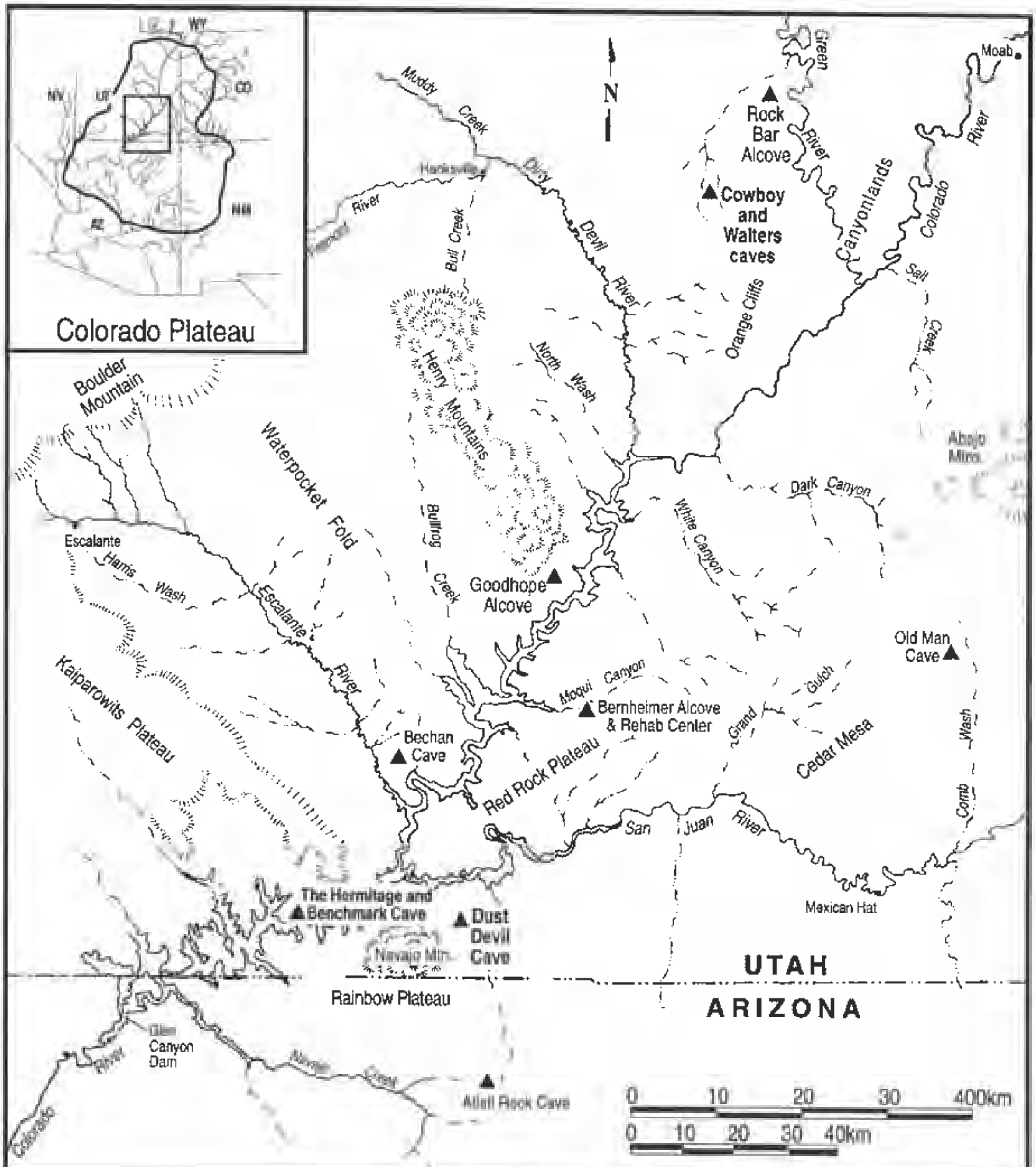

Figure 1. The central portion of the Colorado Plateau showing the location of sites discussed in the text. Bold site names are those yielding plain weave sandals radiocarbon dated for this study.

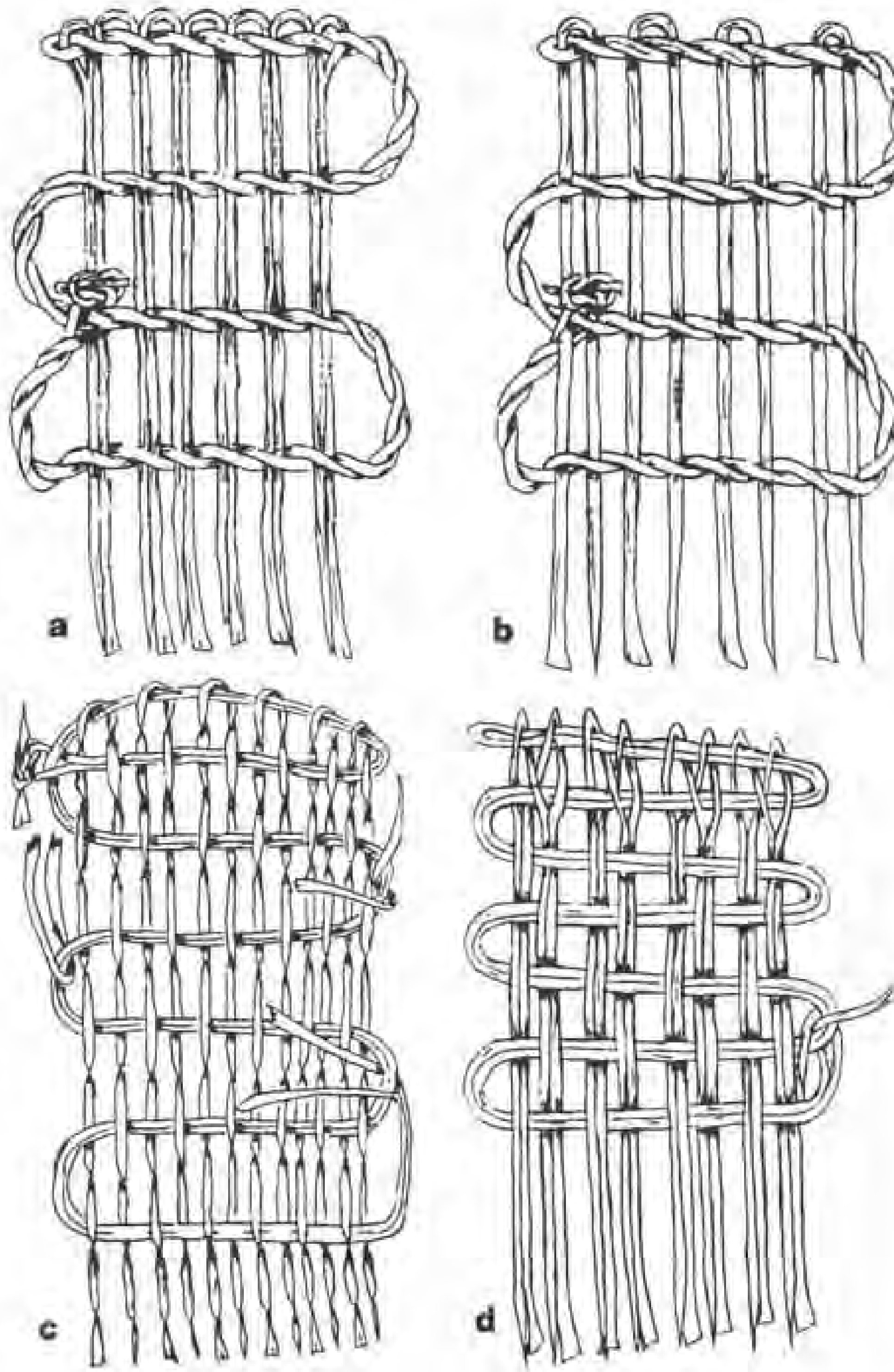

Figure 2. Archaic sandal types of the central Colorado Plateau: (a) and (b), open-twined sandals with different treatment of the warp; (c), fine warp-faced sandal; (d), plain weave sandal (from Ambler 1996).

differed between the sandal types was the weft, which for open twined sandals consisted of Z-twining using two to four leaves, but simple over-one, under-one weaving with two to four leaves for plain-weave sandals.

Open-twined sandals have been found across a large region centered along the Colorado River of the central Colorado Plateau. Sites of the Glen Canyon lowlands yielding open-twined sandals include Bechan Cave (Agenbroad et al. 1989), Benchmark Cave (observed in the site collections housed at the Museum of Natural History, Salt Lake City; see Lipe [1960] and Sharrock [1964]), Bernheimer Alcove (Sharrock et al. 1963:Figure 77b; sandal misidentified as a yucca mat), and Good Hope Alcove (Geib 1989). The northernmost known occurrence is now Rock Bar Alcove (Geib 1994), an unexcavated site about 14 km NE of Cowboy Cave (previously the northernmost find location) on a highland overlooking the lower Green River. Dust Devil and Sand Dune caves at the foot of Navajo Mountain marked the southernmost distribution of the sandal until the recent study of Atlatl Rock Cave (Geib et al. 1996) on the southern edge of the Rainbow Plateau. The easternmost confirmed find of open-twined sandals is Old Man Cave (Geib and Davidson 1994) along Comb Wash. Hurst (1947:11-13) may have recovered fragments of this sandal type from Dolores Cave in SW Colorado, but this remains to be demonstrated by reanalysis of the collections. The known distribution of open-twined sandals is likely unrepresentative of the prehistoric distribution. It is perhaps no coincidence that the distribution closely matches that portion of the Colorado Plateau renowned for its numerous dry shelters.

Ambler identified open-twined sandals as a key diagnostic trait of the early Archaic Desha Complex northeast of Navajo Mountain (Lindsay et al. 1968:120-121). Excavations at Cowboy Cave, however, produced this sandal type from cultural units IV and V (Hewitt 1980:Table 12) dated between about 3700-3200 B.P. and 1900-1400 B.P. respectively. Ambler (1984) suggested that these occurrences in later strata at Cowboy Cave resulted from disturbance of early deposits by later occupants. Berry and Berry (1986:309-310) gave a similar argument to account for the presence of Gypsum points and split-twig figurines in Unit V at this cave. Subsequent to Ambler's assertion, open-twined sandals from five separate sites widely scattered across the central Colorado Plateau were directly dated, and all are within the early Archaic period. Ambler is therefore likely correct about the displacement of open-twined sandals upwards in the deposits of Cowboy Cave into later cultural units. Dates on 11 open-twined sandals from seven sites (Figure 3) provide sufficient justification to state that this type of footwear is restricted to the early Archaic, and may be expected anytime between 9000 and 6500 B.P. (ca. 8030 to 5440 cal. B.C.).

The spatial distribution of plain-weave sandals is similar to that of open-twined sandals, but includes some different sites. Cowboy and Dust Devil caves have produced the greatest number of plain weave sandals and provide the northern- and southernmost known occurrences of the type for the central portion of the Colorado Plateau. Other sites yielding plain-weave sandals are mostly within lower Glen Canyon along the Colorado River, including Benchmark Cave, The Hermitage, and Lizard Alcove (Lipe 1960). Cottonwood Cave, another site excavated by Hurst (1948:Plate IV), yielded the easternmost example of this sandal type (identification made on the basis of the published photo).

Prior to this study only one plain-weave sandal had been directly dated; it came from the top of Stratum IV of Dust Devil Cave with an age of 6840 ± 120 B.P. (Ambler 1996). A dated sandal from Stratum IIIi of Cowboy Cave had similar antiquity (6675 ± 75 B.P.; Jennings 1980:Table 3) but was not described prior to its destruction. It was likely a plain-weave sandal, given the abundance of this type from the stratum. The finding of plain-weave sandals from Unit IV of Cowboy Cave suggested the continuation of this type into the late Archaic, contemporaneous with split-twig figurines and Gypsum points. Yet, these sandals easily could have been vertically displaced in the deposits, as were the open-twined sandals at this site. Based on the set of radiocarbon dates reported below, plain-weave sandals were evidently first made during the end of the early Archaic, after 7000 B.P. (ca. 5840 cal. B.C.). Both plain weave and open-twined styles overlapped during the first half of the seventh millennium B.P., but plain-weave sandals continued to be manufactured through the middle Archaic, extending into the late Archaic, up to almost 3000 years ago (ca. 1240 cal. B.C.). That the plain-weave style developed out of the open-twined style is exemplified by certain sandals that exhibit aspects of both construction techniques. For example, on sandal FS 1822.3 from Cowboy Cave, the first pass of the weft is twined and the other passes consist of simple over-one, under-one plain weaving. I also observed this construction technique on a plain-weave sandal from Benchmark Cave (FS 120.1).

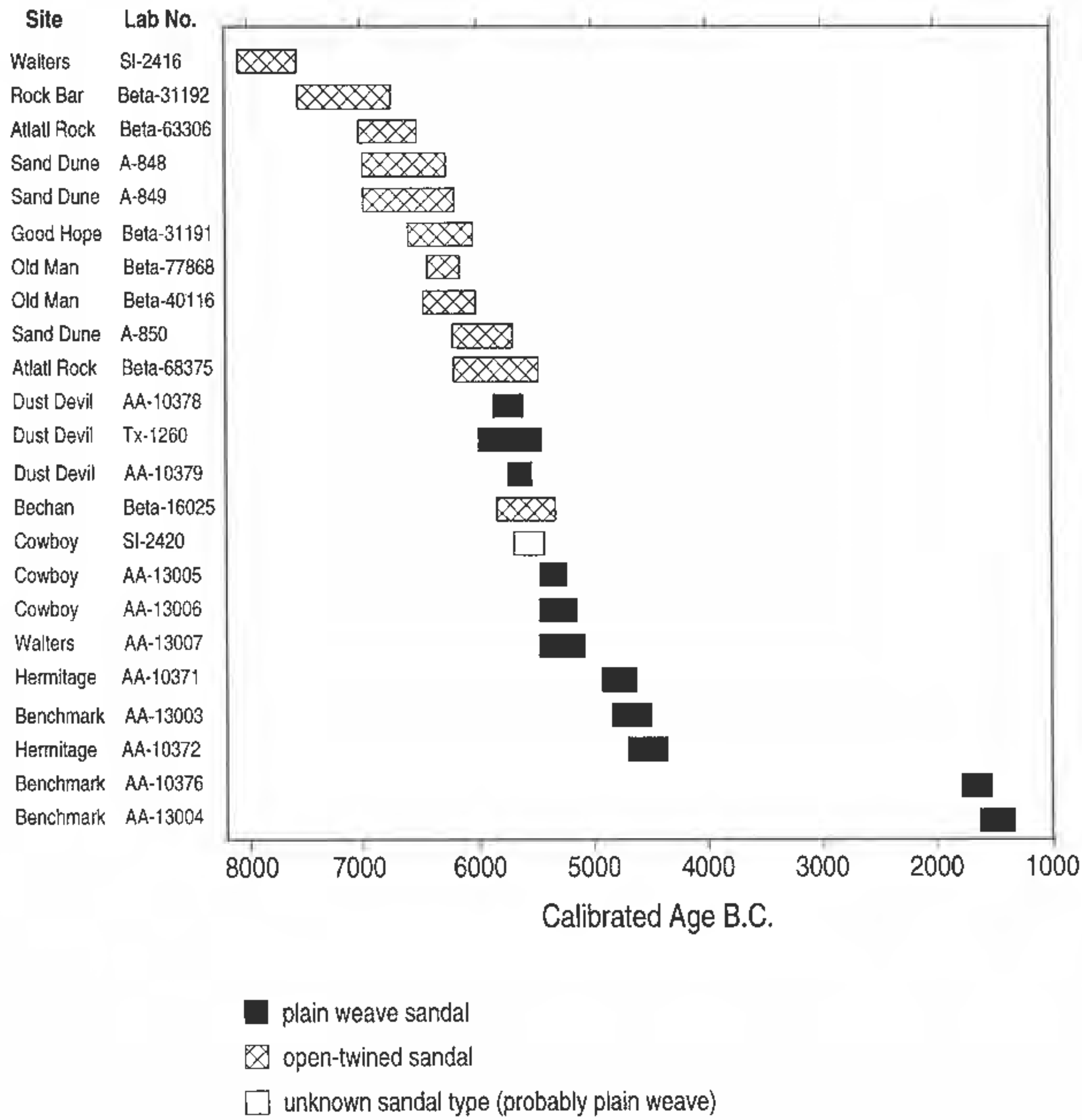

Figure 3. Graph of all direct dates on Archaic sandals of the central Colorado Plateau, including the dated plain weave sandals reported herein. Dates calibrated using the CALIB program, version 3.0.3A (Stuiver and Reimer 1993) using the 20 year data set and method A.

A third but rare Archaic sandal style, fine warp-faced (Ambler 1996; in Lindsay et al. 1968:118), is essentially a variant of the plain-weave type, where the weft is so widely spaced that it is barely discernible between the warp. Temporal placement of fine warp-faced sandals is not certain since none have been directly dated and few have been recovered; all extant examples come from Dust Devil Cave. Ambler (1996) postulates that this sandal type precedes the open-twined style because most of the few fine warp-faced sandals recovered from Dust Devil Cave came from the lowest portion of the early Archaic Stratum IV. It is easy to envision sandals of this type, though, as early experiments with the plain-weave technique, which would place them in the time of overlap between the two major sandal styles. Whatever the case proves to be, it seems certain that fine warp-faced sandals are restricted to the early Archaic.

DATING PLAIN-WEAVE SANDALS

The five sites that produced the sandals dated here are Benchmark Cave (42KA433), Cowboy Cave (42WN420), Dust Devil Cave (NA7613), The Hermitage (42KA443), and Walters Cave (42WN421) (see Figure 1). Formed within Navajo Sandstone, a geologic unit renowned for the production of natural shelters, these sites yielded a variety of perishable remains. Benchmark Cave and The Hermitage are located less than 2.4 km apart from each other along the north side of the Colorado River in Lower Glen Canyon, at an elevation of about 994 m. Both sites were excavated during the Glen Canyon Project of the late 1950s and early 1960s, prior to the creation of Lake Powell (Lipe 1960; Sharrock 1964). The information presented below about these two sites comes from excavation reports and field notes on file at the Utah Museum of Natural History. Slightly more detail is presented about these sites than the other three because the Archaic deposits were not recognized at either site during excavation.[1] Dust Devil Cave occupies a benchland above the canyon of the lower San Juan River on the northern edge of the Rainbow Plateau at an elevation of 1490 m. The cave was initially tested as part of the Glen Canyon Project (Lindsay et al. 1968), and was fully excavated in 1970 as part of a separate research project (Ambler 1996). Cowboy and Walters caves are adjacent grottos at an elevation of 1700 m along a tributary of Horseshoe Canyon on a highland to the west of the confluence of the Green and Colorado rivers. Both caves were excavated in 1975 by a University of Utah field school (Jennings 1980; Schroedl and Coulam 1994), Cowboy almost completely, and Walters just partially.

Benchmark Cave

Site Description. Benchmark Cave is a small grotto that is triangular in both plan and section; it measures about 7.6 m wide at its mouth and 7.6 m deep from front to back. Bedrock occurs about 4.3 m below the ground surface and cultural deposits were found at almost this depth (Figure 4). The cave is located at the base of a south-facing cliff; it opens upon a broad alluvial terrace of the Colorado River, which flows about 14 m below the cave. Evidence of occupation also occurs on this terrace outside the cave proper, but most of the excavation effort was devoted to the dry deposits within the cave. The site was initially excavated during the 1958 field season of the Glen Canyon Project; several long trenches were dug outside the cave by arbitrary levels and a good portion of the cultural deposits from the eastern two-thirds of the cave interior were removed by natural divisions (Lipe 1960). Based on this effort, Lipe (1960:99) thought that the site "probably was used intermittently over a fairly long period of time as a base camp for hunting, gathering and in the later stage, farming." The two stages of occupation identified for the site included a preceramic and preagricultural occupation (Stratum IV), and a ceramic, agricultural occupation that spanned Strata III through I. No dates were assigned to the first occupation, but the later occupation was ceramically assigned to an approximate 100-year interval from about A.D. 1025 to 1125.

The 1958 field season was early in the work of the Glen Canyon Project; thus as more was learned about the archaeological record of the region, the need for more complete excavation of the site became apparent. This was

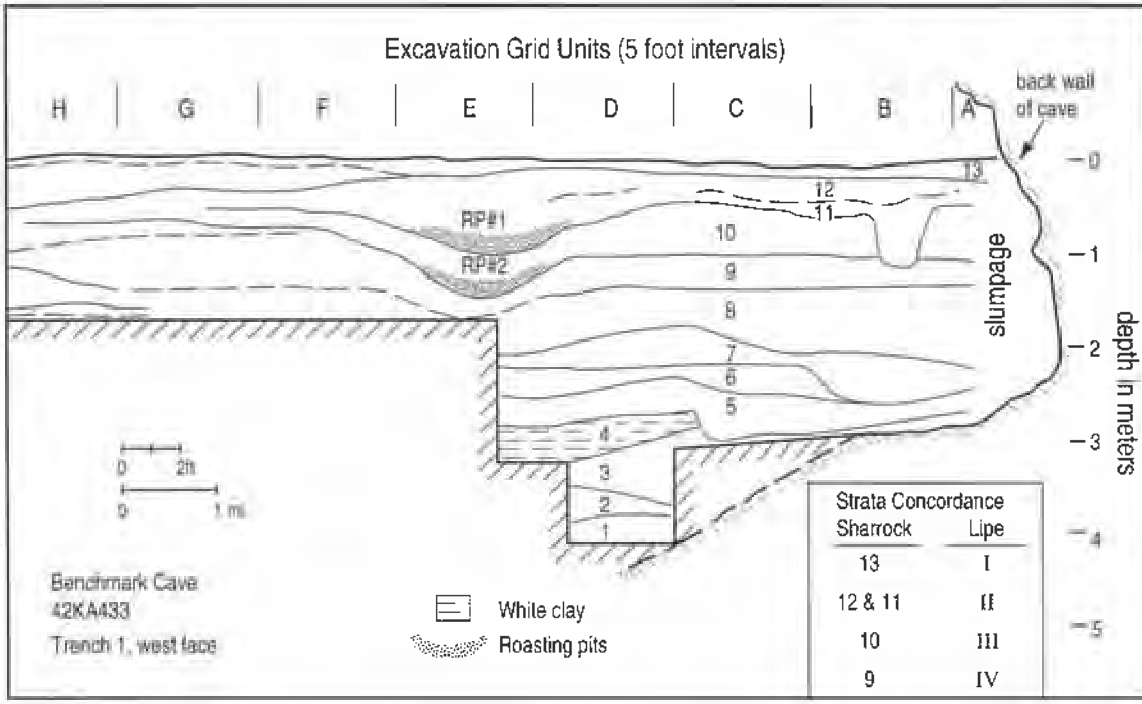

Figure 4. Stratigraphic section of Benchmark Cave (modified from the profile in the field notes prepared by Dave Read and Floyd W. Sharrock).

accomplished in 1962 (Sharrock 1964) when a crew expanded the excavation area within the cave both horizontally and vertically and widened and deepened the main trench to locate bedrock and obtain a better exposure of deposits from the rear of the cave to well beyond its mouth. Sharrock (1964:9) concluded that "the 1962 findings modify the earlier report [Lipe 1960] in so many respects that … the first interpretation of the site will be ignored."

The 1962 trench exposed over 4 m of fill consisting mainly of eolian sand mixed to varying degrees with cultural additions such as charcoal, ash, organic debris and artifacts. The one exception to this was a basin-shaped deposit of alluvial clay almost 3 m below the present surface (Stratum 4). The origin of this deposit was interpreted as a settling pool formed by high flood waters of the Colorado River (Stratum 4 was about 11.5 m above average river level) that occurred "sometime in the past 1000 years and after the first cave occupation" (Sharrock 1964:10). Sharrock (1964:16) believed that the numerous layers that comprised the fill accumulated rapidly without any apparent break or long-term hiatus in occupancy. No radiocarbon dating was done to determine the length of time represented by the 4.3 m of fill, but Sharrock (1964:18) believed that as little as 100 years was probable. A lack of pottery from Strata 1-7 was attributed to a failure by the earliest cave users to bring any to the site. Sharrock (1964:18) concluded that all findings from the cave "leave little doubt as to [site] function and time lapse: this was a popular camp or way station used intermittently perhaps as much as 100 years (probably less) prior to ca. A.D. 1150."

I have no qualms with the functional interpretation or the conclusion that there was no long-term hiatus in human occupancy, but the time depth seems excessively truncated. It would be extraordinary if the 4+ m of fill at Benchmark Cave actually represented 100 years of deposition as claimed. Rapid and deep alluvial burial of sites is well documented in the Glen Canyon region (e.g., Red Ant Kiva, Sharrock et al. 1963), but not so for eolian burial. Excavated caves that have been radiocarbon dated reveal comparatively slow rates of eolian deposition, or virtually no deposition whatsoever during times when humans did not occupy the sites (Schroedl and Coulam 1994). For example, at both Cowboy and Dust Devil caves described below, 9000 years of deposition are represented by less than 2 m of fill.

Sharrock's dismissal of Lipe's claim for a preceramic and preagricultural occupation of Benchmark Cave is unsupported by the excavation notes. Sharrock recovered two sherds below the layer that Lipe attributed as being preceramic and preagricultural, Lipe's Stratum IV, or Stratum 9 in the 1963 report. One came from Stratum 7, the other from Stratum 8, but there are problems with these finds. In the field notes (Feature 29, page 2) Sharrock observes that the corrugated sherd from Stratum 7 "could have fallen in the trench—i.e. not a positive association." The other sherd, a Tusayan Black-on-red, seemed to have a certain vertical provenience, but came from outside the cave proper where strata could not be accurately correlated with those within the cave. Sharrock admits as much in the field notes (Feature 30, page 3): "one [Tusayan Black-on-red] sherd may have been associated [with Stratum 8] but outside the cave. Here all strata become so blended that separation of strata is very tenuous."

Sample Selection. For radiocarbon analysis I selected portions of three plain-weave sandals from the collections of Benchmark Cave. These sandals represent a stratigraphic sequence from just below the surface (Stratum 12) to near the bottom of cultural deposits (Stratum 5). At a depth of over 2 m below the ground surface, Stratum 5 was the deepest cultural deposit from which perishable remains were recovered, and, except for Stratum 3, the deepest cultural deposit at the site. Several plain-weave sandals were recovered from the small exposure of this deposit, and one of these, a child's nearly whole sandal (FS 77.5), was selected for dating (see Kankainen 1995:49 for photo and description of sandal). A date on this artifact would provide the earliest record for this sandal type at the site and close to a maximum age for site occupancy.

The plain-weave sandals from Stratum 5 were the only ones recovered from prepottery contexts; the other examples came from Strata 10 and 12 where pottery was recovered. A sandal from each of these layers was selected for radiocarbon dating: FS 142.11 from Stratum 10 and FS 35.1 from Stratum 12. The several plain-weave sandals recovered from Stratum 10 may be in situ finds. All were large artifacts, unlikely to have been moved upward within the deposits except by human pit digging, and no deep features originated from this stratum. Only one sherd was recovered from Stratum 10, but the 1958 excavations obtained 23 sherds from the approximately equivalent Stratum III. Many of these refit, however, to sherds from higher strata (12 and 13), so they are likely intrusive from above, perhaps because pits from Strata 12 or 13 went unrecognized and their artifacts were included in Stratum 10 (examples include a jar filled with salt and a hide pouch filled with cottonseeds [Lipe 1960:97]).

The highest sandal in the sequence was FS 35.1 (see Kankainen 1995:47 for photo and description of the sandal), recovered during the 1958 excavations from what was then Stratum II, a cultural deposit just below the ground surface; Sharrock later redesignated this layer as Stratum 12. Stratum 12 contained pottery and other diagnostics of Pueblo culture dating to around A.D. 1000-1100. Based on my assumption that plain-weave sandals were an Archaic style, it seems likely that the sandal had been displaced upwards in the deposits of the cave by later digging of various pit features. If the sandal was actually contemporaneous with the pottery, then its radiocarbon date would confirm this, revealing that the sandal style was temporally widespread.

The Hermitage

Site Description. The Hermitage occupies a narrow level area, approximately 40 m long and 1-4 m wide, atop a talus slope that is sheltered by a high, slightly overhanging cliff. The Hermitage was interpreted as a single-component Pueblo site occupied during the late A.D. 1000s and early 1100s (Pueblo II). An organic-rich trash deposit that reached a thickness of 1 m was interpreted as evidence for an intensive and continuous occupation. No plan map of The Hermitage was included in the excavation report; thus, one prepared by Peter Bodenheimer at the close of excavation is included here (Figure 5). The principal features at this site included a trash deposit (Feature 9), a pit house (Feature 2), four cists (Features 3, 4, 17, and 23), two packed use surfaces (Features 7 and 16), and a Glen Canyon Linear petroglyph panel (Figure 6, Feature 20).

The trash midden consisted of a medium to light gray deposit of varying proportions of ash, charcoal, and sand, and

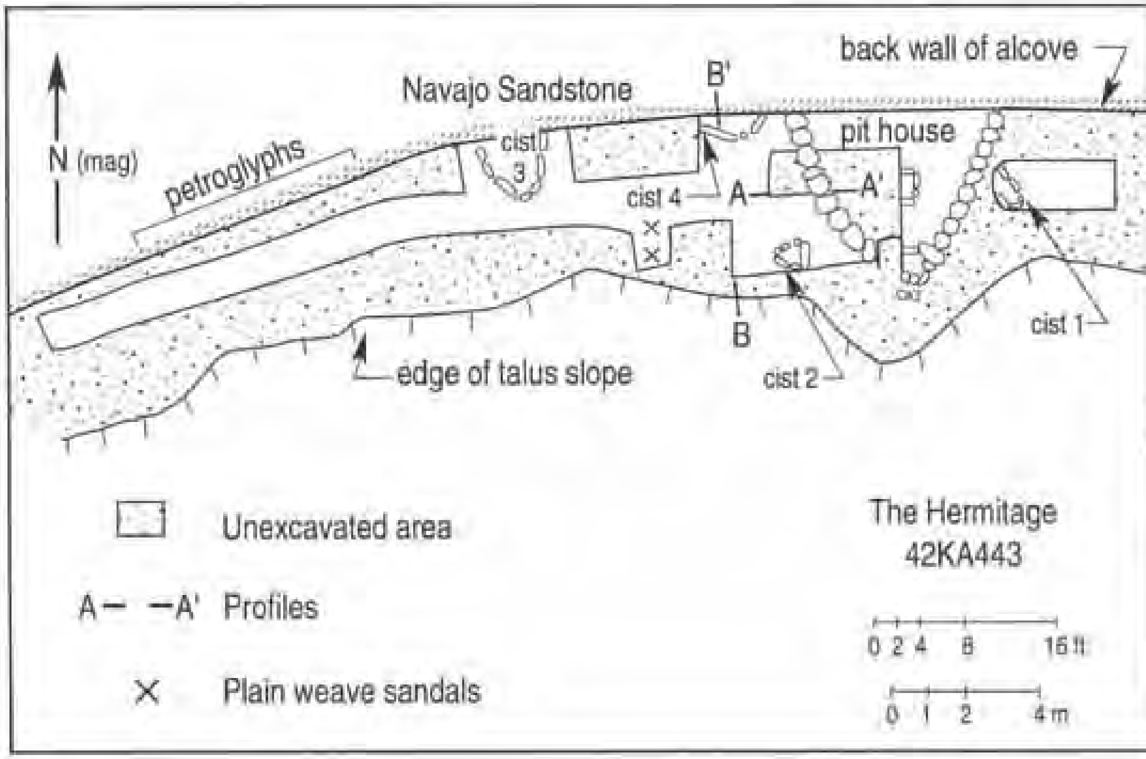

Figure 5. Planimetric map of the Hermitage after excavation, showing the location of profiles of Figure 6 (after the field map prepared by Peter Bodenheimer).

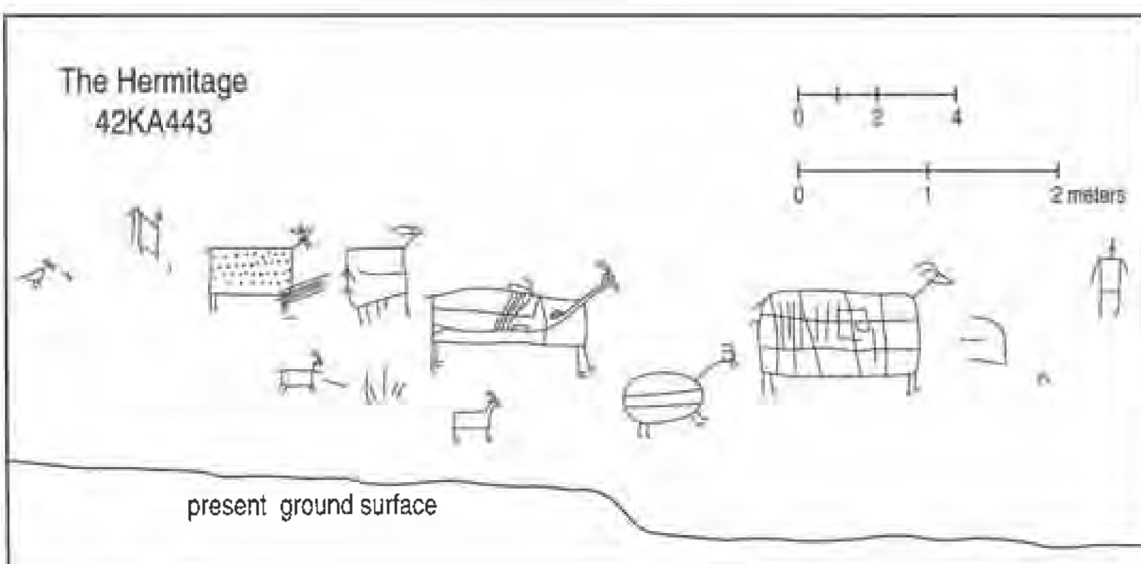

Figure 6. Glen Canyon Linear petroglyphs on the back wall of the Hermitage (after field sketch by William D. Lipe).

organic debris. The field notes reveal that many thin (1-3 cm) layers of ash, sand, and matted organic matter were observable in section, but that individual layers could not be followed horizontally (Feature 9, page 1). Besides individual thin layers, two major divisions of the trash midden were discernible in several places; the best field sketches of this were from the area of thickest trash accumulation immediately west of the pit house (Figure 7). The upper part (Feature 9A) contained considerable organic material and was more consolidated, while the lower part (Feature 9B) was mostly ash and loose sand with few organics. The deposit in this area was removed by arbitrary 12-inch levels that do not correspond neatly with this division. The trash deposit was removed from the rest of the site as a single undifferentiated layer except for near the western edge, where the two packed use surfaces provided separation for materials as either above or below these surfaces.

Some evidence gleaned from the field notes suggests that the site may have been occupied well before the Pueblo period. First of all, as Figure 7 reveals, the Pueblo II pit house postdates the trash deposit. The builders excavated a large pit through the trash deposit and into the underlying sterile to accommodate the pit house. Rubble fill was added between the masonry wall and trash deposit and extended out over the top of the trash deposit. A second point is that most sherds from Level 1 (0-12") of the excavation area west of the pit house came from the rubble and not from the trash midden (Feature 15, page 5). With the recovery of several plain-weave sandals from the trash deposit, it seems likely that most or all of the trash accumulated prior to the Pueblo period.

Sample Selection. Portions of two whole plain-weave sandals from the trash deposit were selected for radiocarbon analysis: FS 19.1 and 24 (see Kankainen 1995:84, 86 for photos and descriptions of the sandals). Based on size differences, the sandals were clearly not a pair. Both were padded with a mass of shredded grass that had conformed to the contours of the wearer's foot. With no vertical differentiation of the aceramic trash deposit, dates on the two sandals would suffice for initial temporal control over this likely Archaic cultural deposit.

Dust Devil Cave

Site Description. Dust Devil Cave occurs within a dome-shaped erosional sandstone remnant, one of many that occur on the northern portion of the Rainbow Plateau. The cave measures about 14 m deep and 8 m wide; it occurs on the south side of a large U-shaped alcove that provides additional partially sheltered living space (Lindsay et al. 1968:Figure 80). Cultural deposits that reached a depth of 2 m within the cave spanned almost 9000 years. During the early Archaic, from about 9000 to 6800 B.P., foragers occupied the site frequently, resulting in a thick accumulation of ash, charcoal, and vegetation interspersed with sand (Stratum IV; Ambler 1996). Stratum IV at Dust Devil Cave was buried beneath a layer of eolian dune sand containing little evidence of human occupation (Stratum V). This stratum was deposited during an apparently lengthy period when the cave was seldom used and never intensively, perhaps as just an occasional rest stop by hunters en route to elsewhere (Ambler 1996). Use of the cave increased greatly during deposition of the overlying Stratum VI, when early farmers (Basketmaker Anasazi) occupied the site. The recovery of several Gypsum points from Stratum VI suggests that late Archaic hunters used the site sporadically as well. Farmers continued to use the cave on a limited basis throughout the Pueblo Period, resulting in the deposition of Strata VII and VIII. During historic times Navajo/Paiute herders penned sheep and goats in the cave, forming a dung layer designated as Stratum IX.

As of yet, only Stratum IV is well dated, with seven stratigraphically consistent radiocarbon assays ranging from 8830 to 6740 years B.P. (Ambler 1996:Table 7). The only dates yet available for Strata V and VI are two recently obtained radiocarbon assays on maize. At 1480 ± 80 and 1370 ± 70 B.P. (both corrected for isotopic fractionation), these dates are notably younger than anticipated, revealing that considerably more radiocarbon dating is required before the depositional histories of Strata V and VI are fully understood. Nonetheless, based on the age of Stratum IV and the occurrence of both late Archaic and Basketmaker remains from Stratum VI, the largely sterile eolian sand of Stratum V was likely deposited during the middle Archaic. Eolian sand had been continuously accumulating within the cave since the early Archaic, but was also receiving a heavy admixture of cultural debris (ash, charcoal, organics, artifacts).

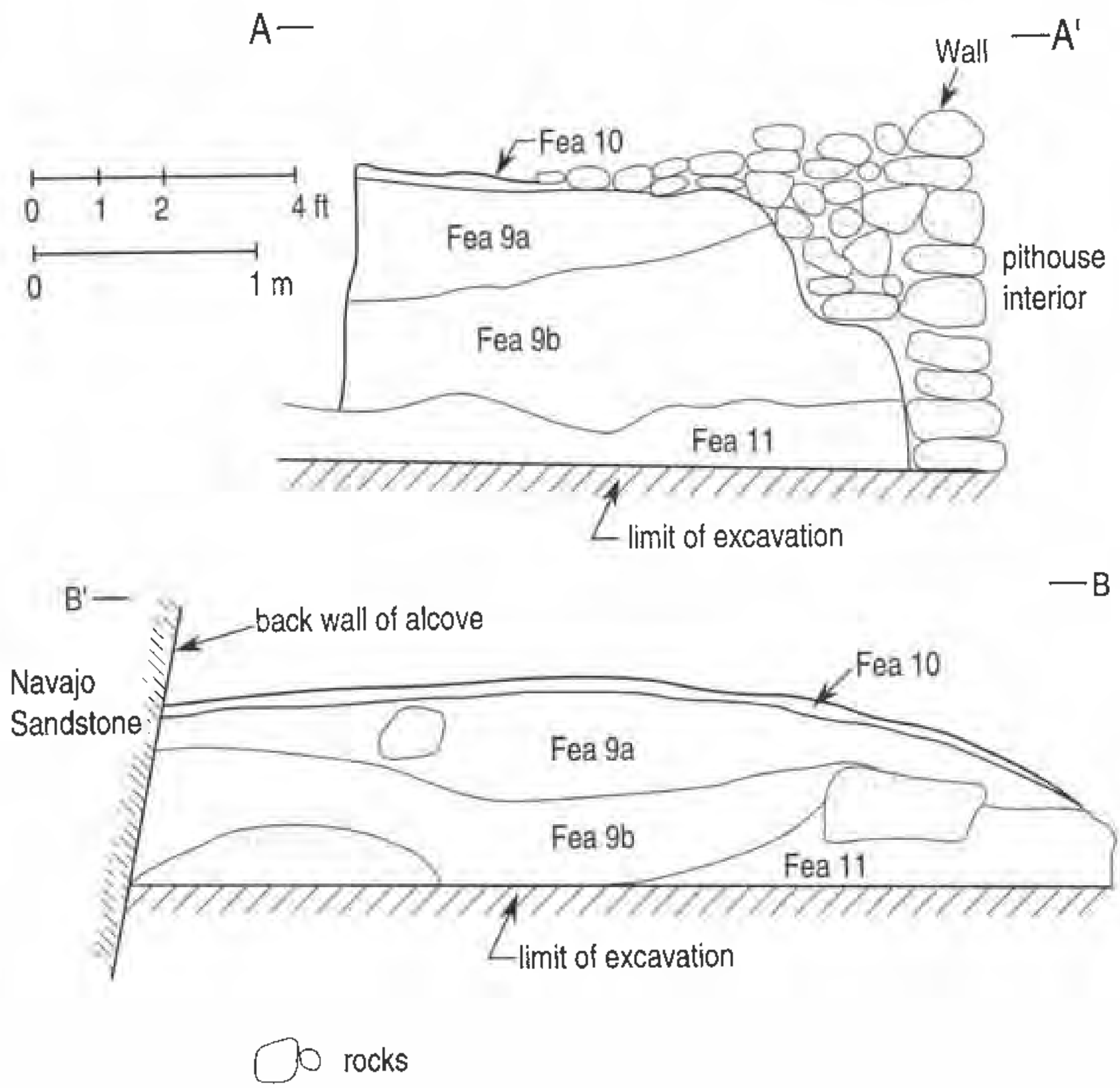

Figure 7. Stratigraphic sections of the deposits identified at the Hermitage (after field sketches by William D. Lipe).

As residential use of the site declined, cultural additions lessened, leaving the eolian sand that continued to accumulate within the cave appearing comparatively sterile.

From the 1970 excavations, Ambler (1996:Table 8) recovered eight plain-weave sandals—six whole or nearly whole examples from the upper portion of the early Archaic deposit, some from the very top at the contact with Stratum V, and two fragments from the middle portion of Stratum IV where open-twined sandals were more numerous. One plain-weave sandal from the top of Stratum IV (Square F9) was dated to 6840 ± 130 B.P. (Ambler 1996:Table 7); along with a hearth charcoal date of 6740 ± 110 B.P. (Ambler 1996:Table 7), it provided the upper temporal bracket for the early Archaic deposit.

Sample Selection. The two sandals from Dust Devil Cave selected for dating came from the top of Stratum IV, one from Square F8 (F8.6) and the other from F10 (F10.2). Portions of yucca leaf ties used in securing the sandals to feet were removed from both of the artifacts for radiocarbon dating. Because plain-weave sandals were not found in any younger strata at the cave, the examples from the top of Stratum IV represent the final interval during which this artifact type was disposed at the site. The one prior date on a plain-weave sandal from the top of Stratum IV (TX-1260) suggested that this interval occurred during the early portion of the sixth millennium B.P. (fifth millennium cal. B.C.), but with the overlying strata so poorly dated there was reason for caution. Assaying two additional plain-weave sandals from the top of Stratum IV would conclusively demonstrate when this type of footwear was last used at the site and whether the occupation of Stratum IV extended into the middle Archaic.

Cowboy and Walters Caves

Site Descriptions. Cowboy Cave is the largest and deepest of all the shelters considered here, measuring 12 m wide at its mouth and 33 m deep. The adjacent Walters Cave is more comparable to Dust Devil in size, measuring 11 m wide at its mouth and 15 m deep. The most habitable portion of Cowboy Cave (the front lighted part), an area of about 110 m^2, was completely excavated to or below a culturally sterile layer of Pleistocene herbivore dung. Excavations revealed 1-2 m of complexly stratified deposits from a history of occupation that spanned almost 7000 years. Jennings (1980:9-26) grouped the numerous individual strata of the site into four cultural units (II–V) thought to represent coherent intervals of occupation separated by periods of site abandonment. Schroedl and Coulam (1994) recently reviewed the evidence from the cave, clarifying site stratigraphy and artifact associations to arrive at a slightly revised sequence of occupancy. Strata IIb–IVb represent early Archaic deposition that is temporally similar to Stratum IV of Dust Devil Cave except that Cowboy Cave continued to be occupied for an additional 500 years or so after Dust Devil Cave was essentially abandoned. There was a large hiatus in occupation about 6300–3800 B.P., during which time there was virtually no deposition within the cave (Schroedl and Coulam 1994:22). The cave was reoccupied during the late Archaic, sometime after 3800 B.P., resulting in the accumulation of Strata IVc–Va. This was followed by another long hiatus from about 3200 to 1900 B.P., then reoccupation for about 500 years between 1900 and 1400 B.P.

Both plain-weave and open-twined sandals were recovered from Cowboy Cave. Most examples of these sandals came from the early Archaic Unit III, but a few examples were found in higher strata. As discussed earlier, the occurrence of open-twined sandals in the late Archaic and the more recent strata is attributed to prehistoric pit digging within the cave and a clerical error (see endnote 2). There is sufficient direct chronometric evidence to be certain that this sandal type has considerable antiquity no matter the age of its discovery context. This is not the case with plain-weave sandals, however; in fact, the occurrence of plain-weave sandals in later deposits of the cave may represent one aspect of cultural continuity during the Archaic period.

A 16 m^2 block excavated near the front of Walters Cave revealed almost 2 m of strata that were similar although not identical to those of Cowboy Cave, and the same general units of occupation were recognized. Because both caves had such similar deposits and histories of use, Jennings decided to leave the rest of Walters Cave untouched for future study. Unfortunately, as with several other partially excavated caves in Utah, looters subsequently mined the strata for artifacts, leaving little for future researchers (Jennings 1980:3).

Sample Selection. The two dated sandals from Cowboy Cave are FS 1692.1 and FS 1790. The former is from Stratum IVc (Feature 37), the depositional unit that represented the reuse of the cave during the late Archaic sometime after around 3800 B.P. A date on this sandal would reveal whether this artifact type continued in use at the site after the reputed 2000+ year occupation hiatus during the middle Archaic, or if the artifacts had been brought up from some lower depositional layer by prehistoric pit digging. Sandal FS 1790 came from Stratum IVb, once thought to represent a culturally sterile depositional layer that separated early from late Archaic strata within the cave. The cultural materials recovered from this and other sterile layers within the cave were attributed to intrusion from the overlying cultural strata (Jennings 1980:26). If the sandal had actually been deposited within the eolian sand of Stratum IVb as it accumulated, then the sandal would date to the middle Archaic or earlier.

The Walters Cave sandal is FS 576; it was one of two plain-weave sandals recovered from the limited work at this site. Both plain-weave sandals came from a layer (Feature 54) that seemed broadly comparable to Unit III of Cowboy Cave (Figure 8). Schroedl and Coulam (1994:26) do not believe that this reconstruction is accurate, but both the difference in sandal types between the strata (open-twined in Feature 71 and plain weave in Feature 54) and the dating of the sandals support my reconstruction. Two other sandals recovered from Walters Cave were open-twined specimens that came from a layer (Feature 71) comparable to Unit II of Cowboy Cave. One of these was radiocarbon dated to 8875 ± 125 B.P.[2]

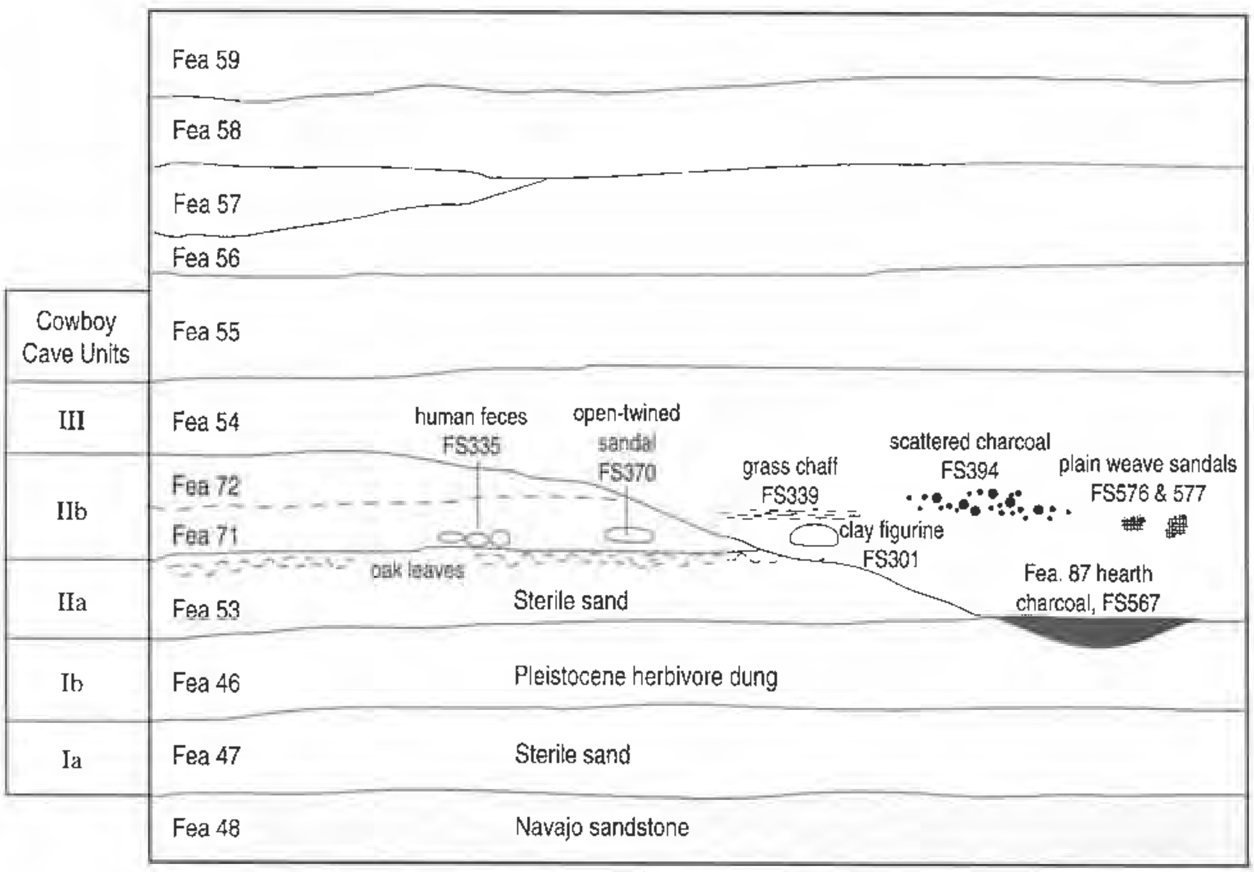

Figure 8. Schematic section of the strata exposed in the test of Walters Cave (reconstructed from field notes).

RESULTS

The minute portions (0.6 to 0.04 g) removed from each of the plain-weave sandals were submitted to the NSF Accelerator Facility at the University of Arizona for AMS radiocarbon assay. Prior to their submission, I inspected each sample under a 40x microscope for any visual traces of contamination such as rodent urine or charcoal adhesions that would not be eliminated in normal laboratory pretreatment; there were none. Radiocarbon analysis of the samples proceeded normally and the results, corrected for ^{13}C fractionation, are presented in Table 1. This table also gives the calibrated 2 sigma age range for each date as calculated by the CALIB program (Stuiver and Reimer 1993, revision 3.0.3A) using the 20-year data set and method A (results rounded to the nearest five years). The calibrated date ranges are graphed in Figure 3 along with the calibrated date ranges for all direct dates on open-twined sandals.

The plain-weave sandals range in age from about 6900 years B.P. at the oldest to 3200 B.P. for the youngest. The two sandals from Dust Devil Cave are the oldest of the lot and are comparable with the previous date on a plain-weave sandal from this site (6840 ± 130 B.P., Ambler 1996:Table 7). The average of these three statistically contemporaneous dates (T¢ = 1.47, Xi^2 = 5.99) is 6838 ± 41 B.P. Based on the calibrated age range of the average, it is evident that plain-weave sandals were last deposited in the cave between 5735 and 5600 cal. B.C. This was also the last time that Archaic hunter-gatherers used the site as a base camp judging from the near lack of cultural deposition within the cave during the formation of Stratum V.

The dates on the plain-weave sandals from Cowboy and Walters caves form a tight statistically contemporaneous group (T¢ = .14, Xi^2 = 5.99), with an average of 6378 ± 45 B.P. (2 sigma range is 5430-5250 cal. B.C.), at least three centuries after the last occurrence of the sandal type at Dust Devil Cave. The Cowboy Cave dates fail to support the contextual evidence that indicates a continuation of plain-weave sandals into the late Archaic. Perhaps some of the plain-weave sandals recovered from Stratum IVc actually belong to that depositional interval, but the evidence at hand suggests otherwise.

These two Cowboy Cave dates helped to bolster Schroedl and Coulam's (1994) argument that the "sterile" sand layers of Unit IV (Strata IVa and IVb) actually represent the end of early Archaic occupancy and not a natural depositional interval separating cultural layers. It is perhaps no coincidence that the sandal dates are almost identical to a date on charcoal (6390 ± 90; Jennings 1980:Table 3) recovered from Stratum IVa. Jennings questioned the stratum association once the radiocarbon result was known, and used the date as the upper temporal bracket for Unit III (Jennings 1980:Table 2) rather than as a beginning date for Unit IV.

The dated sandal from Walters Cave provides the only age determination for the stratum of this site that is comparable to Unit III of Cowboy Cave. This date is also important because of an associated painted clay anthropomorphic figurine (Hull and White 1980:Figure 47) that some authors (Schaafsma 1986:225; Schroedl 1989:17) hold up as indirect evidence for the considerable antiquity of the Barrier Canyon rock art style.[3]

Three of the sandals date to the middle Archaic, between 5600 and 5900 B.P., during the early part of the purported gap in the radiocarbon record for the Colorado Plateau. These are the two sandals from the preceramic midden deposit of The Hermitage and the sandal from the lowest cultural layer of Benchmark Cave that yielded perishable artifacts—Stratum 5. Unlike at Cowboy Cave, the plain-weave sandals from The Hermitage could not have been intruded up from some deeper cultural layers, since there were none. The sandal dates, therefore, also apply to the trash deposit. The presence of substantial middle Archaic trash accumulation suggests that this site likely served as a seasonally used residential base. At Benchmark Cave, too, the find context of the Stratum 5 sandal was doubtless its context of use; recall that the underlying Stratum 4 was the noncultural alluvial clay, which effectively sealed Stratum III, the lowest cultural deposit of the site. The roughly 1.5 m of cultural and noncultural deposits that separate Stratum 5 from the probable late Archaic Stratum 10 (see below) represent considerable middle Archaic deposition within the cave. Sharrock (1964) is still likely right that the numerous layers that comprised the fill accumulated without any apparent long-term hiatus in occupancy, but in light of the dates, the layers did not accumulate rapidly but rather over many millennia.

Table 1. Radiocarbon Dating Results for Plain Weave Sandals.

Site	Sample No.	Laboratory No.	Radiocarbon Age (BP)	δ^{13} C*	Calibrated 2σ Range
Benchmark Cave	FS 35.1	AA-10376	3355 ± 50	(-25.0)	B.C. 1745 - 1515
	FS 77.5	AA-13003	5810 ± 70	-23.5	B.C. 4835 - 4495
	FS 142.11	AA-13004	3210 ± 55	-23.3	B.C. 1605 - 1325
Cowboy Cave	FS 1692.1	AA-13005	6390 ± 65	-22.0	B.C. 5440 - 5225
	FS 1790	AA-13006	6385 ± 85	-21.9	B.C. 5445 - 5140
Dust Devil Cave	F8.6	AA-10379	6785 ± 60	(-25.0)	B.C. 5725 -5525
	F10.2	AA-10378	6890 ± 60	(-25.0)	B.C. 5850 - 5610
Hermitge Site	FS 19.1	AA-10371	5890 ± 55	-12.1	B.C. 4905 - 4615
	FS 24	AA-10372	5665 ± 60	(-25.0)	B.C. 4680 - 4360
Walters Cave	FS 576.1	AA-13007	6350 ± 85	-22.9	B.C. 5440 - 5075

*Numbers inparentheses are values assumed by the laboratory.

The surprise dates were those within the second millennium B.C. from Benchmark Cave. Prior to submitting any samples I thought that plain-weave sandals were being used well into the middle Archaic, but not later, and that the finds of this sandal type from late Archaic and younger strata at Cowboy Cave were due to prehistoric mixing of the deposits. At Cowboy Cave this may still be the case, but the current dates from Benchmark Cave confirm that plain-weave sandals were still in use during the late Archaic. A sandal technology that began during the end of the early Archaic, persisted during the middle Archaic, and extended into the late Archaic provides strong evidence for cultural continuity and casts further doubt on the notion of an occupational hiatus separating the early and late Archaic.

The sandal from Stratum 12 at Benchmark is now known to have been made about 2000 years prior to the start of pottery use within the region; thus its association with the pottery of Stratum 12 is spurious. The sandal was likely displaced upwards in the deposits by the Puebloan occupants who dug various pits within the cave. A likely origin for this sandal was Stratum 10, where several plain-weave sandals were recovered, one of which has an age similar to that from Stratum 12. Until additional dating proves otherwise, I find sufficient reason to believe that Stratum 10 of Benchmark Cave is a late Archaic cultural deposit.

By establishing the true antiquity of its deposits, Benchmark Cave takes on new significance with regard to understanding the Archaic period and the adoption of agriculture. Indeed, if it were possible, a third round of excavation at this site would be called for (unfortunately the cave is now about 140 m below the waters of Lake Powell). The existing collections certainly deserve additional study and reconsideration in this new temporal light.

Both sites with plain-weave sandals dated to the middle Archaic are located in the Glen Canyon lowlands adjacent to the Colorado River. As evidenced by heavy trash accumulation, these riverine sites were evidently used extensively and frequently during the middle Archaic. In contrast, despite selecting sandals with the greatest possibility of dating to this interval, especially in the case of Cowboy Cave, the plain-weave sandals from the caves of the highlands date to the early Archaic. The sandal dates continue to support the notion that Cowboy and Dust Devil caves were either totally abandoned during the middle Archaic or used rarely. The abandonment or drastic reduction in use of previously well-used sites can be attributed, I believe, to a change in settlement pattern resulting from the culmination of early to middle Holocene drying and warming. During the middle Archaic for the central Colorado Plateau, water availability became a key factor in deciding which sites were and were not used as residential bases.

Reed and Nickens (1980:60) gave a similar explanation for the discovery of middle Archaic cultural deposits at DeBeque Rockshelter on the Northern Colorado Plateau. They suggested that the proximity of this shelter to the Colorado River may have made it a more suitable residence relative to other areas of the Colorado Plateau during a time of deteriorating environmental conditions.

CONCLUSIONS

The dating of plain-weave sandals has helped to partially fill the reputed middle Archaic gap in the Colorado Plateau radiocarbon record. The sandals dated to between 5600 and 5900 B.P. come from two shelters of the Glen Canyon lowlands (The Hermitage and Benchmark Cave) that contain trashy layers from fairly substantial and repeated forager occupation. A series of dates from Benchmark Cave alone would likely reveal nearly continuous occupation from early through late Archaic. Had the preceramic deposits at The Hermitage and Benchmark Cave been radiocarbon dated when the sites were excavated, the whole notion of a middle Archaic date gap might never have occurred.

The dates presented here, plus others obtained in the past 15 years (see Geib 1995), do not support the notion that the Archaic Period of the central Colorado Plateau was characterized by a sequence of major population abandonments and intrusions. Middle Archaic dates between roughly 6000 and 4000 B.P. are still few in number, especially compared to the numerous examples of early and late Archaic dates, but there is good reason to suggest that the central Colorado Plateau was continuously occupied from about 9000 B.P. up through the introduction of agriculture and the end of the Archaic.

The sandal dates also demonstrate continuity in a perishable technology over a span of almost 4000 years. Plain-weave sandals provide a cultural link between the early and late Archaic occupations of the central Colorado Plateau. They were first manufactured during the end of the early Archaic and their production overlapped open-twined sandals during the first half of the seventh millennium B.P. Because certain sandals exhibit aspects of both plain-weave and open-twined construction techniques, it is evident that the plain-weave style developed out of the open-twined style. Plain-weave sandals continued in use through the middle Archaic and into the late Archaic, up to 3000 years ago. This reveals long-term stability and continuity in one aspect of perishable technology during a time when new projectile point styles were adopted and settlement and mobility patterns were significantly altered.

The sandal dates appear to support the idea that well-watered portions of the central Colorado Plateau became more focal to settlement-subsistence patterns during a time of maximum Holocene warmth and dryness. The sites with abundant evidence of middle Archaic occupancy are those situated alongside the Colorado River, while caves in dry upland settings that had previously served as residential bases were seldom occupied.

ACKNOWLEDGMENTS

The sandal samples were dated at the NSF–Arizona AMS Facility at the University of Arizona, which receives partial funding from the National Science Foundation. I greatly appreciate the efforts of A.J.T. Jull and the rest of the staff at the AMS facility. Most of the samples came from the Utah Museum of Natural History, University of Utah; Laurel Casjens and Kathy Kankainen of the museum were invaluable in researching the collections. J. Richard Ambler sparked my interest in the Archaic many years ago and has continued to stimulate ideas. William D. Lipe encouraged me to research the Glen Canyon Project collections from sites such as The Hermitage and Benchmark Cave because he was sure that Archaic components had gone unreported. His comments on a draft of this paper, as well as those of R.G. Matson, Miranda Warburton and Francis E. Smiley, are greatly appreciated. I thank Louella Holter for word processing and editing and Ron Redsteer for the excellent maps. As a final note, it is a credit to Jesse Jennings's system of note taking and collections management that I could so readily use the collections and notes housed at the Utah Museum of Natural History to pursue new lines of research.

NOTES

[1]Lipe (1960:99) identified a "preceramic and preagricultural" occupation of the cave, but this interpretation was superseded by Sharrock's (1964) conclusion that the site was occupied for just a brief 100-year or so interval during Pueblo II..

[2] The dated sandal was not described prior to being destroyed for a radiocarbon date. Examination of field photographic archives housed at the University of Utah leave no doubt that it was an open-twined sandal. Hewitt (1980:Table 14) does not list any open-twined sandals recovered from Walters Cave, yet a field photograph clearly shows two open-twined sandals in situ in the lowest cultural deposit (Feature 71) at the cave. One of these was specifically identified as a sandal in the field notes and field specimen log and this was the artifact submitted for radiocarbon dating (FS370). The other artifact was identified as basketry in the field notes and specimen log, yet no basketry is listed as coming from Walters Cave (Hewitt 1980:Table 14). This discrepancy resulted because the field specimen number for this other woven artifact was written down by the analyst as 1370.2 instead of 370.2 (Nancy Hewitt's sandal analysis notes on file at UMNH). In the field specimen log, FS1370 is listed as a metate fragment from Cowboy Cave, not Walters Cave. Hewitt describes the 1370.2 artifact as a poorly preserved fragment of an open-twined sandal, which is exactly what the field photograph shows. There are no other artifacts in the collections with the FS370 designation, just the sandal fragment that Hewitt describes as 1370. Resolving this discrepancy also removes the one open-twined sandal listed as coming from Unit V of Cowboy Cave. It is abundantly clear that use of this type of sandal had discontinued thousands of years prior to Unit V occupancy. It is now evident that a simple clerical error added the sandal to Unit V of Cowboy Cave instead of its proper provenience as Unit II of Walters Cave.

[3] The type site for the Barrier Canyon style is located within the same drainage system as Cowboy Cave, only about 18 km from the cave. Recent attempts at directly dating Barrier Canyon rock have not yet obtained a determination as old as the sandal associated with the figurine (Tipps 1995).

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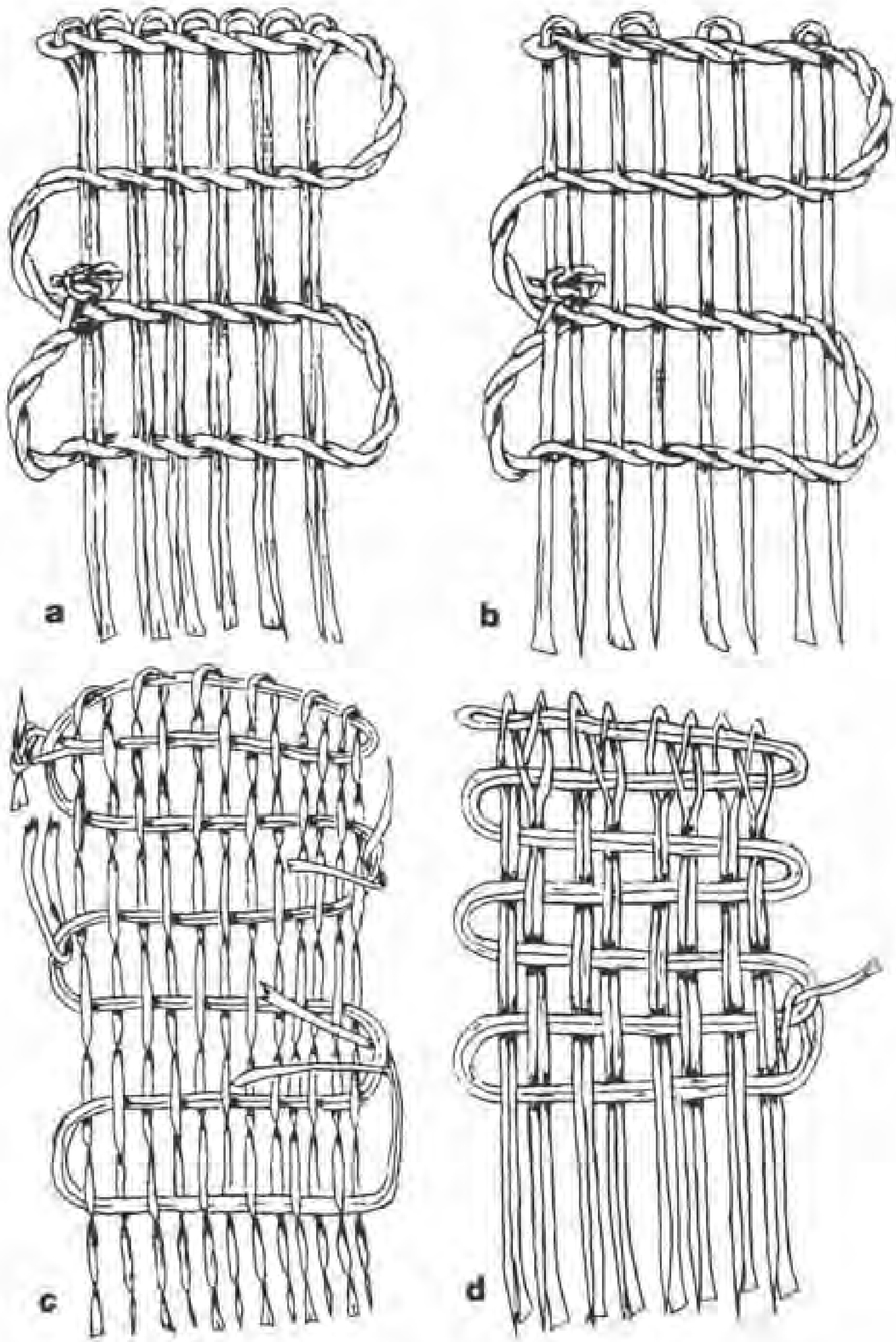
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THE HELL'N MORIAH CLOVIS SITE

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Site 42MD1067 is a single component Clovis site which represents a retooling station where projectile points were manufactured, and broken projectile points were replaced or resharpened. The site is located at what for a time was the southern margin of the regressive lake in Tule Valley near the end of and shortly after the Bonneville lake cycle. Geomorphic and stratigraphic evidence indicate that the most environmentally attractive period in prehistory for human exploitation in the general site area was between 13,950 and 10,000 yr B.P. During this period, resources associated with Lake Tule and with adjacent wetland/marsh environments would have been within close proximity to the site.

INTRODUCTION

The Hell'n Moriah Clovis Site (42MD1067) is a unicultural scatter of Clovis lithic artifacts located on the lower Piedmont slope of southeastern Tule Valley in Millard County, Utah (Figure 1). The site represents only the second single-component Clovis site documented in the state of Utah, and the first in situ Clovis artifact assemblage documented for the eastern Great Basin. The site occurs on and downslope of a small ridge, informally called the marl ridge, and lies at an approximate elevation of 1440 m asl. This location offers a panoramic view of Tule Valley to the west and is backed by the Provo and Bonneville shorelines of late Pleistocene Lake Bonneville up slope to the northeast. Present vegetation consists of desert scrub species, dominated by shadscale and halogeton, and occasional bunch grass. The site area, as defined by the scatter of lithic artifacts, measures 190 m from north to south by 120 m from east to west and encompasses approximately 2.28 ha. (Figure 2). Although the site is crossed by U.S. Highway 6/50, most of the artifacts are found on the north side of the right-of-way corridor.

The Hell'n Moriah Clovis lithic assemblage consists of 146 lithic artifacts. Formal tools include seven projectile points/fragments, three biface fragments, a hammerstone, and a side scraper.

GEOMORPHIC HISTORY

Site 42MD1067 consists of the marl ridge, an alluvial surface that extends downslope (to the southwest) from the base of the ridge, and a steeply sloping bluff that connects the two (Figure 2). The marl ridge is composed of Lake Bonneville white marl (Gilbert 1890) overlain by reworked sandy marl and capped with a patchy veneer of gravel, which is likely

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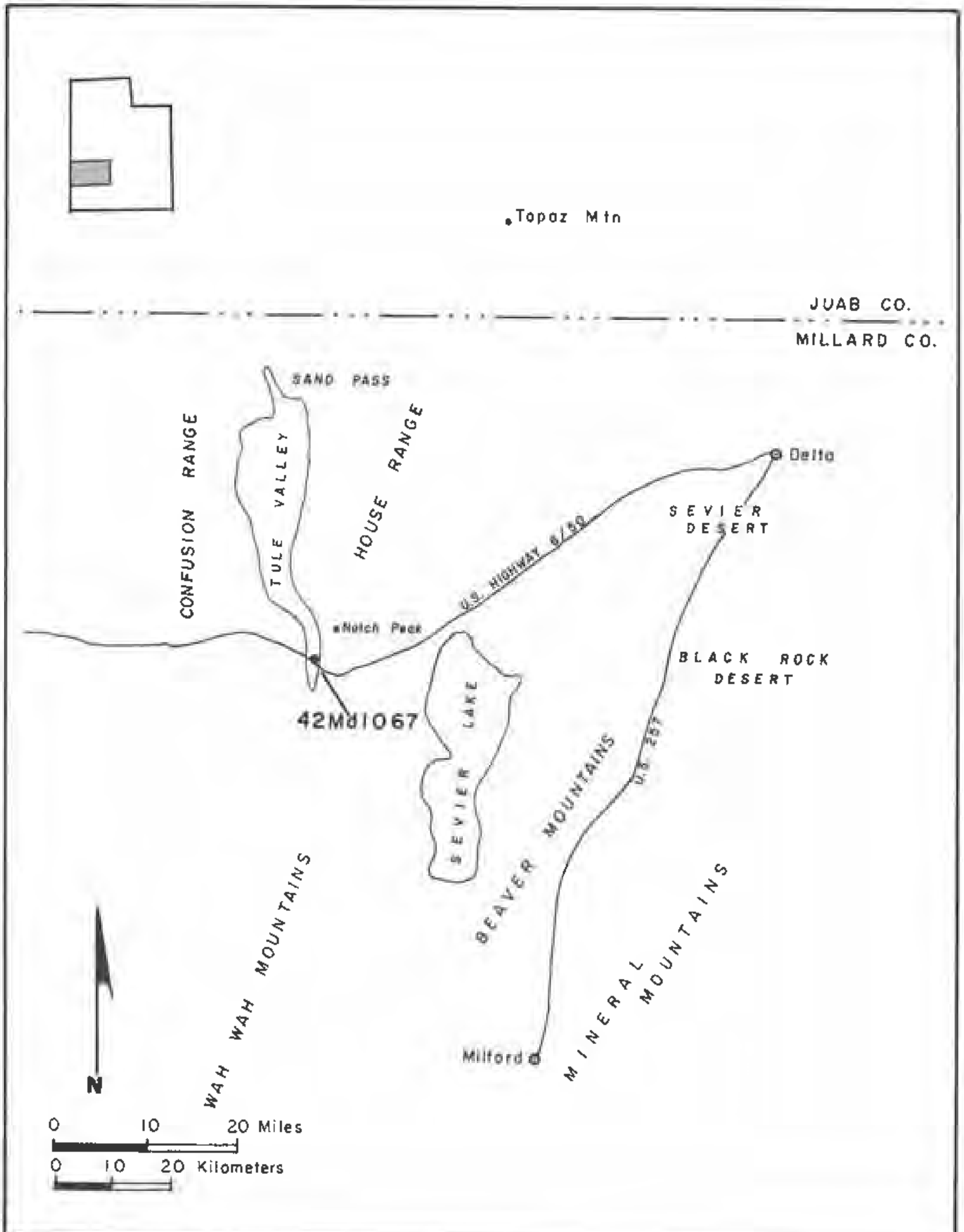

Figure 1. Regional map showing the location of the Hell'n Moriah Clovis Site (42MD1067) and major geographic features of west-central Utah.

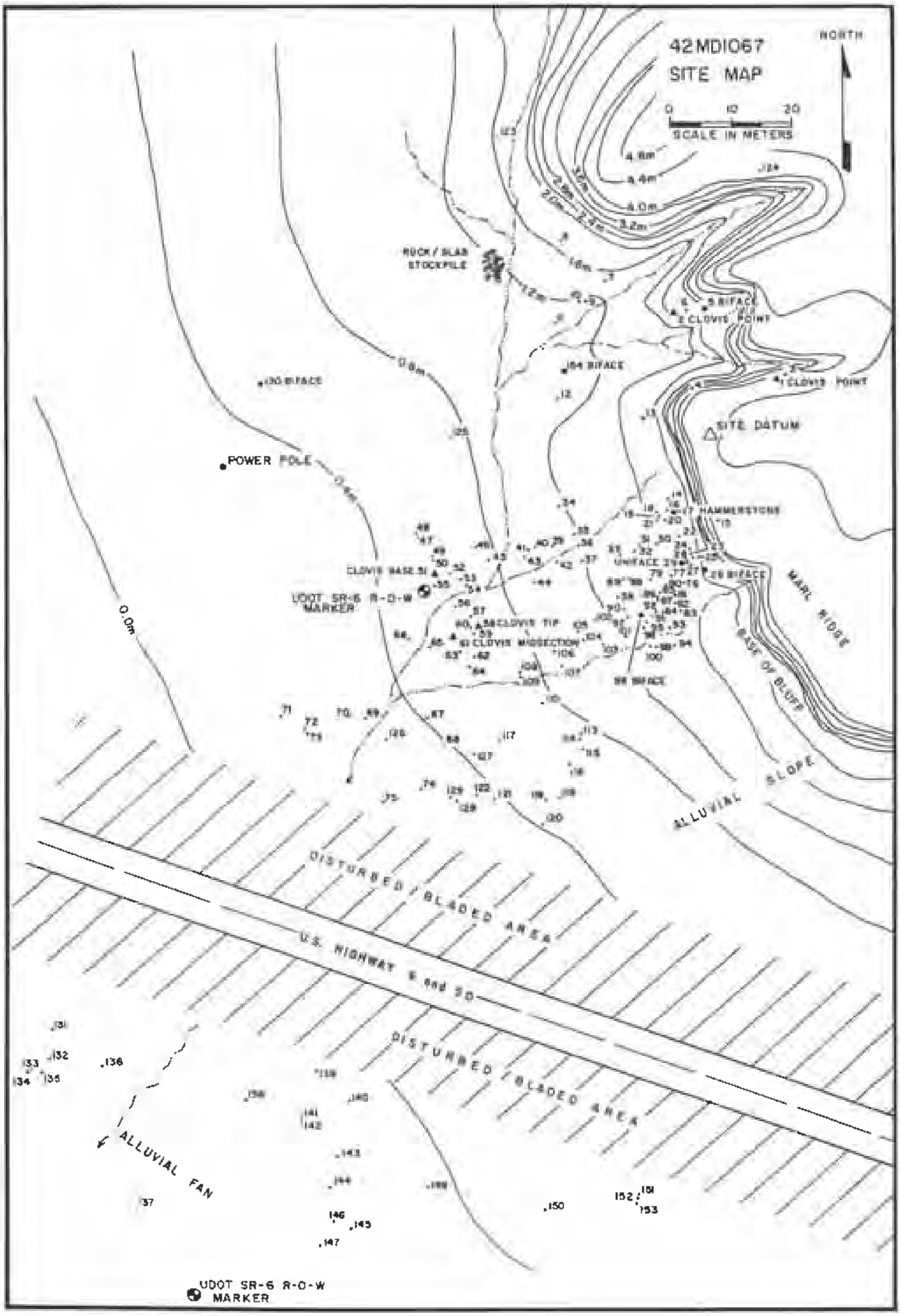

Figure 2. Site 42MD1067, site map.

Lake Bonneville coastal gravel that was reworked by the falling water plane and/or by subsequent alluvial-fan processes. Fluvial and slope wash processes, probably acting since Lake Bonneville fell below the site elevation in the very late Pleistocene, are eroding the ridge. Gravels that once capped now-eroded portions of the ridge lie on the bluff and on the alluvial surface southwest of the bluff.

Clovis artifacts are found within the discontinuous gravel that overlies the marl ridge, on the steeply sloping bluff, and especially on the alluvial surface (Figure 2). The cultural material is concentrated in a zone extending about 40 m southwest of the bluff. Artifacts located on the alluvial surface are distributed in a distinctly fan-shaped pattern. The distribution of the cultural material suggests that, like the ridge gravel, many of the artifacts have migrated downgradient from their original position and have become dispersed over the alluvial surface. Downslope movement of the artifacts presumably took place after the site was abandoned. The pattern of the artifact scatter suggests that the site was originally centered on the marl ridge near, and perhaps 20 m south-southwest of, the site datum. Before dissection of the ridge to its present condition, the center of the site may have extended north of the datum by as much as 40 m.

TEMPORAL CONSIDERATIONS

The geomorphic and sedimentologic history of Tule Valley reveals that there was opportunity for human use of the Hell'n Moriah Clovis Site after about 14,000 B.P. Tule Valley was integrated with Lake Bonneville from approximately 19,500 B.P. to shortly after 14,000 B.P. (Sack 1990). Geomorphic and stratigraphic evidence from elsewhere in the valley indicate that when the regressing Lake Bonneville fell below the lowest point on its divide with Tule Valley, the newly isolated Lake Tule stood close to that minimum divide elevation long enough to construct a fairly substantial shoreline (Sack 1989, 1990). The lowest point on the divide occurs at Sand Pass at the far northeastern end of Tule Valley, about 65 km north of the Hell'n Moriah Clovis Site, and has an elevation of 1446 m. However, because of differential hydroisostatic rebound and faulting (Gilbert 1890; Currey 1982), the modern elevation of that Lake Tule shoreline tends to be lower at the south end than at the north end of the basin. In addition, postlacustrine subaerial processes have obliterated some of the Tule Valley shoreline evidence (Sack 1992). Although no mappable segments of the Lake Tule shoreline are found today in the Clovis site area, preserved segments in the vicinity of the site lie between approximately 1436 and 1437 m (Sack 1990). Because the site datum lies at an approximate elevation of 1440 m, it is concluded that shortly after 14,000 B.P. this location was just a few meters above the level of the Lake Tule stillstand. Calculations based on estimated regional regression rates, which range from 0.1 to 0.4 m/yr (Sack 1990), suggest that the datum has been subaerially exposed since between 13,950 and 13,750 B.P.

The Hell'n Moriah Clovis Site is located at what for a time was the southern margin of the regressive-phase lake in Tule Valley. From the time of the site's subaerial exposure until Lake Tule reached very low levels, resources associated with the lake and with adjacent wetland or marsh environments would have been available for human use. A radiocarbon age of 9140 ± 90 yr B.P. (Beta29185; ^{13}C adjusted) derived from gastropod shells which were collected from central Tule Valley indicates that Lake Tule had fallen to an elevation of approximately 1349 m by about 9150 yr B.P. (Sack 1989). This stratigraphic evidence supports Jennings' (1978) contention that a regional change to a warmer and/or drier climate occurred sometime around 10,000 to 9,000 yr B.P. When Lake Tule occupied the 1349-m level, its shore was located more than 20 km north of site 42MD1067. Associated wetland/marsh environments would have been almost as far from the site. Thus, assuming that human use in this area was related to resources associated with lake, wetland, and/or marsh habitats, the most environmentally attractive period in prehistory for human exploitation of the site in southern Tule Valley was between about 13,950 and 10,000 yr B.P.

42MD1067 LITHIC ASSEMBLAGE DESCRIPTION

Seven Clovis projectile points were collected from the site. This includes two complete specimens, two tip fragments, two base fragments and a base/midsection (Figures 3 and 4).

Obvious manufacture breaks in the collection were restricted to two specimens. Artifact No. 58 is a tip fragment that appears to have broken during channel flake removal, whereas on Artifact No. 61 a flaw in the raw material may have caused the channel flake platform to collapse resulting in a bend break of the midsection.

Clovis points that appear to have broken during use consist of a tip fragment (Artifact No. 5) and two base fragments (Artifact Nos. 51 and 96). The tip fragment exhibits a wide impact flute fracture resulting in a transverse snap. In the case of Artifact No. 51, a flaw in the material probably caused a stress/bend break. It is suspected that the break happened through use rather than during manufacture due to the presence of proximal lateral grinding on the artifact, which is usually described as the final task in Clovis projectile point production (Agenbroad and Huckell, in press). The last projectile point that may have broken during use is Artifact No. 96. This artifact has undergone extreme postdepositional damage and the midsection diagonal break cannot be interpreted technologically. The only diagnostic element remaining on this fragment is that lateral grinding is present on one proximal ear. This fact tentatively suggests that the point may have broken during use.

Clovis points that did not suffer any major breakage include both of the complete projectile points (Artifact Nos. 1 and 2). Artifact No. 1 exhibits only minor damage, which consists of a tip impact fracture that was subsequently retouched. The re-pointing of the tip may have affected the overall functional length-to-width ratio of the projectile point, thus causing the artifact to be discarded. The second complete point does not display the final sequences of marginal pressure retouch characteristic of the final stages of Clovis point production and no lateral/basal grinding is present. This nearly complete fluted point exhibits no features which suggest the reason for its incompletion.

Taken as a whole, the Clovis point assemblage is marked by technological consistencies in morphology, size, and style. Morphologically, the points display consistencies in longitudinal and lateral cross sections, flaking patterns, and basal concavity depths (Table 1). Proximal lateral grinding is present on all finished points but none display basal concavity grinding. Their size dimensions are similar to Copeland and Fike's (1988) comparative statistics for Clovis specimens from Utah and other North American Clovis locations (Table 2). Overall, the collection from 42MD1067 exhibits a slightly larger mean projectile width size and basal width size than those reported by Copeland and Fike (1988), but this variation amounts to only a few millimeters. Stylistically, the points do not have the deep basal concavities common to many of the Clovis points illustrated in Copeland and Fike's (1988) study; the specimens from 42MD1067 display shallow concave bases with only slightly protruding ears. This difference, however, may not be stylistic. It may instead be inherent to the thickness of the base after removal of the first channel flake(s) which requires an adequate but deeper second/opposite striking platform, thus forming a deep V-shaped basal concavity with greatly extending ears. From their conformity in size and style it is concluded that the projectile points from 42MD1067 are the products of artisan(s) working within a single tradition and perhaps even within a single social unit.

Nonprojectile point artifacts collected from the site include three biface fragments, a hammerstone and a side scraper (Figures 5, 6 and 7). The three bifaces correspond to Stage III (Artifact No. 154) and Stage IV (Artifact Nos. 26 and 130) of Frison and Bradley's (1980:31) technomorphological six-stage format for the manufacture of Folsom bifaces. In the case of the first biface fragment, initial soft hammer percussion thinning and margin regularization had just begun, whereas this process had been well underway in the other two biface fragments. All three bifaces exhibit perverse fractures. This breakage pattern occurs almost exclusively during flake removal and almost without exception indicates manufacture breaks (Frison and Bradley 1980:43)

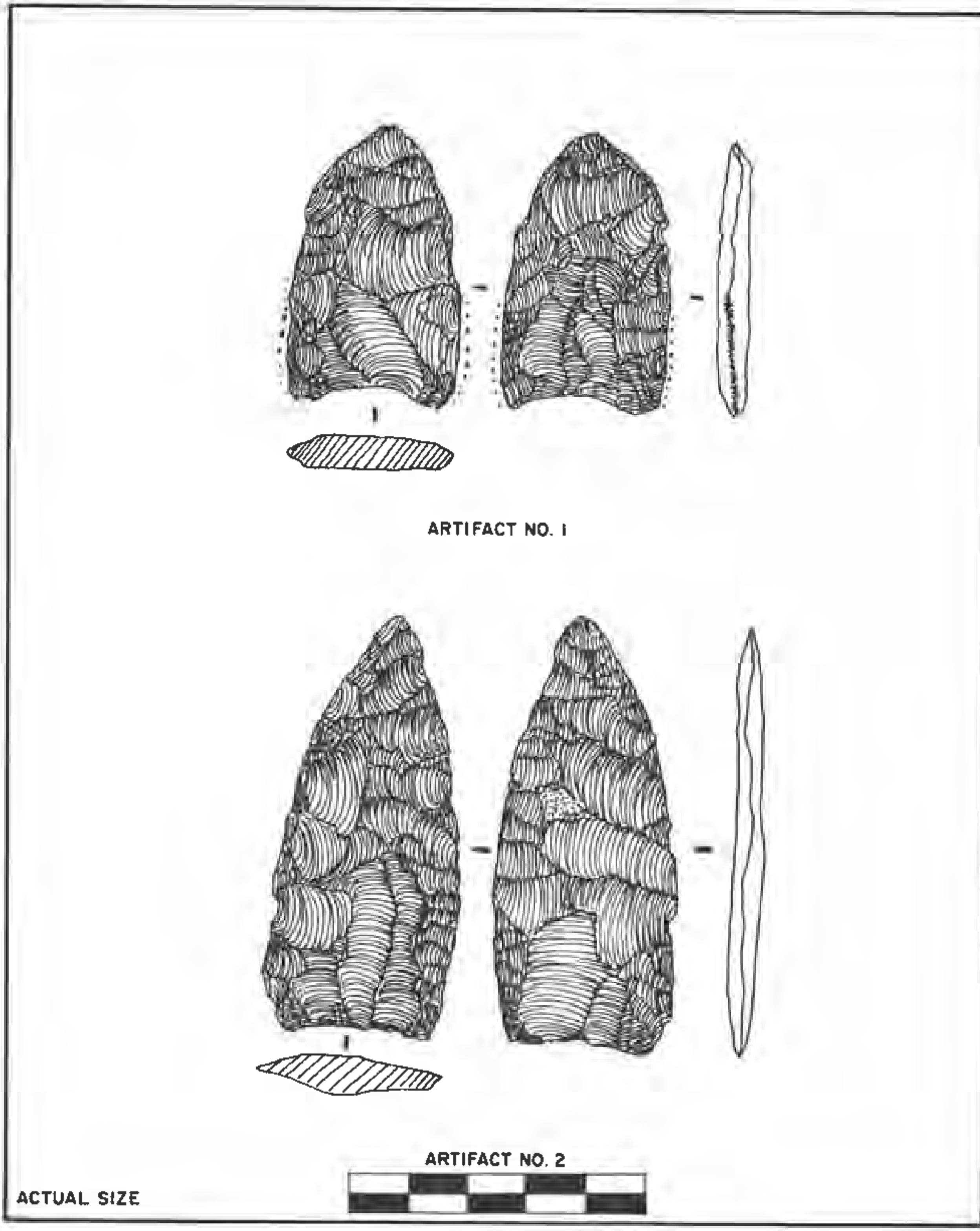

Figure 3. Site 42MD1067, Clovis projectile points. Dots indicate extent of lateral margin dulling (cm scale).

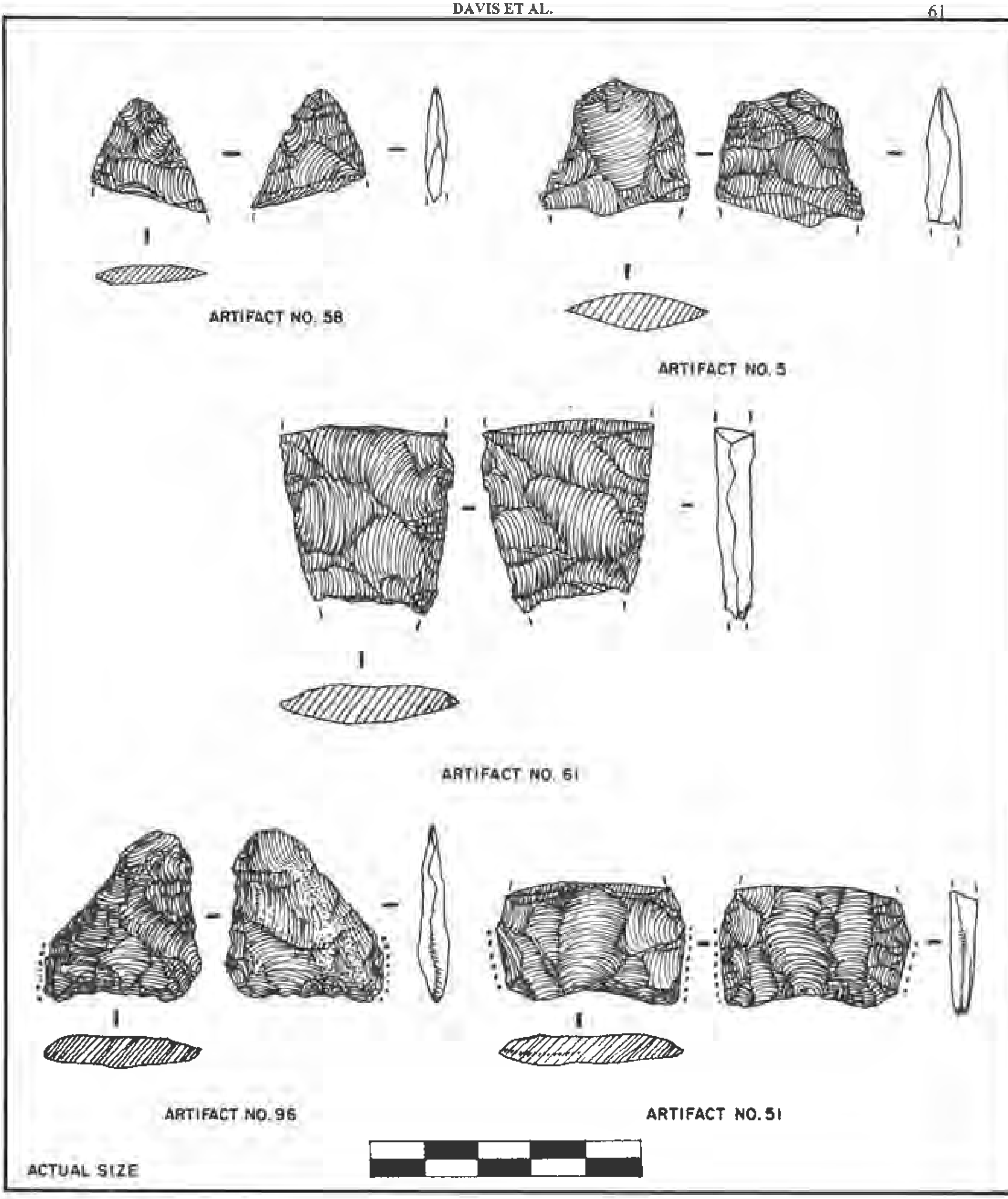

Figure 4. Site 42MD1067, Clovis projectile point fragments. Dots indicate extent of lateral margin dulling (cm scale).

Table 1. Site 42MD1067: Clovis Point technological variables.

Artifact No.	Condition	Material	Length	Width	Thickness	Base Width	Flute Width	Flute Depth	Lateral Grinding	Basal Grinding
1	CR	01	46.5	28	6.5	26	10	1.5	+	0
2	C	QYC	70	31	6	27.5	11	1	0	0
5	TF	01	-	-	7	-	-	-	-	-
51	BF	CC	-	34.5	5.5	31	11.5	0.5	+	0
58	TF	CQC	-	-	-	-	-	-	-	-
61	MF	QBC	-	31	7	22.5	-	-	-	-
96	BF	01	-	29	5	28	-	-	+	0

Condition:
CR = Complete But Reworked
C = Complete
TF = Tip fragment
BF = Base Fragment
MF = Midsection/Base Fragment

Materials:
01 = Obsidian
QYC = Yellowish Orange Mottled Chalcedony
CC = White Translucent Chalcedony
CQC= Quartz Crystal
QBC = Orangish Brown Chert

Grinding
+ = Present
0 = Absent

Note: All measurements in millimeters

The hammerstone (Artifact No. 17) displays varying degrees of battering and attrition along four edges and was presumably used to pound, mash, hammer, or beat unknown materials. Due to the lack of ring-cracks, it is concluded that the artifact was not used as a percussor (Bradley 1993, personal communication).

The final collected artifact consists of a large, straight, transverse side scraper fragment (Artifact No. 29). The tool appears to have broken during use, however, it is not yet known if the artifact was utilized at this site or curated from another site locality as a possible raw material source.

The debitage assemblage consists of approximately 134 flakes. Each piece of debitage was point-provenienced (see Figure 2) and then described according to flake and material type. Results of the debitage rough-sort is presented in Table 3. The combined category of bifacial thinning flakes and bifacial thinning flake fragments is the most prevalent debitage type (n=72, 53.8 percent). This is followed by interior flakes and interior flake fragments (n=49, 36.6 percent). Other flake types include shatter (n=7, 5.2 percent), unknown flake types (n=3, 2.2 percent) and pressure retouch flake fragments (n=3, 2.2 percent). No decortication flakes were observed.

A large portion of the observed debitage is typified by thin, expanding flakes with bifacially faceted striking platforms, often strongly lipped and abraded. Although not conclusive at this level of analysis, the field data suggest a strong probability that a large majority of the bifacial thinning and interior flakes came from the biface reduction

Table 2. Comparative statistics for Clovis specimens (means, standard deviations, range).

Site	Length	Width	Thickness	Base Width	Flute Width	Flute Depth
42MD1067	-	30.7±2.2	6.1±0.7	27±2.8	-	-
	-	(28-34.5)	(5-7)	(22.5-31)	-	-
Utah	57.6±10.1	27.7±4.2	7±1.6	23.3±3.5	13±	1.2±5
	(47-73)	(21.5-34)	(4.5-11)	(133-29)	(9-18)	(.5-2)
Blackwater	-	-	-	-	-	-
	(51-153)	(25-51)	(5-10)	-	-	-
Naco	64±18.2	28.3±3.4	8.4±.7	24.9±2.9	-	-
	(58-116)	(23-34)	(7.5-9.5)	(19-27)	-	-
Lehner	66.4±19.8	26±4.9	7.5±1.1	22.7±3.8	-	-
	(31-97)	(17-31)	(5-10)	(15-27)	-	-
Rio Grande	-	26±39	5.8±1.2	23.9±2.7	12.3±1.6	-
	-	(22-32.3)	(4.1-9)	(19-29)	(9.9-16.5)	-
Domebo	67.7±10.5	24.3±3.5	8.5±2.1	21.7±2.5	11.7±8.3	-
	(57-78)	(21-28)	(7-10)	(19-24)	(5-9)	-
Kentucky	76.9	28.3	7.2	25.8	16.3	-
	(32-195)	(27-52)	(7-11)	(25-44	(16-30)	-
St. Louis	133	45.5	8.7	-	-	-
	-	-	-	-	-	-

(After Copeland and Fike 1988:17) Note: All measurements in millimeters

system. It is also possible that the fragmentary condition of most of the flakes is the result of postdepositional trampling (i.e., sheep).

A diverse selection of nine varieties of stone can be identified from the artifact assemblage. Of this number, four are chalcedonies, two are fine-grained charts, and the rest are obsidian, quartzite, and quartz.

The most abundant raw material type found at the site is white translucent chalcedony (n=68, 50.8 percent). This material has a uniform appearance and varies only slightly in color from a typically white to a light grayish white. The only artifact/tool of this material found on the site is the broken side scraper (Artifact No. 29). The tool was manufactured from a large percussion flake which prior to breakage could have measured as long as 100 to 120 mm in length. Hence, it is quite possible that this material type derives from moderately large nodules. The other three chalcedonies range from translucent to nearly opaque. They occur as yellowish orange mottled chalcedony (n=7, 5.2 percent), reddish white mottled chalcedony (n=6, 4.5 percent) and black speckled translucent chalcedony (n=5, 3.7 percent). The source areas for these chalcedonies are not known, but it is believed that they are of local origin. This assumption is based on three observations. First, chalcedonies are common on later prehistoric sites in the region. Second, the Upper Cambrian Ajax and Notch Peak Formations, which occasionally contain chalcedony, chert, and quartzite nodules (Stokes 1986:50) outcrop in close proximity to the site. Finally, discard characteristics of the Clovis

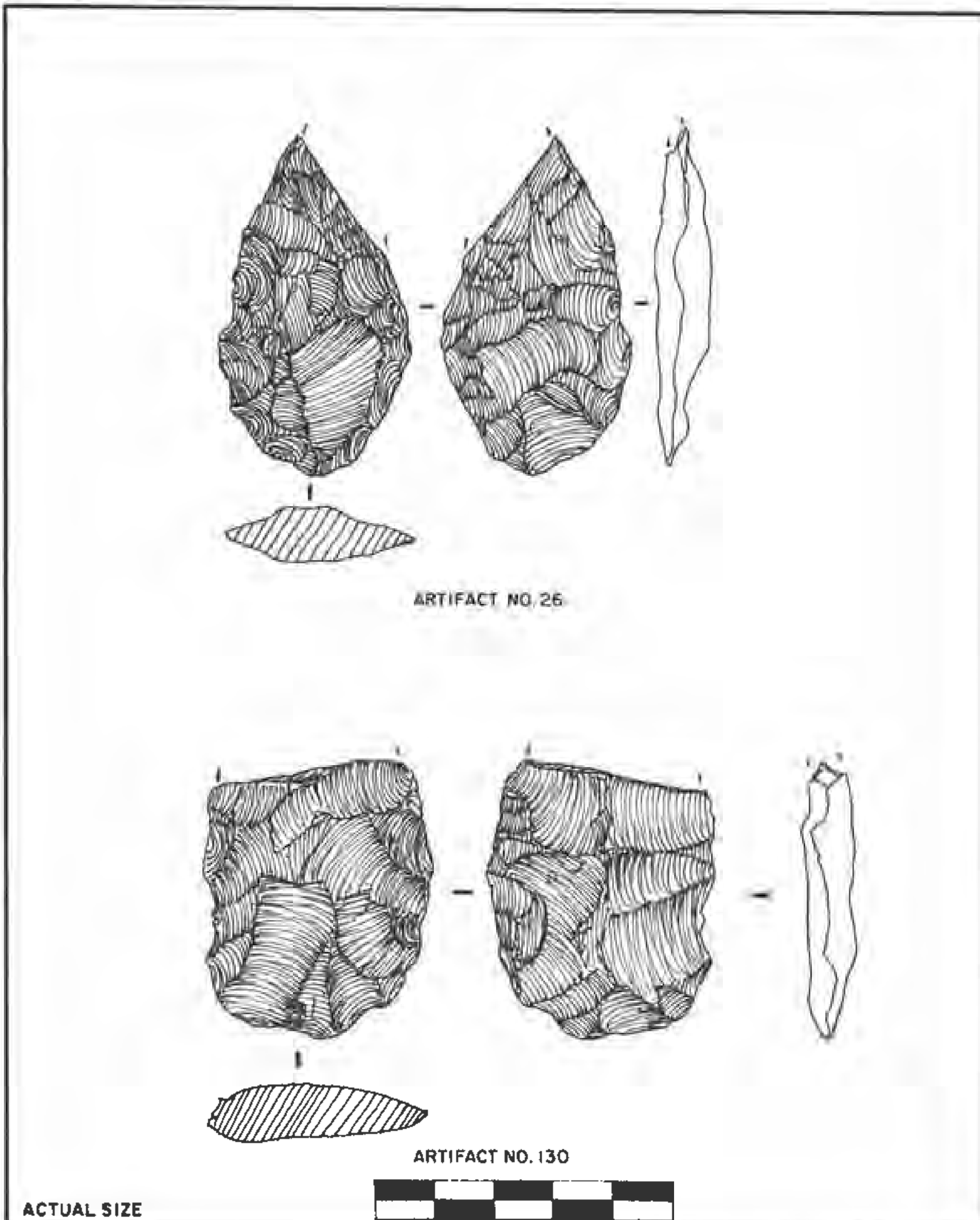

Figure 5. Site 42MD1067, biface fragments (cm scale).

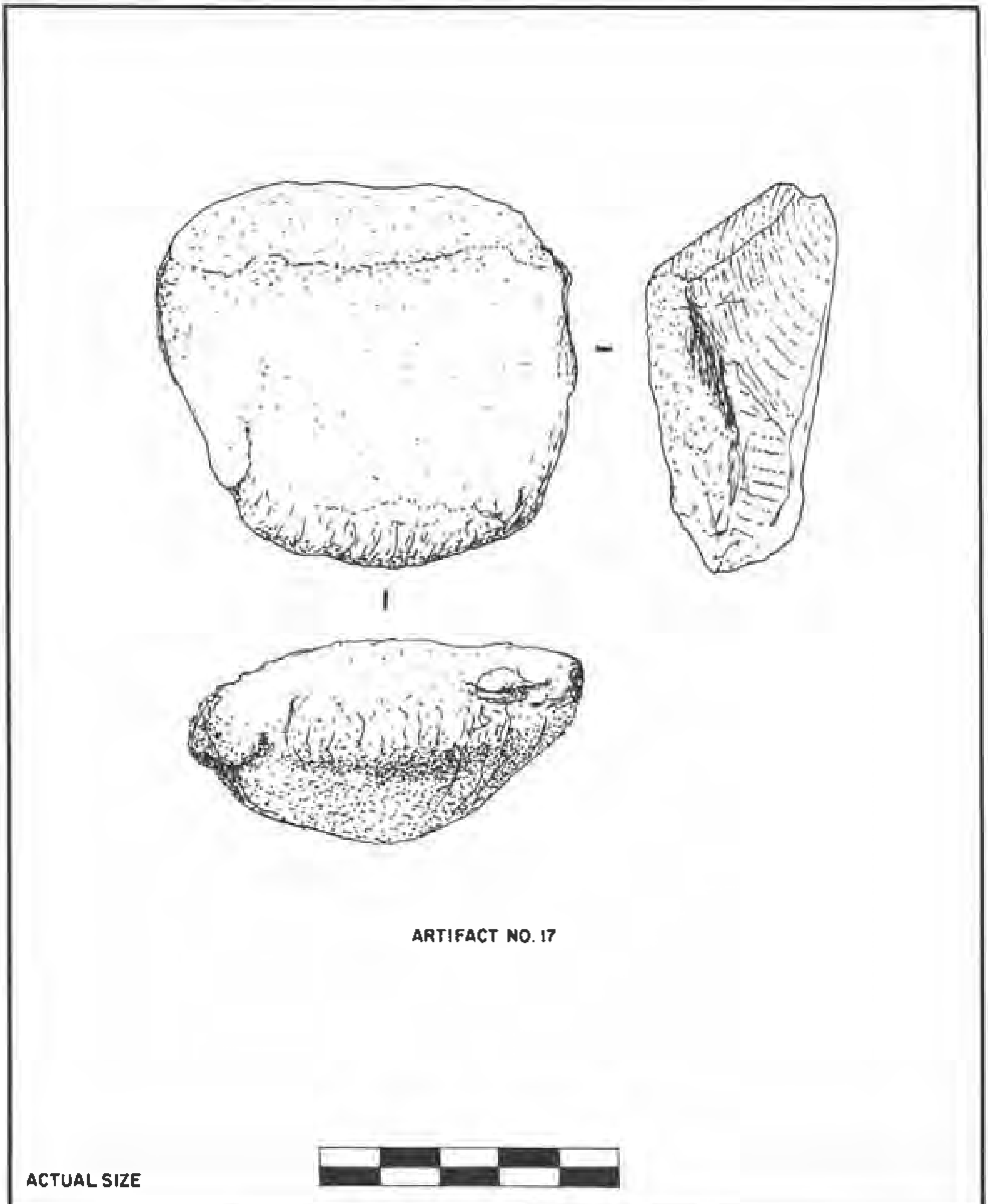

Figure 6. Site 42MD1067, hammerstone (cm scale).

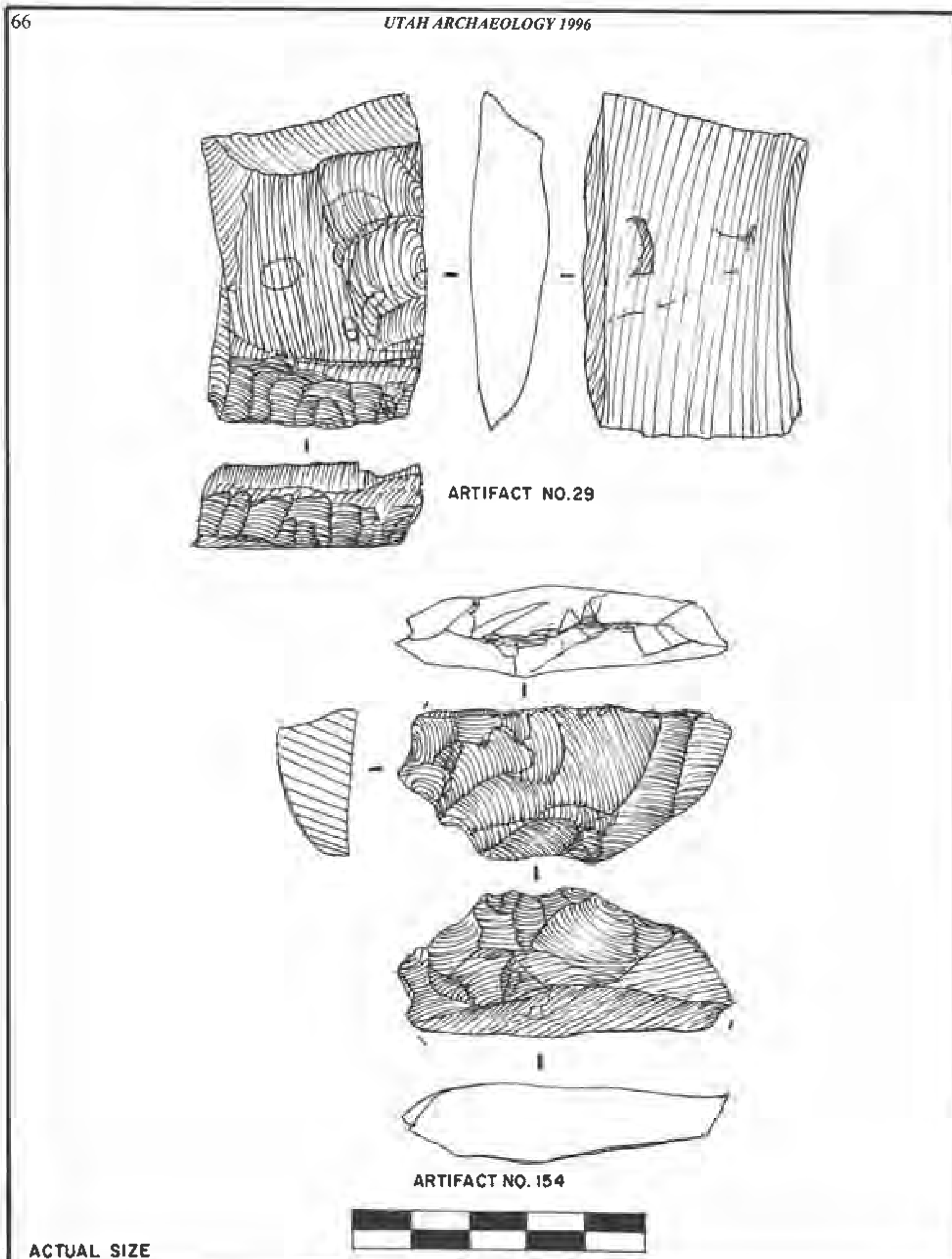

Figure 7. Site 42MD1067, side scraper and biface fragment (cm scale).

Table 3. Site 42Md1067 - Lithic debitage: cross tabulation of material type by flake type.

	Flake Types								
Material Types	BTF	BTFF	SH	UF	IF	IFF	PRFF	Total	Percent
CC	14	20	5	2	1	26	0	68	50.8
OI	3	14	0	0	1	13	1	32	23.9
WC	0	0	1	0	0	0	00	1	0.7
RC	2	2	0	1	0	1	0	6	4.5
BSC	0	2	0	0	0	3	0	5	3.7
QYC	4	1	0	0	0	2	0	7	5.2
WQ	2	4	1	0	0	2	1	10	7.5
QBC	1	3	0	0	0	0	1	5	3.7
Total	26	46	7	3	2	47	3	134	100
Percent	19.4	34.4	5.2	2.2	1.5	35.1	2.2	100	

Flake Types:

BTF = Bifacial Thinning Flake
BTFF = Bifacial Thinning Flake Fragment
SH = Shatter
UF = Unknown Flake Type
IF = Interior Flake
IFF = Interior Flake Fragment
PRFF = Pressure Retouch Flake Fragment

Material Types:

CC = White Translucent Chalcedony
OI = Semi-Translucent Obsidian
WC = White Chert
RC = Reddish White Mottled Chalcedony
BSC = Black Speckled Translucent Chalcedony
QYC = Yellowish Orange Mottled Chalcedony
WQ = White Fine-Grained Quartzite
QBC = Orangish Brown Chert

artifact assemblage suggest that it was not an important concern for maximum utility to be obtained from every piece of raw material. This indirectly indicates close proximity to raw material sources.

The second most abundant raw material type is a semi-translucent, smoky, black-banded obsidian. This material type accounts for 23.9 percent of the debitage assemblage (n=32). Finished artifacts include a complete Clovis point (Artifact No. 1), a Clovis point tip (Artifact No. 5), a Clovis point base (Artifact No. 96) and a Stage IV biface (Artifact No. 26). Obsidian is known to outcrop in western Iron, southern Beaver, and northern Washington counties in what is known geologically as the Tonoquints Volcanic Section of Utah (Stokes 1977). Known archaeological obsidian source localities in Utah have been reported near Modena in western Iron County, near the Wild Horse and Pumice Hole areas of the Mineral Mountains east of Milford, in the Black Rock Desert area of Millard County, and at Topaz Mountain northwest of Delta (Simms and Isgreen 1984:301-311; Westfall et al. 1987:87). In linear distance the obsidian source areas at Topaz Mountain and the Black Rock Desert are approximately 75 km from the Hell'n Moriah Clovis site. Trace element composition should help identify the most probable source(s) of obsidian present at the site.

Ten pieces of quartzite debitage (7.5 percent) and a Stage IV quartzite biface (Artifact 130) compose the third most common material type utilized on the site. The material is a white to gray colored, fine-grained stone. On the basis of the well-executed work on Artifact No. 130, this material definitely exhibits a well-defined conchoidal fracture making it amenable to controlled knapping. This quartzite appears to be identical in color and texture to the lithic material procured at site 42MD1064, a large 740 ha. quartzite source location situated approximately six km east of this site.

One other raw material which appears to have been utilized only rarely is chert. Cherts from the artifact assemblage include five flakes of orangish brown chert (3.7 percent) and one flake of white chert (0.7 percent). Formal artifacts manufactured from chert consist of the Clovis point midsection (Artifact No. 61) and the Stage III biface (Artifact No. 154). The source for this material is probably the Upper Cambrian Ajax and Notch Peak Formations.

The final raw material type found at the site consists of the Clovis Point tip made of clear quartz (Artifact No. 58). This point fragment is similar to three small clear quartz-crystal Clovis points recovered from the Leaner Mammoth Site in Arizona (Haury 1956; Wormington 1957:56). The relative purity and quality of the quartz suggest that it probably derived from a large crystal. Although such crystals have been collected by local rockhounds at Amasa Valley, which is located approximately 15 km north of this site, it is not known if the material in this Clovis point fragment came from this local source.

The sources of the raw material utilized by the Clovis flintknapper(s) to produce projectile points at Site 42MD1067 are largely unknown. There is supporting evidence, however, that the nine material types may be local to the general Tule Valley region. Almost all of the material types reveal careful selection of quality, texture, and perhaps even aesthetically pleasing color, to permit the manufacture of large bifaces upon which the Clovis industry at Site 42MD1067 was based. It does seem generally true that Clovis flintknappers had a predilection for choosing high quality, visually appealing raw materials for tool manufacturing (Agenbroad and Huckell, in press).

At this level of investigation it is difficult to gauge the amount of downslope artifact migration on the site and how these movements have affected perceptions of the internal structuring of the site. Examination of the site map (Figure 2) shows that the artifacts are rather evenly scattered across the site with two somewhat distinct concentrations occurring at the base of the marl bluff and on the upper alluvial slope. Plotting of the artifacts by material type reveals that white translucent chalcedony and obsidian are the dominant material types in both concentrations and that, by and large, the other material types occur as outliers in the general artifact scatter. The distribution of these two material types would argue for their former association with discrete knapping workshops. The refitting/reassembling of individual flakes of these two material types into their proper reduction sequence can provide insights into the overall structure of the site. Given that nearly 11,000 years of postabandonment geomorphic processes may have affected the spatial integrity of the cultural assemblage, it may still be possible to determine if flintknapping activities occurred during a single occupational episode, to identify the work of a single knapper working on a single implement, and to determine if more than one individual was at work in a knapping locus. Further analysis of the debitage assemblage will address these technological and behavioral concerns.

CONCLUSION

Site 42MD1067 is a single component Clovis site which represents a retooling station where projectile points were manufactured, and broken projectile points were replaced or resharpened. The site is located at what for a time was the southern margin of the regressive lake in Tule Valley near the end of and shortly after the Bonneville lake cycle. Geomorphic and stratigraphic evidence indicate that the most environmentally attractive period in prehistory for human exploitation in the general site area was between about 13,950 and 10,000 yr B.P. During this period, resources associated with Lake Tule and with adjacent wetland/marsh environments would have been within close proximity to the site. Such conditions may have supported large fauna, thereby attracting Clovis hunters to the area. The retooling of weaponry at the site indicates that some form of hunting activities had occurred. It is possible that the site may represent a component of a kill site located somewhere in the general vicinity.

ACKNOWLEDGMENTS

Research work at 42MD1067 was supported by the Utah Department of Transportation as part of the SR 6/50 highway improvement project. We would like to thank Susan Miller, Utah Department of Transportation archaeologist, for her managerial skills and editorial comments. Gratitude and praise are extened to field crew Kurt Alloway, Heidi Fischer, Vaughn Hadenfeldt, Winston Hurst, Joe Pachak and Roger Stash. The authors would like to thank reviewers Larry Agenbroad, Eric Blinman, Bruce Bradley, Robert Euler, Winston Hurst and Deborah Westfall for their comments and advice. We would also like to thank Nancy Lamm of Olathe, Colorado for her fine-quality maps which make up an important part of this paper, and Roger Stash for his artifact illustrations.

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NOTES

SOME PREHISTORIC HOLES ALONG CLIFF AND CUB CREEKS, AND AT DEAD HORSE SPRING, UINTAH COUNTY, UTAH

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INTRODUCTION

In north eastern Utah there are few sites, except the numerous rock art panels, where a person can go and see something in place that the prehistoric peoples made and used. These "Indian holes" are such a feature, and we shall describe a few of them so that interested persons may try to locate them. No attempt is being made to locate all of the sites in even the limited area discussed.

For this report we discuss two types of sites with holes that can be identified - those called pattern sites - where clusters of holes seem to form a pattern that may have meaning, and individual holes that, though not always solitary, do not seem to have any sort of meaningful pattern.

What should we call these holes? Many early observers in the locality called them "soup holes". More recently the term "bedrock mortars" has been used. As long as people discussing them know what the terms used mean it is not so important. The difficulty arises when outsiders assume the names imply more knowledge than we have.

"Soup holes" implies they were used for cooking, possibly by the hot- rock boiling method. Some of the questions about this may seem more important to us than to them. How to wash a bedrock pot, for instance, or keep sand out of the stew? Considering the labor necessary to make these holes, their use for cooking would imply that a fairly permanent camp was located nearby along with water, fuel, and shelter, as necessary. Should you visit some of these sites, look for these features also.

"Bedrock mortar" suggests that something was ground, either vegetable or mineral. Logically, they should be located either where the material was procured or where it was processed and used. The grinding of mineral material is attractive because it would seemingly account for their manufacture, pounding hard material could enlarge a small depression into a large hole. The precision of the holes, though, with almost circular design and straight sides, does not suggest that they are just the result of random pounding.

Ceremonial rather than utilitarian use has been suggested. The holes may have been used to process the materials used in a ceremony, store the objects used, or were the holes themselves used in the ceremony, or were they the focus of the ceremony? When visiting the sites, does anything suggest a reason people would stay in the vicinity a long time or return periodically to the place?

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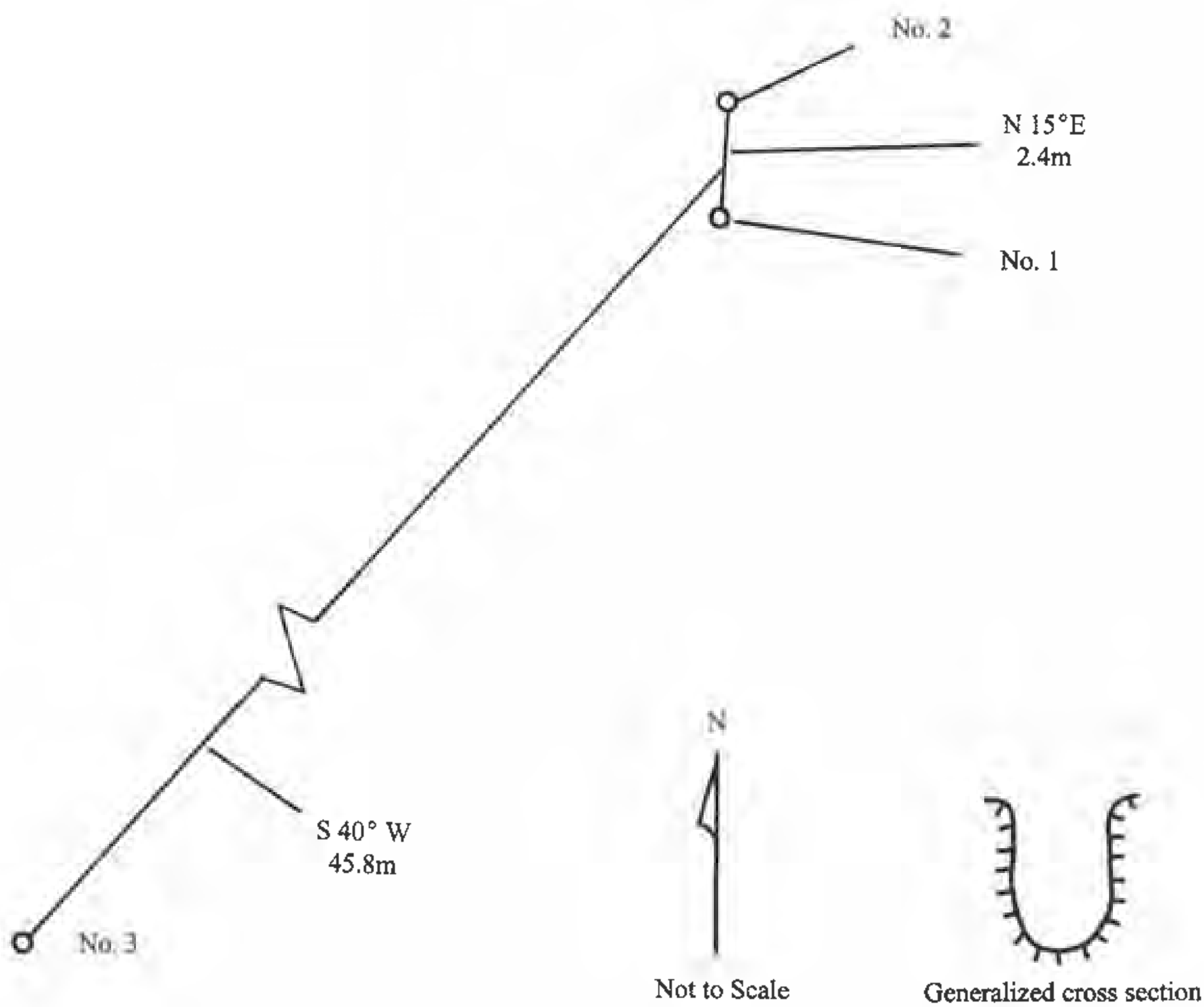

Figure 1. North Cliff Creek 1 (NCC1) not to scale.

Generalizations are dangerous, but individual holes tend to be larger than pattern holes, averaging about 30 cm in diameter and about the same in depth with straight and, sometimes, very smooth sides. Often there are small holes, or cups, near by. Some show considerable weathering.

NORTH CLIFF CREEK 1

This site (NCC 1) is east of Jensen, Utah on the south slope of the ridge between Green River and Cliff Creek in the upper area of a wash draining into Cliff Creek. Figure 1 shows the plan.

It consists of three good sized holes in a bare outcropping of Carmel Sandstone in a bowl shaped depression where two intermittent tributaries join to form a wash draining south into Cliff Creek. On the east side of this depression, fingers of sandstone are exposed and the holes are in these (Figure 2).

The two closest holes are 2.4 m apart, northeast in direction, in the same finger of rock. Hole No. 1, the southern most of the two, is 35.5 cm in diameter and 30.5 cm deep, very circular, with straight sides and a smoothly rounded, saucer shaped bottom (Figure 3).

Hole No. 2 is 41 cm in diameter and 30.5 cm deep with a bowl shaped bottom. A fissure in the sandstone has allowed irregular weathering around the top, much more than in No. 1 (Figure 4).

Hole No. 3 is 45.8 m southwest, 45.5 cm in diameter and 48.5 cm in depth. This one is not as vertical as the others; the southern wall slopes inward and meets the rounded bottom about one third of the distance across the bottom (Figure 5). Figure 6 shows its relationship to the first two holes. A person standing by Holes 1 and 2.

The sides of these holes are weathered, and we do not know if the circular patterns on the walls are due to manufacture or weathering of the stone.

The depression would seem to be attractive for a small camp, but there is no evidence of a camp. Perhaps it was ground level when made. About 100 m south the deepening wash has service-berry and similar bushes growing in it.

Figure 2. North Cliff Creek showing holes in bedrock.

Figure 3. North Cliff Creek Hole No. 1.

Figure 4. North Cliff Creek Hole No. 2.

Figure 5. North Cliff Creek Hole No. 3.

Figure 6. North Cliff Creek.

Figure 7. South Cliff Creek looking northwest across site. Holes in first rock outcrop, Cliff Creek beyond.

SOUTH CLIFF CREEK NO. 1

This site (SCC 1) is on the south rim of Cliff Creek Wash, a tributary of Green River, and about three miles east of Jensen, Utah (Figure 7).

There are five well made holes in the top of an exposed outcrop of Curtis sandstone at the base of a stabilized sand ridge. The site itself is essentially level, but the exposed sandstone outcrop slopes below it to the south wall of Cliff Creek Wash. The holes average 46 cm in diameter and 40 cm in depth. In plan they are very circular, only one being noticeably oval, and the sides are weathered but very regular and true. Each has sand in the bottom, one a bush growing in it. The bottom of the one sampled was smoothly rounded. The general trend of the plan is NE, but the holes do not line up (Figure 8).

The North Cliff Creek Site (NCC 1) lies about one half mile east across Cliff Creek. Compared to the North Cliff Creek ones, these holes are larger, do not seem to be weathered as much inside, and three of them have small cup-like secondary holes around them.

Hole No. 1, on the south end, is slightly oval, measuring 43 cm by 53 cm and depth is 51 cm. It has four cups associated with it, each about 7.5 cm across by 5 cm deep (Figure 9).

Hole No. 2 is 3.05 m northeast from Hole No. 1. It is 46 cm in diameter by 41 cm deep and has five cups associated with it, each about 7.5 cm across by 5 cm deep (Figure 10).

Hole No. 3 is 12.6 m northeast from Hole No. 2 and measures 46 cm in diameter by 46 cm deep with associated cups. (Figure 11).

Hole No. 4 (Figure 12) is 2.1 m northeast from Hole No. 3 and is in the sloping side of the rock. The diameter is 46 cm and on the high side it is 33 cm deep while on the low side it is only 20.5 cm deep. There are no associated cups.

Hole No. 5 (Figure 12) is 3.6 m northeast from Hole No. 4 and is 35 cm in diameter by 10 cm deep with no associated cups.

These holes are very smooth, tapering slightly for about 10 cm from the top and then are very straight and smooth to the bottom. All have about 10 cm of sand in the bottom and a small bush is growing in one. They join the ledge in very smooth curves. The stone is very fine grained without the fractures or cracks that show in some ledges.

The sand ridge above the site has some evidence of use as a camp. The two hand stones in Figure 10 were found there. Cliff Creek is now about 30.5 m below the site.

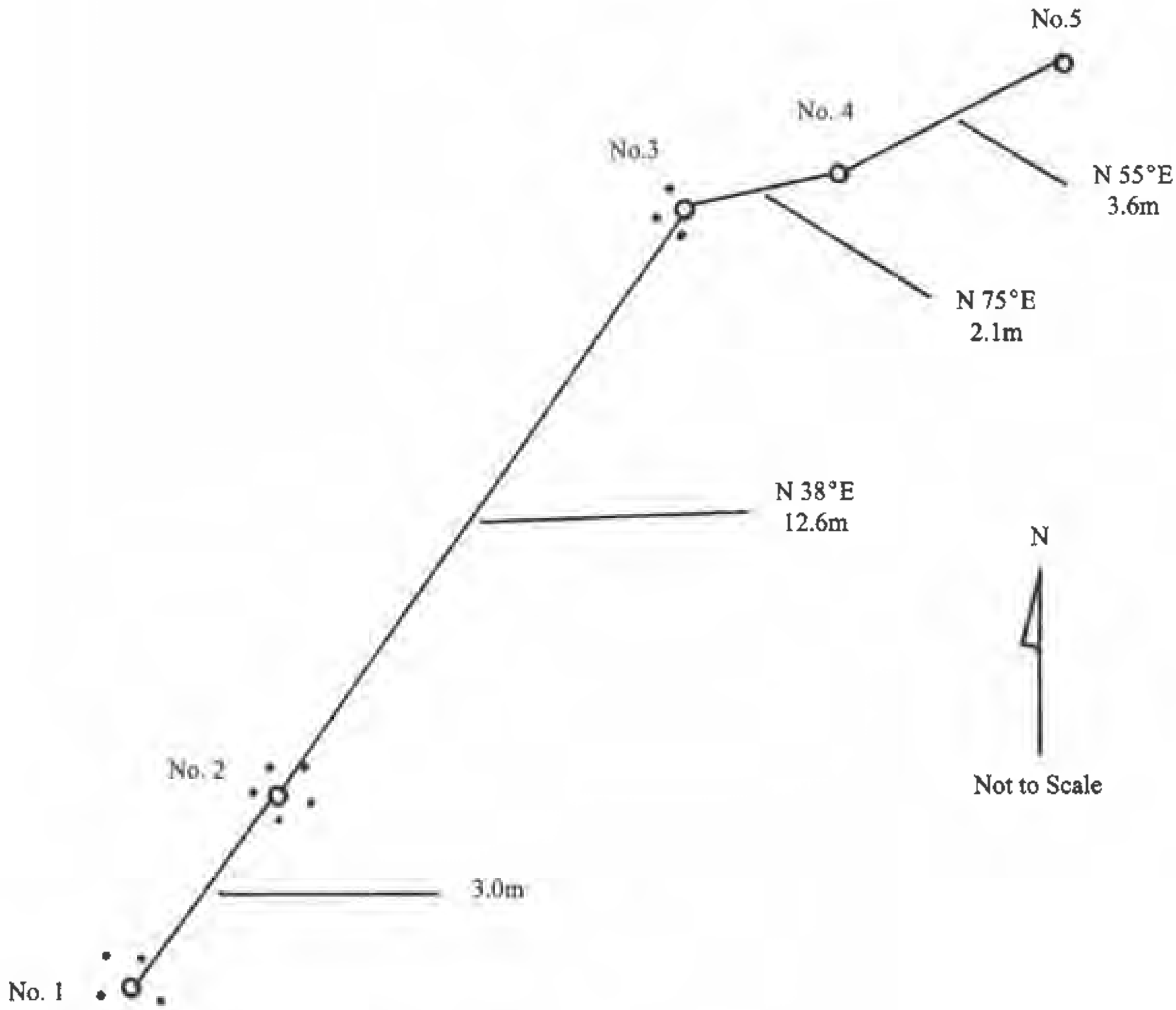

Figure 8. South Cliff Creek No. 1 (SCC1) not to scale.

Figure 9. South Cliff Creek Hole No. 1 with four associated cups.

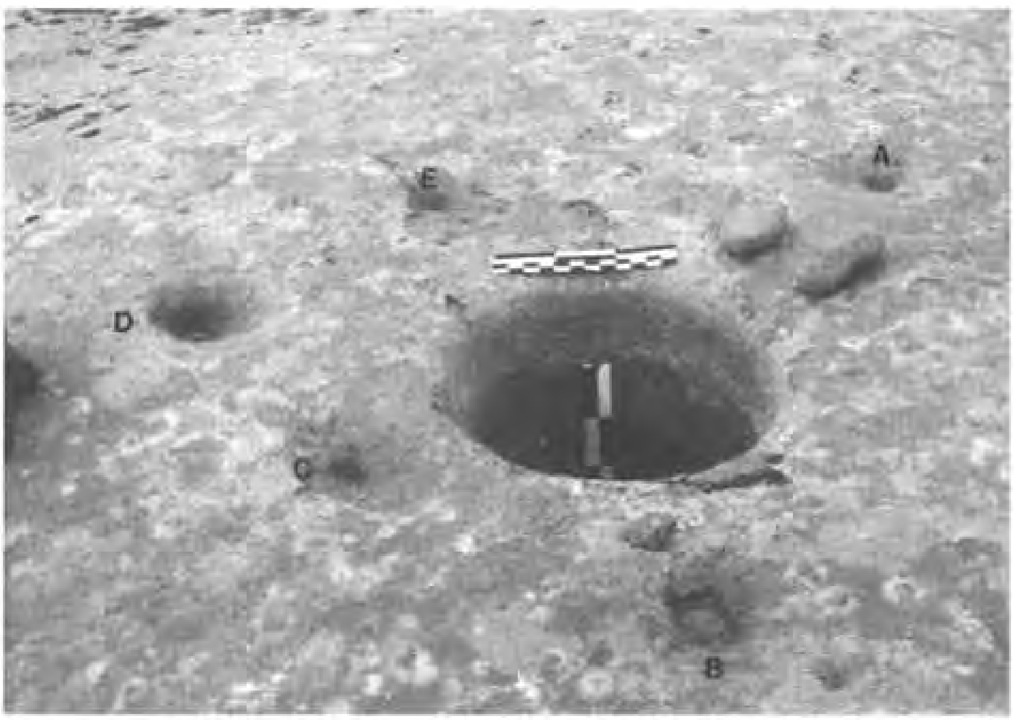

Figure 10. South Cliff Creek Hole No. 2 with five associated cups.

Figure 11. South Cliff Creek Hole No. 3 with three associated cups.

Figure 12. South Cliff Creek Hole No. 4 in sloping part of rock with no cups. Hole No. 5 with no cups.

SOUTH FORK CUB CREEK - 42UN87

This site, 42UN87 was recorded by J. H. Gunnerson in 1957 (Gunnerson 1957:47). He says, "Between forks of Cub Creek just above the juncture and on the s side of an isolated sandstone ridge. Site is sandy, with moderate stand of sage. On a gently sloping section at e end of sandstone ridge is a group of small cuplike depressions forming a square about 7 ft on a side and with some depressions within the square as well. Cub Creek provides a good supply of clear, sweet water the year around, but there is little space suitable for horticulture nearby"

This site in Dinosaur National Monument is on the ridge extending easterly from the back side of a prominent rock formation called Elephant Toes Rock on the south fork of Cub Creek about one half mile above the forks (Figures 13 and 14).

Feature No. 1 is the pattern described by Gunnerson (1957:47) (Figures 15 and 16).

All the holes are very weathered and some are barely distinguishable. The two on the west are perhaps the best, the corner one being 19 cm across and 13 cm deep (Figure 17). Several have secondary cups inside the bottoms, perhaps from the solution action of standing water. The ridge slopes about 40° toward the southeast. The pattern is across the spine and slopes three ways.

Feature No. 2 is up the ridge to the west on a small area of exposed sandstone surrounded by sand with grass and small brush growing in the sand. The rock is about 61 cm across and the hole is 20 cm in diameter and 20 cm deep. A small cup, square in outline, 7.5 cm in one direction by 9 cm the other direction and 5 cm deep, is 15.5 cm east from the larger hole (Figure 18).

Feature No. 3 is farther west on the bare rock at the base of a sandstone wall. The central feature is a hole, slightly oval, 18.5 x 19 cm in diameter and 26.5 cm deep (Figure 19). Associated with this are four cups. Cup A is 2.45 m east in a small exposure of bedrock surrounded by sand and measures 10 cm in diameter and depth. Cup B is 1.28 m southwest on the bedrock and is 9 cm in diameter and 5 cm deep. Cup C is 9 cm west and has a diameter and depth of 10 cm. Cup D is 1 m west and is 7.5 cm in depth and diameter (Figure 20).

Figure 13. South Fork Cub Creek - 42UN87 Location Photograph "Elephant Toes Rock".

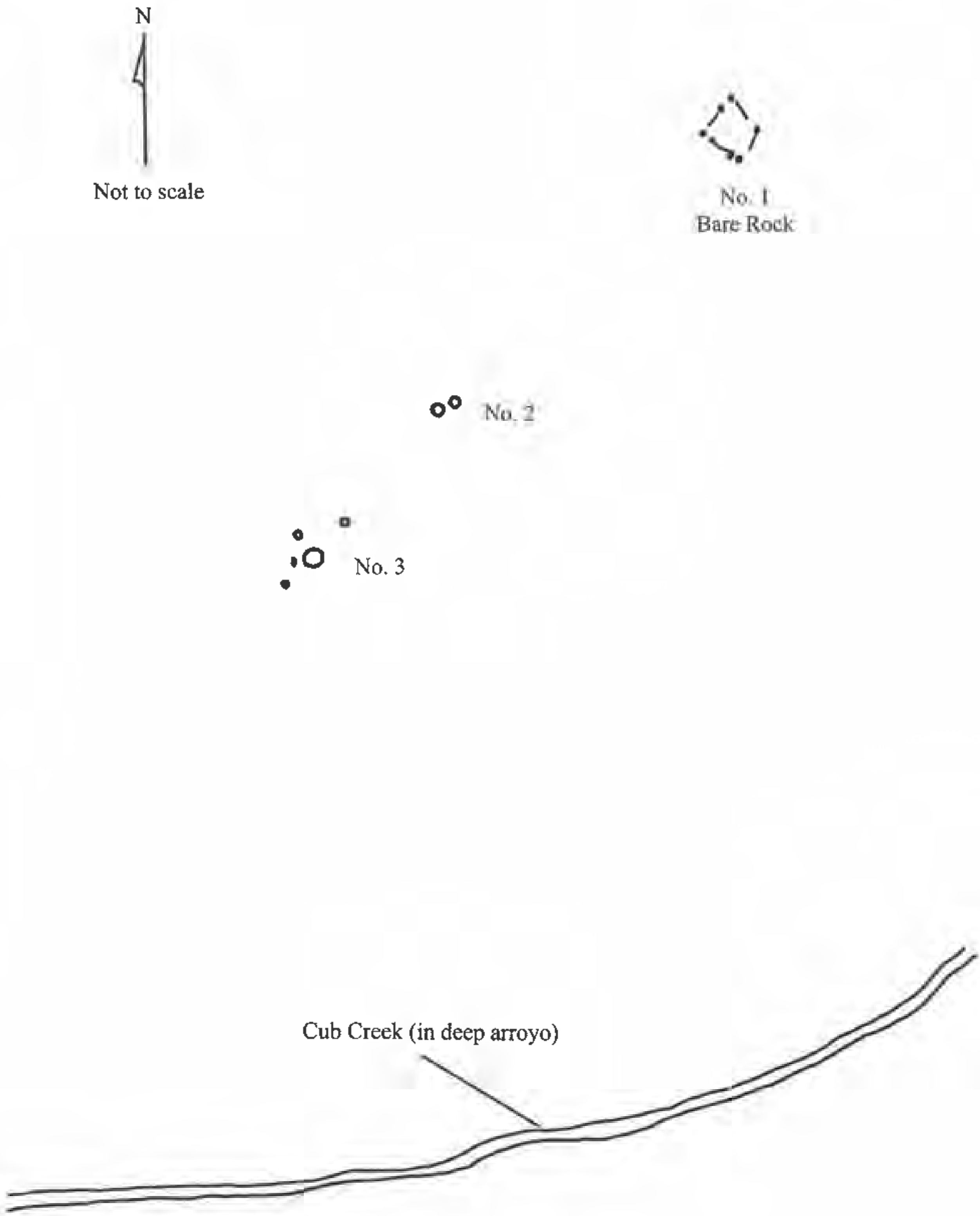

Figure 14. South Fork Cub Creek Site 42UN87 - site sketch.

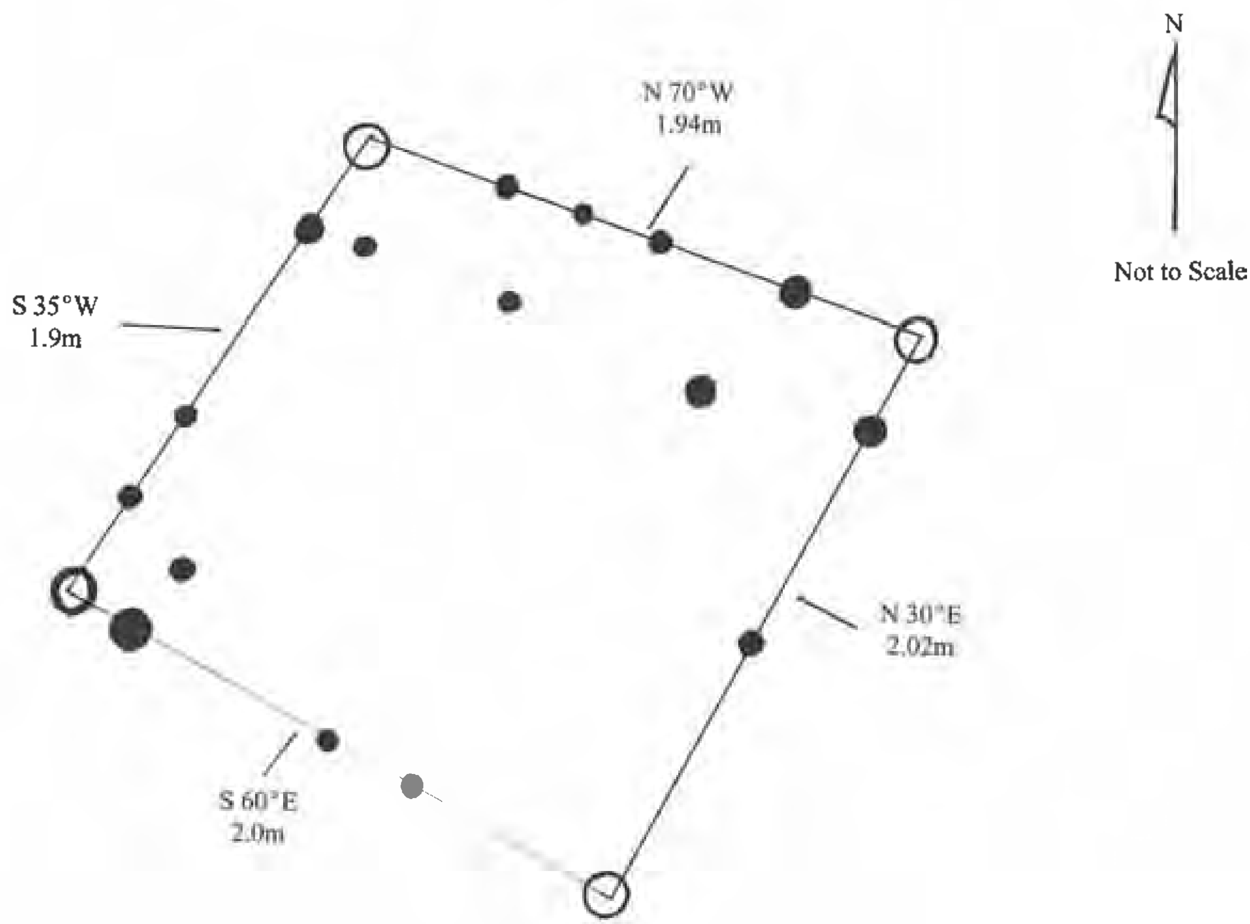

Figure 15. South Fork Cub Creek - 42UN87, Feature 1 not to scale.

Figure 16. 42UN87 - Feature No. 1

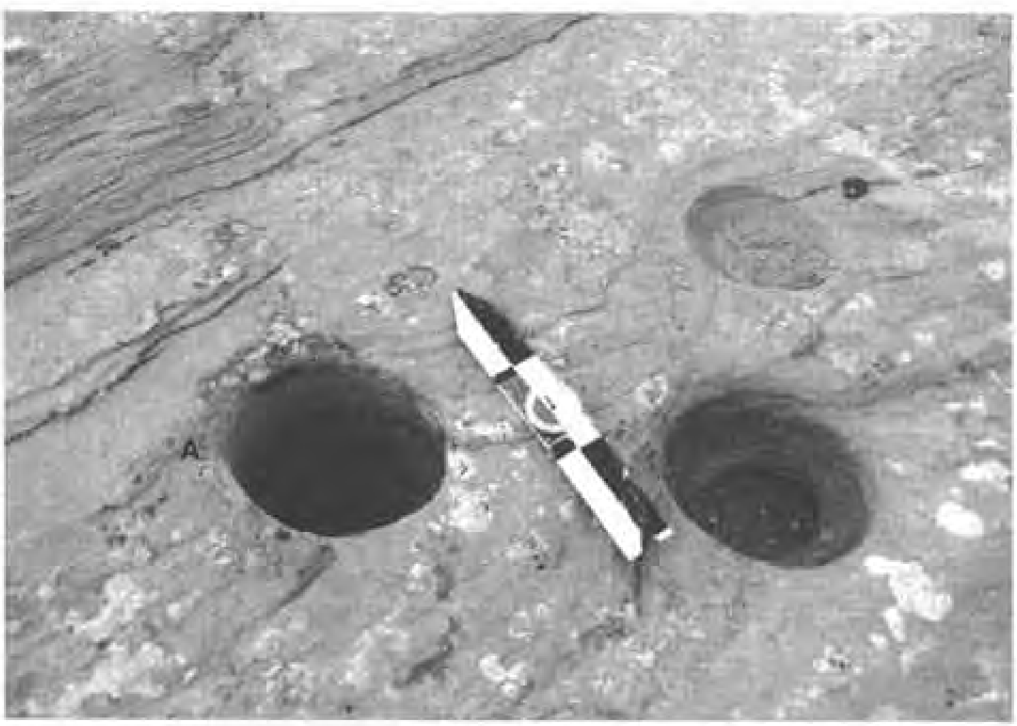

Figure 17. South Fork Cub Creek - 42UN87, Feature No. 1.

Figure 18. 42UN87, Feature No. 2.

Figure 19. 42UN87, Feature No. 3.

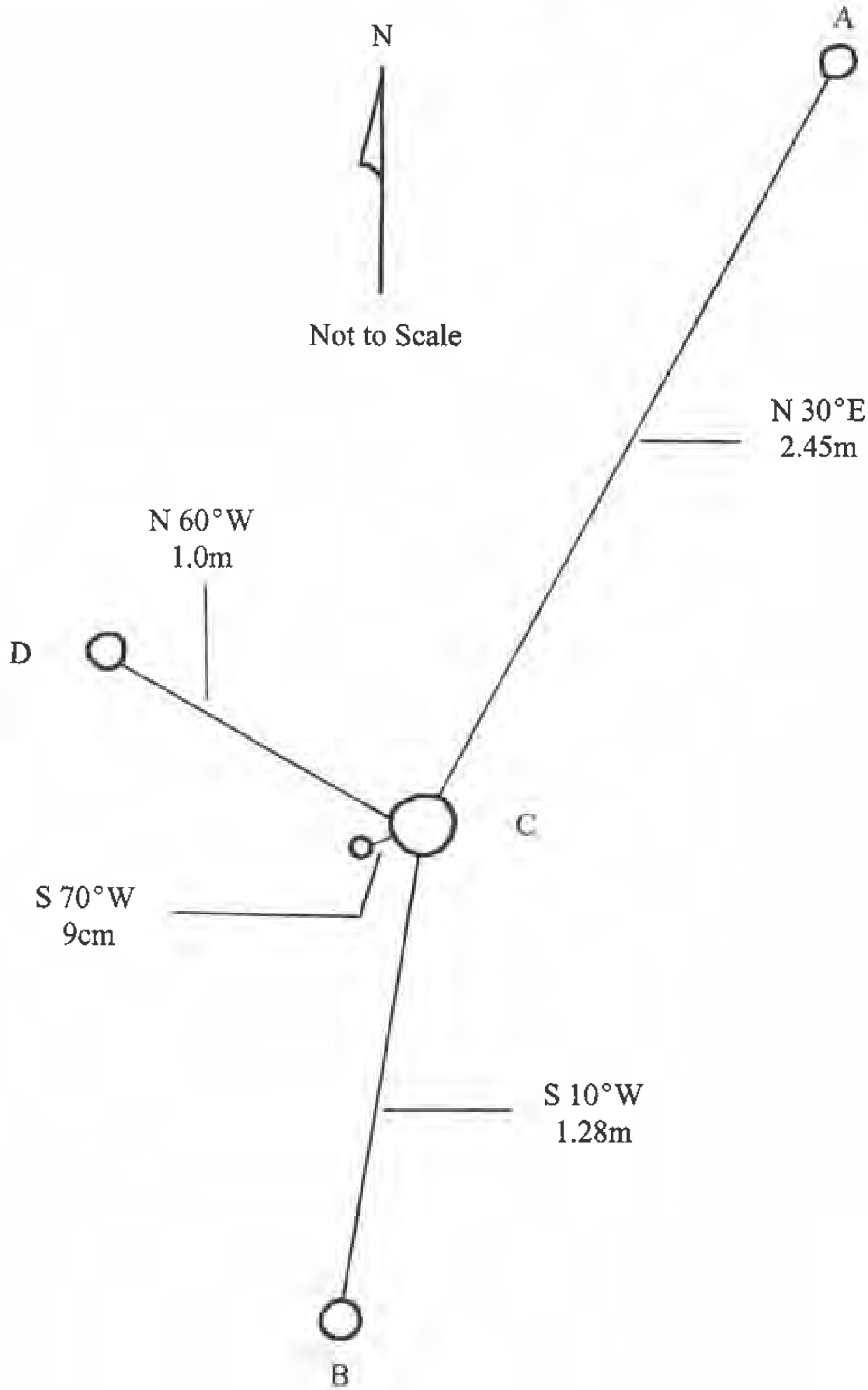

Figure 20. South Fork Cub Creek Site - 42UN87 Hole Group No. 3.

DEAD HORSE SPRING

Dead Horse Spring, site 42UN468, is south of US 40, east of the Green River, just north of the Vernal-Bonanza road and west of Red Wash. This is the rim of Dead Man Bench overlooking the drainage of Walker Hollow to the Green River and is the junction of the Duchesne River formation to the south and the Uintah formation to the north. There are four holes in bedrock where an intermittent drainage drops about 20 feet over a ledge. Under the ledge is an intermittent seep which gives the site its name and which supports the growth of bushes (Figures 21 and 22).

The first hole is in the drainage about 3 m from the drop and is 35.5 cm in diameter by 30.5 cm deep and is often filled with sand. A fracture in the rock bisects the hole (Figure 23). Years ago someone chiseled the words "corn mill" in the rock in front of the hole and this is now very weathered.

Two other holes are in the ledge to the east and about 3 m higher. One of these may be natural (Figure 24). Hole No. 2 is 30.5 cm in diameter by 15 cm deep. The bottom is a smoothly rounded saucer shape (Figure 25). Hole No. 3 is 3.6 m east at the base of a small ledge and has always been full of sand when we have seen it. The hole is 36 cm in diameter and 31 cm deep (Figures 26 and 27).

Hole No. 4, which may not be man-made, is 100 m southwest from Hole No. 1. It is 24 cm in diameter, but only 7.5 cm deep with a very irregular bottom and was filled with sand (Figures 28 and 29).

This was a popular stopping place for freighters traveling between the Ashley Valley and the railroad at Dragon or Watson in the early years of this century. The evidence of their camping, rusted cans, bits of glass, and metal still shows on the ground above the spring. At that time water could almost always be found under the ledge.

Figure 21. Dead Horse Spring, overview of site 42UN468.

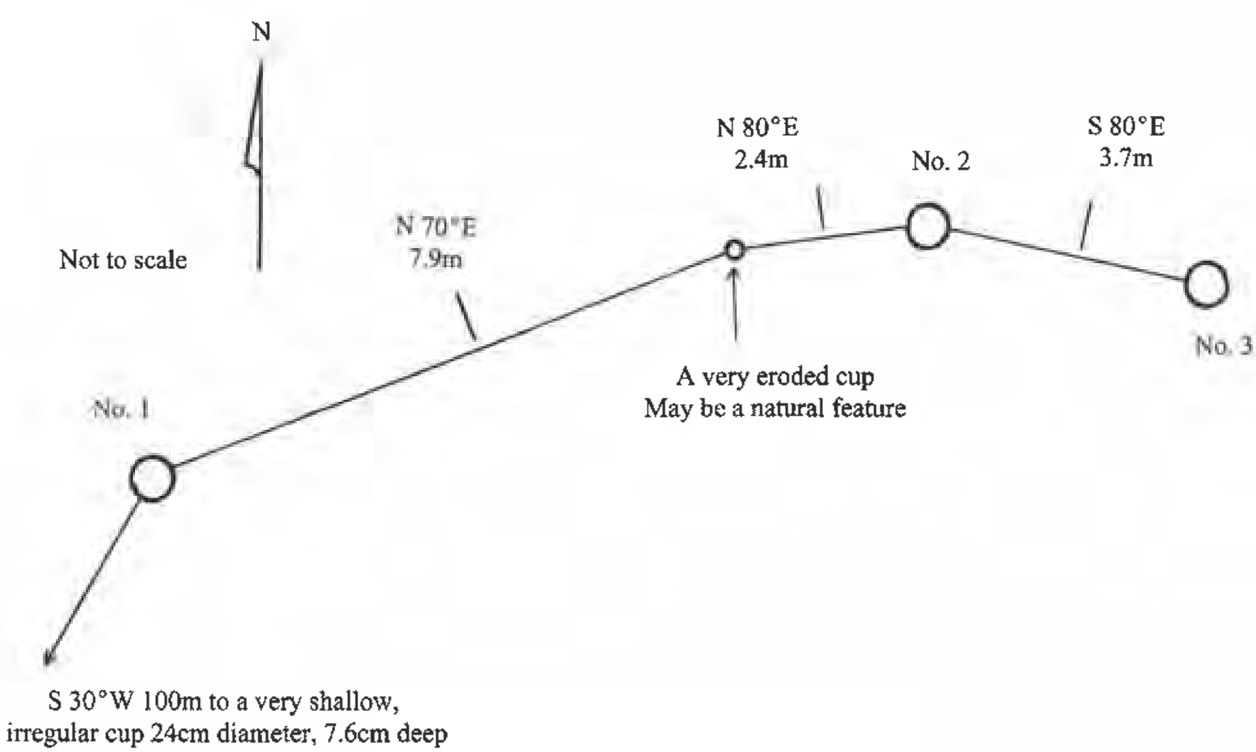

Figure 22. Holes at Dead Horse Spring not to scale.

Figure 23. Hole No. 1.

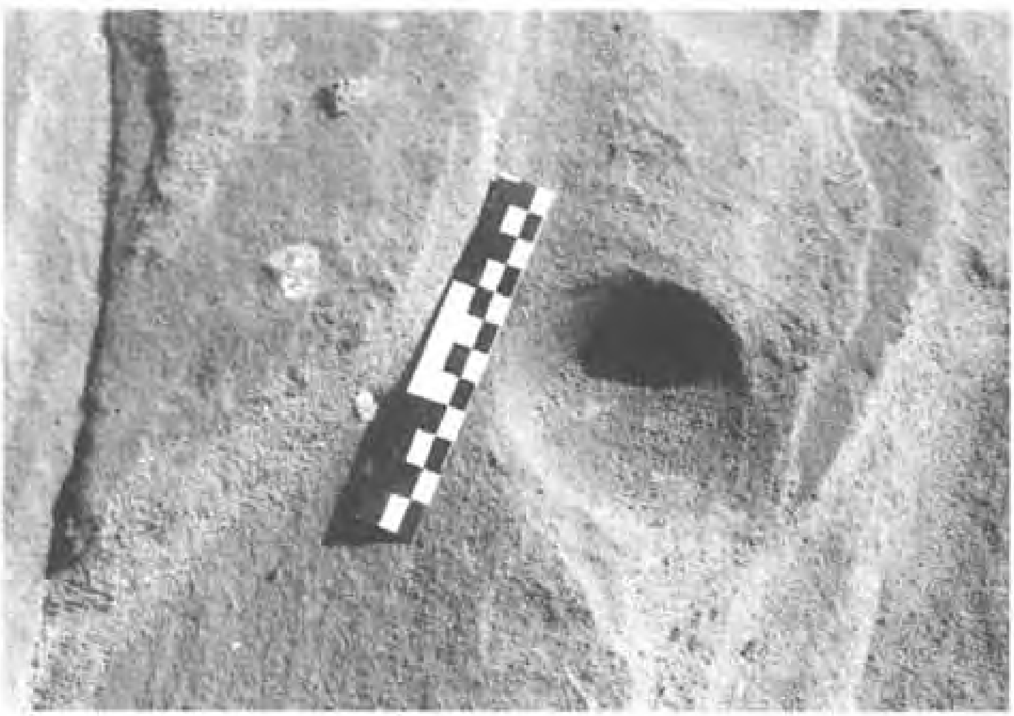

Figure 24. The small "cup" which may be a natural feature.

Figure 25. Hole No. 2.

Figure 26. Hole No. 3.

Figure 27. Showing relationship of Hole 3, in foreground, to No. 2 and No. 1 by person standing in the background.

Figure 28. Hole No. 4.

Figure 29. Showing relationship of Hole No. 4 in foreground to Hole No. 1 at arrow.

CONCLUSION

In conclusion, we think there are problems with any of the suggested possible uses of these holes. The size of most, although large when considering the labor involved, is small for cooking or storing any quantity of material. Some evidence of prehistoric camps exists at many of the locations, but the specific indicators of use, like burned rocks, used grinding stones, or the obvious locations of fires of large size or long duration, does.

Those located on ridges would be suitable for storing small objects; those located in drainages where they are often filled with sand or water would seem poor choices for storage.

Any material ground in them would have to be transported to the places the holes are located. Is there any source of material within reasonable distance of the holes now, or might have been in the past? Removing ground material from relatively deep holes would seem to be time consuming and inefficient, especially so when we know they had already devised an easier way of doing it - the trough metate.

Ceremonial use is attractive, especially when you can devise your own ceremony to fit the situation as you have found it.

In spite of all this, we are well aware, as is everyone else, that similar holes have been used for all these purposes and others at different times and places.

There is the possibility that the holes are much older than we suspect, as if that would solve the problem. It would, however, place it further away and that might help.

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ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY, LIST OF REPORTS WITH 1995 PROJECT NUMBERS ASSIGNED

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INTRODUCTION

All organizations who conduct archaeological projects in the state are obliged to: (1) obtain a project number from the Antiquities Section, Division of State History and (2) submit a report on the work done.

The following is a list of project numbers assigned by the Antiquities Section for projects with 1995 project numbers.

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ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1995 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
BE	Survey	BYU-OPA	S. Baker	Kennecott Ruby Violet in Wah Wah Mts. (2 repts.)	U-95-BC-0397b
BE	Survey	BLM-Cedar City	G. Dalley	Geothermal Fire Rehab	U-95-BL-0097b
BE	Survey	BLM-Cedar City	G. Dalley	57 Acre Fire Rehab	U-95-BL-0098b
BE	Survey	BLM-Cedar City	G. Dalley	Holt Creek Pipeline	U-95-BL-0421b
BE	Survey	BLM-Cedar City	G. Dalley	Sheldon Jessup Land Sale	U-95-BL-0481b
BE	Survey	BLM-Cedar City	G. Dalley	Barrick - Blue Mtn. 3809 NOI UTU-72787	U-95-BL-0715b
BE	Survey	BLM-Cedar City	G. Dalley	Bradshaw - Big Cedar Cove 3809 NOI UTU-72784	U-95-BL-0716b
BE	Survey	BLM-Cedar City	G. Dalley	Bradshaw - Moscow Res. vic. 3809 NOI UTU-72785	U-95-BL-0717b
BE	Survey	BLM-Cedar City	G. Dalley	UDOT FLIP Frisco Wash UTU-72786	U-95-BL-0718b
BE	Survey	BLM-Cedar City	G. Dalley	Kiewit Mining Railroad Ballast	U-95-BL-0719b
BE	Survey	BLM-Cedar City	G. Dalley	West Hills Gravel Exploration	U-95-BL-0720b
BE	Survey	BLM-Cedar City	G. Dalley	OK Mine UTU-72789	U-95-BL-0721b
BE	Survey	BLM-Cedar City	G. Dalley	F. Woods Trespass Pipeline and Trough	U-95-BL-0722b
BE	Survey	BLM-Cedar City	G. Dalley	OK Mine KB Claims UTU-72789	U-95-BL-0723b
BE	Survey	BLM-Cedar City	G. Dalley	Pete Martin Amendment #1 UTU-68893	U-95-BL-0724b
BE	Survey	BLM-Cedar City	G. Dalley	Big Wash Fence	U-95-BL-0725b
BE	Survey	BLM-Cedar City	G. Dalley	Milford Pass Burn	U-95-BL-0727b
BE	Survey	BLM-Cedar City	G. Dalley	Pinnacle Pass Burn	U-95-BL-0728b
BE	Survey	Intersearch	B. Frank	Kiewit Mining Group - Range Quarry and Roads	U-95-IG-0562b,s
BE	Survey	Intersearch	B. Frank	Beaver City Landfill Expansion Project	U-95-IG-0566b
BE	Survey	SWCA	T. Euler	UDOT SR-21 Survey	U-95-ST-0384b
BE/MD	Survey	Intersearch	B. Frank	US West Beaver to Cove Fort	U-95-IG-0019b,s
BO	Survey	BLM-Salt Lake	D. Melton	Penny Permit	U-95-BL-0060b
BO	Survey	BLM-Salt Lake	D. Melton	Lionheart Quarry	U-95-BL-0246b,p
BO	Survey	BLM-Salt Lake	D. Melton	Lynn Springs Quarry	U-95-BL-0247b,f
BO	Survey	BLM-Salt Lake	D. Melton	Rosebud Community Pit	U-95-BL-0303b
BO	Survey	BLM-Salt Lake	D. Melton	Spring Fences	U-95-BL-0304b
BO	Survey	BLM-Salt Lake	D. Melton	Lionheart Quarry II	U-95-BL-0388b
BO	Survey	BLM-Salt Lake	D. Melton	Fisher Creek Mine	U-95-BL-0389b
BO	Survey	BLM-Salt Lake	D. Melton	Grouse Mountain Mine	U-95-BL-0390b
BO	Survey	BLM-Salt Lake	D. Melton	State Line Drill Holes	U-95-BL-0391b
BO	Survey	BLM-Salt Lake	D. Melton	Salt Wells HMP Fence at N End of the GSL	U-95-BL-0465b,p,s

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
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County	Activity	Organization	Field Supervisor	Project Name	Project Number
BO	Survey	BLM-Salt Lake	D. Melton	Cedar Hill Pipeline Spur	U-95-BL-0605b
BO	Survey	BLM-Salt Lake	D. Melton	Cycle Well	U-95-BL-0606b,p
BO	Survey	BLM-Salt Lake	D. Melton	Lynn Road Repair	U-95-BL-0615b
BO	Survey	Baseline	A. Nielson	UDOT 600 North Road Upgrade in Brigham City	U-95-BS-0001p,a
BO	Survey	USFS-Sawtooth	D. Santini	Ball Mountain Livestock Improvement	U-95-FS-0337f
BO	Survey	USFS-Sawtooth	C. Wells	Oakley Mine Survey	U-95-FS-0680f
BO	Survey	Hill AFB	D. Weder	Oasis Natural Gas Lines	U-95-HL-0029m
BO	Survey	Hill AFB	D. Weder	MSA Road and Pads	U-95-HL-0030m
BO	Survey	Hill AFB	D. Weder	CKU Test at PAPA	U-95-HL-0189m
BO	Survey	Hill AFB	D. Weder	Oasis Truck Scales	U-95-HL-0191m
BO	Survey	Hill AFB	D. Weder	Eagle Tower TOSS Fiberoptics Line	U-95-HL-0200m
BO	Survey	Hill AFB	D. Weder	Eagle Tower TOSS Towers	U-95-HL-0234m
BO	Survey	Hill AFB	D. Weder	TTU Fire Break	U-95-HL-0332m
BO	Survey	Hill AFB	D. Weder	Fire Ecology Station	U-95-HL-0607m
BO	Survey	Hill AFB	D. Weder	Fire Training Area	U-95-HL-0705m
BO	Survey	Sagebrush	M. Polk	UDOT SR-13 Between I-15 and Main St.	U-95-SJ-0244p
BO	Survey	Sagebrush	M. Polk	Material Pit Near Grouse Creek Junction (UDOT)	U-95-SJ-0322s
CA	Survey	USFS-Wasatch/Cache	T. Scott	Tony Grove Recreation Improvements	U-95-FS-0218f
CA	Survey	Sagebrush	W. Simmons Johnson	UDOT US-91 and SR-61 Intersection North of Cove	U-95-SJ-0463p,s
CA	Survey	Sagebrush	W. Simmons Johnson	UDOT Two Intersections & 10-Acre Block vic. Logan	U-95-SJ-0677p,s
CA	Survey	UDSH-Antiquities	D. Schmitt	DWR Land Exchange	U-95-UC-0235s
CA	Survey	Utah State Univ.	S. Simms	South Cache Butte Survey	U-95-UJ-0654p
CB	Survey	AERC	R. Hauck	Anschutz Clear Creek Unit Wells	U-95-AF-0064f
CB	Survey	AERC	R. Hauck	Class II of Alkali Tract vic. Book Cliffs	U-95-AF-0114p
CB	Survey	AERC	R. Hauck	Eval. of Sites 42Cb291 & 42Cb92 in Dugout Canyon	U-95-AF-0640b
CB	Survey	Abajo	K. Montgomery	Horizon Coal Co. Drill & Water Supply Locations	U-95-AS-0418p,s
CB	Survey	BYU-OPA	R. Talbot	BOR-Scofield Reservoir Campground	U-95-BC-0319w
CB	Survey	BLM-Price	B. Miller	Gordon Creek Fence	U-95-BL-0347b
CB	Survey	BLM-Price	B. Miller	Carbon Gravel Pits	U-95-BL-0619b
CB	Survey	BLM-Price	B. Miller	Anadarko Mitigation Additions	U-95-BL-0620b
CB	Survey	Baseline	A. Nielson	River Gas 1995 Drilling Season Addendum No. 2	U-95-BS-0359s
CB	Survey	Baseline	A. Nielson	Horizon Coal Corporation	U-95-BS-0416p

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County	Activity	Organization	Field Supervisor	Project Name	Project Number
CB	Survey	USFS-Manti/La Sal	D. Mickelsen	Jacob Private Road + Addend. (Rec. Trail)	U-95-FS-0357f,p
CB	Survey	JBR	S. Billat	Mt. Fuel Wellington to East Carbon City	U-95-JB-0089b
CB	Survey	JBR	L. Billat	Pipeline from East Carbon City to Columbia	U-95-JB-0188b
CB	Monitor	JBR	R. Crosland	Monitor for Mountain Fuel Pipeline	U-95-JB-0578b
CB	Survey	Metcalf	C. Graham	Anadarko Pipeline	U-95-MM-0475b
CB	Survey	Metcalf	M. Metcalf	Anadarko Helper Federal D-1	U-95-MM-0531b
CB	Survey	Powers Elevation	G. Newberry	River Gas Well Program	U-95-PA-0522p,s
CB	Survey	Senco-Phenix	J. Senulis	Pacific Powerline	U-95-SC-0487b
CB	Survey	Senco-Phenix	J. Senulis	Miscellaneous Pipelines & Roads for River Gas	U-95-SC-0679b,p,s
CB	Survey	Sagebrush	J. Montgomery	100 S/SR-55 Intersection in Price (UDOT)	U-95-SJ-0042p,s
CB	Survey	Sagebrush	H. Weymouth	Castle Gate Mine Addition	U-95-SJ-0213p,s
CB	Survey	Sagebrush	H. Weymouth	Turn Lane along SR-191 for Willow Crk. Mine (UDOT)	U-95-SJ-0214p,s
CB/DC	Survey	BLM-Price	B. Miller	Ninemile Canyon 1995 Survey	U-95-BL-0775b,p
CB/DC	Survey	Senco-Phenix	J. Senulis	Burr Oil Gasline in Ninemile Canyon	U-95-SC-0486b
CB/EM	Survey	BYU-OPA	L. Richens	Fiber Optic Cable Along Highways 10 and 155	U-95-BC-0068b,s
CB/EM	Survey	Baseline	G. Norman	River Gas 1995 Drilling Season	U-95-BS-0118b,p,s
CB/GR	Survey	BLM-Price	B. Miller	Desolation Canyon	U-95-BL-0352b
CB/UT	Survey	Baseline	G. Norman	Central Telephone Clear Creek to Sheep Canyon	U-95-BS-0344b,f,p,s
CB/UT	Survey	Baseline	G. Norman	Central Telephone Fairview to Spanish Fork Cny.	U-95-BS-0401p,s
DA	Survey	BLM-Vernal	E. Moncrief	OWIYUKUTS Prescribed Burn	U-95-BL-0301b,p
DA	Survey	BLM-Vernal	E. Moncrief	Kings Point Trail	U-95-BL-0396b
DA	Survey	BLM-Vernal	B. Phillips	Browns Park Reservoir	U-95-BL-0563b
DA	Survey	BLM-Vernal	E. Moncrief	Ford Springs Riparian Project	U-95-BL-0597b
DA	Survey	BLM-Vernal	E. Moncrief	East Grindstone Spring Riparian Project	U-95-BL-0598b
DA	Survey	BLM-Vernal	E. Moncrief	West Grindstone Spring Riparian Project	U-95-BL-0599b
DA	Survey	BLM-Vernal	E. Moncrief	Rye Grass Allotment Improvement	U-95-BL-0623b
DA	Survey	USFS-Ashley	B. Loosle	Half Moon Park Timber Sale	U-95-FS-0194f
DA	Survey	USFS-Ashley	B. Loosle	Lodgepole/Sheep Creek Timber Sale	U-95-FS-0196f
DA	Survey	USFS-Ashley	B. Loosle	Ute Mountain II Salvage	U-95-FS-0290f
DA	Excavation	USFS-Ashley	B. Loosle	Hayes Site Excavation (42Da668)	U-95-FS-0292f(e)
DA	Excavation	USFS-Ashley	B. Loosle	Swett North Excavation (42Da669)	U-95-FS-0293f(e)
DA	Survey	USFS-Ashley	B. Loosle	Cart Creek Pinyon-Juniper Removal	U-95-FS-0444f

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
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County	Activity	Organization	Field Supervisor	Project Name	Project Number
DA	Survey	USFS-Ashley	L. Broadbent	Allen Creek Ski Trail	U-95-FS-0625f
DA	Survey	USFS-Ashley	B. Loosle	Red Canyon Corral	U-95-FS-0765f
DA	Survey	USFS-Ashley	D. Kothen	Mustang Campground Entryway	U-95-FS-0766f
DA	Survey	Manah	T. Reust	CPS Station NWP	U-95-ME-0158f
DA/SM	Survey	USFS-Ashley	B. Loosle	D-1 Road Closures	U-95-FS-0520f
DA/UN	Survey	USFS-Ashley	B. Loosle	Flaming Gorge - Uintas Scenic Byway	U-95-FS-0232f,s,w
DC	Survey	AERC	G. Hadden	Balcron Monument Butte Two Wells	U-95-AF-0065b
DC	Survey	AERC	R. Hauck	Water Return Pipelines vic. Castle Peak	U-95-AF-0560b
DC	Survey	ARCON	G. Norman	Strawberry River Bridges Evaluation (UDOT)	U-95-AK-0289p,s
DC	Survey	ARCON	G. Norman	Borrow Pit at Hannah	U-95-AK-0321p
DC	Survey	AIA	J. Truesdale	Petroglyph Well 7-18	U-95-AY-0271i
DC	Survey	AIA	J. Truesdale	Petroglyph Ute Tribal 2A-8 Well	U-95-AY-0584i
DC	Survey	AIA	J. Truesdale	Ute Tribal 1A-32 Pipeline	U-95-AY-0651i
DC	Survey	BIA-Phoenix	N. Crozier	BIA-PAO Road Project UOIR 181(3)	U-95-BI-0229i
DC	Survey	BLM-Price	B. Miller	Ninemile Canyon 1994	U-95-BL-0345p,s
DC	Survey	BLM-Vernal	D. Beauschantz	Stubbs and Stubbs Mineral Material Disposal	U-95-BL-0387b
DC	Survey	Baseline	A. Nielson	UDOT Maint. Storage @ Pinyon Rdg/US-40 nr Tabiona	U-95-BS-0159s
DC	Survey	CASA	L. Hammack	8 Power Lines for Pacific Corp	U-95-CH-0776b
DC	Survey	USFS-Ashley	C. Oprandy	Iron King Claims	U-95-FS-0263f
DC	Survey	USFS-Ashley	C. Cowan	Rock Creek Water System	U-95-FS-0313f
DC	Survey	USFS-Ashley	B. Loosle	Pole Mountain Analysis	U-95-FS-0339f
DC	Survey	USFS-Ashley	C. Cowan	Yellowstone Parking	U-95-FS-0761f
DC	Survey	USFS-Ashley	C. Cowan	Upper Stillwater Field Station	U-95-FS-0762f
DC	Survey	Metcalf	J. Scott	Coastal Salt Water Disposal Line	U-95-MM-0288i
DC	Survey	Metcalf	M. Metcalf	Snyder Monument Butte Federal Wells	U-95-MM-0327b
DC	Survey	Metcalf	J. Scott	ANR Ute 1-16B6 Access Corridor	U-95-MM-0354b,p
DC	Survey	Metcalf	J. Scott	Coastal ANR Saltwater Line for Ute 2-31A2	U-95-MM-0413i
DC	Survey	Metcalf	J. Scott	Coastal Ute Well 3-17A1	U-95-MM-0445i
DC	Survey	Metcalf	D. Barclay	Chasel Ute #1-6A2 & #3-6A2 Wells	U-95-MM-0642i
DC	Survey	Sagebrush	S. Murray	Two Lomax Wells & Access Rds. S of Wells Draw	U-95-SJ-0039s
DC	Survey	Sagebrush	S. Murray	Four Federal Wells Near Monument Butte	U-95-SJ-0040b
DC	Survey	Sagebrush	S. Murray	Monument Butte Wells 14-36 and 16-36	U-95-SJ-0074s

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
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County	Activity	Organization	Field Supervisor	Project Name	Project Number
DC	Survey	Sagebrush	W. Simmons Johnson	Ashley Federal Well No. 10-23 Near Wells Draw	U-95-SJ-0108b
DC	Survey	Sagebrush	H. Weymouth	Gilsonite State 141-32 & Cody Fed 2-35 S of Myton	U-95-SJ-0241b
DC	Survey	Sagebrush	H. Weymouth	Block Survey/Pleasant V. Unit near Castle Peak	U-95-SJ-0242b
DC	Survey	Sagebrush	H. Weymouth	Five Ute Tribal Wells Near Brundage Canyon	U-95-SJ-0243i
DC	Survey	Sagebrush	S. Murray	Castle Peak Pipeline	U-95-SJ-0283b,p,s
DC	Survey	Sagebrush	W. Simmons Johnson	Lomax Federal #14-25 & Access S of Pleasant Valley	U-95-SJ-0333b
DC	Survey	Sagebrush	H. Weymouth	Monument Butte Federal Wells 3-34 and 4-1	U-95-SJ-0365b
DC	Survey	Sagebrush	S. Murray	Monument Butte 3-36, 10-36 and 15-36 Wells	U-95-SJ-0403s
DC	Survey	Sagebrush	S. Murray	Monument Butte Federal Wells 11-25 and 12-25	U-95-SJ-0449b
DC	Survey	Sagebrush	L. Langley	Monument Butte State #2-36 & #9-2 Wells & Access	U-95-SJ-0490s
DC	Survey	Sagebrush	W. Simmons Johnson	Monument Butte Federal #15-25 Well & Access	U-95-SJ-0491b
DC	Survey	Sagebrush	W. Simmons Johnson	Monument Butte Federal Well 7-36 and Access Road	U-95-SJ-0568s
DC	Survey	Sagebrush	S. Murray-Ellis	Monument Butte No. 7-25 and 10-25 Wells	U-95-SJ-0579b
DC	Survey	Sagebrush	W. Simmons Johnson	Monument Butte Federal #15-27 and Access Road	U-95-SJ-0588b
DC	Survey	Sagebrush	W. Simmons Johnson	Monument Butte State Wells Nos. 10-2 and 15-2	U-95-SJ-0638s
DC	Survey	Sagebrush	W. Simmons Johnson	Ashley Federal Well No. 7-23	U-95-SJ-0639b
DC	Survey	Sagebrush	W. Simmons Johnson	Monument Butte State Wells Nos. 4-36 and 6-36	U-95-SJ-0657s
DC	Survey	Sagebrush	W. Simmons Johnson	Pleasant Valley Federal Well No. 1-21	U-95-SJ-0658b
DC	Survey	Sagebrush	M. Polk	Three State Wells: 1A-36, 8-36 and 9-36	U-95-SJ-0674s
DC	Survey	Sagebrush	S. Murray-Ellis	Gilsonite State Well 15-32	U-95-SJ-0675s
DC	Survey	Sagebrush	H. Weymouth	Monument Butte Federal Wells 3-25, 6-25 and 8-25	U-95-SJ-0699b
DC	Survey	Sagebrush	H. Weymouth	Inland Federal Wells 2-25, 9-25 and 16-25	U-95-SJ-0700b
DC	Survey	Sagebrush	H. Weymouth	Inland Monument Federal 1-251 Well	U-95-SJ-0708b
DC/UN	Survey	AERC	G. Hadden	9 Balcron Wells in Castle Peak & 8 Mile Flat	U-95-AF-0306b,s
DC/UN	Survey	AERC	G. Hadden	Four Balcron State Wells vic. Castle Peak Draw	U-95-AF-0664s
DC/UN	Survey	AERC	R. Beaty	13 Balcron Wells and Access vic. Castle Peak Draw	U-95-AF-0773b
DC/UN	Survey	AERC	R. Beaty	Two Balcron Wells vic. Castle Peak Draw & Big Wash	U-95-AF-0774b
DC/UN	Survey	BYU-OPA	R. Talbot	Well Pads vic. Pariette Draw & Bench & 8 Mile Flat	U-95-BC-0051b,i
DC/UN	Survey	USFS-Ashley	B. Loosle	Chipeta Lake 1995 PIT Survey	U-95-FS-0435f
DC/UN	Survey	Sagebrush	W. Simmons Johnson	Three Wells Near Pariette Draw & Monument Butte	U-95-SJ-0061b
DC/UN	Survey	Sagebrush	S. Murray	O.K. Corral Fed #1-30 & S. Pleasant V. Fed #4-22	U-95-SJ-0225b
DV	Survey	Sagebrush	H. Weymouth	UDOT 1350 East & Hill Field Intersection	U-95-SJ-0152s

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
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County	Activity	Organization	Field Supervisor	Project Name	Project Number
DV	Survey	Sagebrush	H. Weymouth	Layton Hills North Intersection (UDOT)	U-95-SJ-0212p,s
DV	Survey	Sagebrush	M. Polk	UDOT Signal Rd. Improvmts. at Burke Ln. & Lagoon Dr.	U-95-SJ-0676p,s
DV	Survey/Test	UDSH-Antiquities	Jones & Schmitt	Antelope Island	U-95-UC-0518s
DV/WB	Survey	Sagebrush	M. Polk	UDOT Six Ogden Intersections	U-95-SJ-0023p,s
DV/WB	Survey	Weber State Univ.	B. Arkush	Hill AFB 1, 2 & 4	U-95-WC-0280p
EM	Survey	Alpine	J. Horn	Mohrland Mine (42Em1642) Documentation	U-95-A1-0257p
EM	Survey	AERC	G. Hadden	UP&L Corridor vic. Wilberg Mine/Cottonwood Canyon	U-95-AF-0063b,f,p,s
EM	Survey	AERC	R. Hauck	Ecochallenge Locations in Buffalo Hollow/Mexican Mt.	U-95-AF-0082b,p
EM	Survey	AERC	G. Hadden	Drill Site vic. Trail Mountain	U-95-AF-0275f
EM	Survey	AERC	G. Hadden	Genwal East Mountain Sample Survey	U-95-AF-0410f
EM	Survey	AERC	G. Hadden	Subsidence Reclamation Location on East Mountain	U-95-AF-0547f
EM	Survey	AERC	R. Beaty	Escarpment/Talus Zone at Cottonwood Canyon Mouth	U-95-AF-0711b
EM	Survey	Abajo	K. Montgomery	Questar Lateral 26-2 Pipeline	U-95-AS-0093b,p,s
EM	Survey	BLM-Price	B. Miller	Cloyd Pipeline Extension	U-95-BL-0346b
EM	Survey	BLM-Price	B. Miller	Buckhorn Corral Removal	U-95-BL-0348b
EM	Survey	BLM-Price	B. Miller	Peter's Pond	U-95-BL-0349b
EM	Survey	BLM-Price	B. Miller	Wild Horse Roundup	U-95-BL-0350b
EM	Monitor	BLM-Price	B. Miller	Ecochallenge Monitor at Site 42Em2429	U-95-BL-0351b
EM	Survey	BLM-Price	B. Miller	Justensen Fence	U-95-BL-0617b
EM	Survey	BLM-Price	B. Miller	Range Creek Road Closure	U-95-BL-0618b
EM	Survey	USFS-Manti/La Sal	S. McDonald	U of U Seismic Station East Mountain	U-95-FS-0269f
EM	Survey	USFS-Manti/La Sal	D. Mickelsen	Upper Joe's Valley Fence Enclosure	U-95-FS-0576b
EM	Survey	Metcalf	K. McDonald	Ferron Federal 16-9-19-7 Well	U-95-MM-0146b,s
EM	Survey	Metcalf	C. Graham	Ridge Runner 11-20 and 13-17 Wells	U-95-MM-0150f
EM	Survey	Metcalf	K. McDonald	Andover Partners Federal 1-17 & 1-19 Wells	U-95-MM-0181b,s
EM	Survey	Metcalf	K. McDonald	Chandler Associates Ferron Federal 7-12-19-7	U-95-MM-0267b
EM	Survey	Metcalf	K. McDonald	Chandler Associates Ferron State 4-36-18-7	U-95-MM-0268s
EM	Survey	Metcalf	J. Scott	Chandler Ferron Federal Wells 5-7-18-8 & 6-20-17-8	U-95-MM-0329b
EM	Survey	Metcalf	J. Scott	Addend to Chandler Ferron Fed 16-9-19-7 Access Rd	U-95-MM-0330b
EM	Survey	Metcalf	J. Scott	Chandler Pipeline & Drip Tank	U-95-MM-0334b
EM	Survey	Metcalf	J. Scott	Chandler Federal 11-1-19-7 and 3-3-18-8 Wells	U-95-MM-0412b
EM	Survey	Metcalf	J. Scott	Chandler Ferron Federal 8-7-18-8 Well	U-95-MM-0434b

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County	Activity	Organization	Field Supervisor	Project Name	Project Number
EM	Survey	Metcalf	C. Graham	Two Ferron Federal Wells	U-95-MM-0472b
EM	Survey	Metcalf	C. Graham	Three Ferron Federal Wells & Addendum	U-95-MM-0473b,p
EM	Survey	Metcalf	C. Graham	Grimes Wash Federal A-1 & D-1 Well Pads	U-95-MM-0474b
EM	Survey	Metcalf	M. Metcalf	Chandler Ferron Federal Well 8-27-17	U-95-MM-0652b
EM	Survey	Sagebrush	H. Weymouth	Three Oil Wells	U-95-SJ-0053b
EM	Survey	Sagebrush	H. Weymouth	Texaco Well #23-8 Federal and Access	U-95-SJ-0080b
EM	Survey	Sagebrush	H. Weymouth	Four Wells near Buzzard Bench	U-95-SJ-0081b
EM	Survey	SWCA	K. Gilmore	UDOT SR-29	U-95-ST-0073b,p,s
EM	Survey	UGS	M. Shaver	Two Drill Pads in the Ferron Project	U-95-UN-0400b
EM	Survey	Desert West	K. Carambelas	Six IDC Well Pads	U-95-WZ-0655b
EM/SP	Survey	USFS-Manti/La Sal	D. Mickelsen	Flat Water Fisheries Improvement & Riparian Fence	U-95-FS-0575f
EM/SP	Survey	USFS-Manti/La Sal	D. Mickelsen	CRI of 8 Communication Sites	U-95-FS-0577f
GA	Survey	Alpine	J. Horn/R. Greubel	Circle Cliffs Survey	U-95-AI-0255n
GA	Survey	BLM-Kanab	D. McFadden	South Central Telephone R/W in Red Canyon & Bryce	U-95-BL-0071b
GA	Survey	BLM-Kanab	D. McFadden	River Ranch Flood Control Structures	U-95-BL-0072b
GA	Survey	BLM-Kanab	D. McFadden	Hatch Pipeline	U-95-BL-0137b,s
GA	Survey	BLM-Kanab	D. McFadden	Fishpond Allotment Fenceline	U-95-BL-0166b
GA	Survey	BLM-Kanab	D. McFadden	Death Ridge Pipeline	U-95-BL-0167b,s
GA	Survey	BLM-Kanab	D. McFadden	Calf Creek Fenceline	U-95-BL-0168b
GA	Survey	BLM-Kanab	D. McFadden	Garfield County Bulldog Hollow Pipeline	U-95-BL-0183b
GA	Survey	BLM-Kanab	D. McFadden	Panguitch Community Gravel Pit	U-95-BL-0184b
GA	Survey	BLM-Kanab	D. McFadden	Black Canyon County Road R/W	U-95-BL-0219b
GA	Survey	BLM-Kanab	D. McFadden	Upper Valley Rendezvous	U-95-BL-0261b
GA	Survey	BLM-Kanab	D. McFadden	Garkane Power Right-of-Way UTU-74007	U-95-BL-0368b
GA	Survey	BLM-Kanab	D. McFadden	Tropic City Road Right-of-Way (Bulldog Bench)	U-95-BL-0369b
GA	Survey	BLM-Richfield	C. Harmon	Ticaboo Pipeline	U-95-BL-0539b
GA	Survey	BLM-Richfield	C. Harmon	Turkey Knob Spring	U-95-BL-0540b
GA	Survey	BLM-Richfield	C. Harmon	Jump Fence	U-95-BL-0541b
GA	Survey	BLM-Kanab	D. McFadden	Panguitch Road R/W	U-95-BL-0586b
GA	Survey	BLM-Kanab	D. McFadden	Gregurek Road R/W	U-95-BL-0779b
GA	Survey	BLM-Kanab	D. McFadden	RPP Conveyance South of Tropic	U-95-BL-0786b
GA	Survey	NPS-Capitol Reef	L. Kreutzer	Bison Fence	U-95-NA-0603n

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1995 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
GA	Excavation	Anasazi State Park	W. Latady	1995 Excavation at 42Ga34, The Coombs Site	U-95-UD-0594s(e)
GA	Survey	Utah Trust Lands	K. Wintch	SULA 1015 and 972 Amendment/Ticaboo Leases	U-95-UM-0099s
GA/IN	Survey	SWCA	T. Euler	UDOT SR-20 West of Bear Valley Junction	U-95-ST-0205b,p
GR	Survey	Abajo	J. Montgomery	Riders of the Purple Sage Movie Sets	U-95-AS-0394b
GR	Survey	Abajo	K. Montgomery	Citizens Fiberoptic Colorado River to Moab Airport	U-95-AS-0431b,p,s
GR	Test	Abajo	K. Montgomery	Eval. of 42Gr2556 Along Tusher Canyon Rd. (CR-156)	U-95-AS-0479p
GR	Survey	Abajo	J. Montgomery	City of Moab Mill Creek Flood Control & Parkway	U-95-AS-0494s
GR	Survey	BLM-Grand	B. Louthan	AMMI Placer Gold Mine	U-95-BL-0006b
GR	Survey	BLM-Grand	B. Louthan	Mineral Bottom Airstrip	U-95-BL-0078b
GR	Survey	BLM-Grand	B. Louthan	Bair/Cisco Allotment Reservoirs	U-95-BL-0101b
GR	Survey	BLM-Grand	B. Louthan	Ecochallenge Mineral Canyon Staging Area	U-95-BL-0102b
GR	Survey	BLM-Grand	B. Louthan	Burt's Explosive Lease	U-95-BL-0103b
GR	Survey	BLM-Grand	B. Louthan	Robert Levin Pipeline	U-95-BL-0144b
GR	Survey	BLM-Grand	B. Louthan	Hotel Mesa Fossil Dig	U-95-BL-0145b
GR	Survey	BLM-Grand	B. Louthan	Nash Wash-Horse Pasture Fence	U-95-BL-0211b,p,s
GR	Survey	BLM-Grand	B. Louthan	Big Bend Borrow/Fill/Overflow Camping Area	U-95-BL-0258b
GR	Survey	BLM-Grand	B. Louthan	Umetco Ground Water Monitor Well	U-95-BL-0458b
GR	Survey	BLM-Grand	R. Fike	Renegade Gap Fence	U-95-BL-0459b
GR	Survey	BLM-Grand	B. Louthan	Pine Ridge Wildlife Water Guzzler	U-95-BL-0460b
GR	Survey	BLM-Grand	B. Louthan	Dolores River/Gateway Boulder Quarry	U-95-BL-0461b
GR	Survey	BLM-Grand	B. Louthan	Spring Creek Fence in Dolores Triangle	U-95-BL-0629b
GR	Survey	BLM-Grand	B. Louthan	Westwater Fire Rehab in Dolores Triangle	U-95-BL-0630b
GR	Survey	BLM-Grand	B. Louthan	Takeout Beach Parking Expansion	U-95-BL-0667b
GR	Survey	BLM-Grand	B. Louthan	Merrell and Jan Herod Occupancy Lease	U-95-BL-0678b
GR	Survey	BLM-Grand	B. Louthan	Duma Point Gap Fences	U-95-BL-0685b
GR	Survey	Baseline	G. Norman	Grand County Airport Expansion-Powerline Relocation	U-95-BS-0370b
GR	Survey	CEU Museum	P. Miller	Moab Winery	U-95-CT-0202s
GR	Survey	4-Corners	C. DeFrancia	Spanish Valley Sewer Lines	U-95-FE-0358p
GR	Survey	4-Corners	C. DeFrancia	Wilson Canyon 3-D Seismic	U-95-FE-0648b,p
GR	Survey	USFS-Manti/La Sal	J. Williams	Mason Draw Campground Fence and Trough	U-95-FS-0538f
GR	Survey	GRI	C. Conner	Pipeline to the CSV 2-31 Well	U-95-GB-0395b
GR	Survey	GRI	C. Conner	Pipeline to NFS Horsepoint Well	U-95-GB-0533b

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1995 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
GR	Survey	GRI	C. Conner	Bush #13-1 Well and Access	U-95-GB-0574b
GR	Survey	GRI	C. Conner	Triangle Mesa Rehab	U-95-GB-0608b
GR	Survey	JBR	S. Billat	Cisco Haul Road Near I-70	U-95-JB-0028b
GR	Survey	Metcalf	K. McDonald	Two Inventories for Valley Asphalt I-70 (UDOT)	U-95-MM-0095b,s
GR	Survey	NPS-Arches	N. Coulam	Arches Fence	U-95-NA-0535n
GR	Survey	Sagebrush	J. Montgomery	One Intersection in Moab (UDOT)	U-95-SJ-0041p,s
GR	Survey	Utah State Univ.	W. Lewelling	Lawson Land Exchange	U-95-UJ-0536b,p
GR	Survey	Utah State Univ.	W. Fawcett	North Beaver Mesa	U-95-UJ-0793b,f
GR	Survey	Woods Canyon	J. Fetterman	Northwest Pipeline CPS 1622	U-95-WN-0542b
GR	Survey	Desert West	K. Lupo	Filming Location in the White Wash Sand Dunes	U-95-WZ-0233b
GR	Survey	Desert West	K. Lupo	Addendum to White Wash Sand Dunes	U-95-WZ-0300b
GR/SA	Survey	BLM-Grand	B. Louthan	Two Salamander Bike Races	U-95-BL-0048b,s
GR/SA	Survey	BLM-Grand	B. Louthan	Easter Jeep Safari/Fall Campout	U-95-BL-0628b,s
GR/UN	Survey	GRI	C. Conner	Proposed Spring Diversion Project	U-95-GB-0457p,s
IN	Survey	BLM-Cedar City	G. Dalley	Wooly Spring Pipeline	U-95-BL-0422b
IN	Survey	BLM-Cedar City	G. Dalley	Iron County/Cottonwood Road	U-95-BL-0482b
IN	Survey	BLM-Cedar City	G. Dalley	Mineral Exchange	U-95-BL-0726b
IN	Survey	BLM-Cedar City	G. Dalley	Two Modena Gravel Pits	U-95-BL-0729b
IN	Survey	BLM-Cedar City	G. Dalley	Orison Road	U-95-BL-0730b
IN	Survey	BLM-Cedar City	G. Dalley	Middle Lund Road FUP	U-95-BL-0731b
IN	Survey	BLM-Cedar City	G. Dalley	Lund Road Community Pit	U-95-BL-0732b
IN	Survey	BLM-Cedar City	G. Dalley	Enoch City Sand Sale	U-95-BL-0733b
IN	Survey	BLM-Cedar City	G. Dalley	Lund Road East	U-95-BL-0734b
IN	Survey	BLM-Cedar City	G. Dalley	Little Creek FUP/CP	U-95-BL-0735b
IN	Survey	BLM-Cedar City	G. Dalley	Butte Allotment Pasture Fence #2	U-95-BL-0736b
IN	Survey	BLM-Cedar City	G. Dalley	Leigh Livestock Reservoir	U-95-BL-0737b
IN	Survey	BLM-Cedar City	G. Dalley	Adams Well Demo Site - Prairie Dog	U-95-BL-0738b
IN	Survey	BLM-Cedar City	G. Dalley	Rush Lake Gravel Pit	U-95-BL-0739b
IN	Survey	BLM-Cedar City	G. Dalley	Summit Commo Site R/W UTU-67789	U-95-BL-0740b
IN	Survey	BLM-Cedar City	G. Dalley	Dixie REA R/W UTU-73827	U-95-BL-0741b
IN	Survey	BLM-Cedar City	G. Dalley	Bradshaw - Parowan Gap	U-95-BL-0742b
IN	Survey	BLM-Cedar City	G. Dalley	Marshall Well Protective Fence	U-95-BL-0743b

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1995 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
IN	Survey	BLM-Cedar City	G. Dalley	Paintball Games	U-95-BL-0744b
IN	Survey	BLM-Cedar City	G. Dalley	Orison Road Gravel	U-95-BL-0745b
IN	Survey	BLM-Cedar City	G. Dalley	The "C" Overlook	U-95-BL-0746b
IN	Survey	BLM-Cedar City	G. Dalley	The "C" Trail	U-95-BL-0747b
IN	Survey	BLM-Cedar City	G. Dalley	Cedar City Shooting Range	U-95-BL-0748b
IN	Survey	USFS-Dixie	M. Jacklin	Mammoth Timber Salvage	U-95-FS-0432f
IN	Survey	USFS-Dixie	M. Jacklin	Yankee Meadow Restrooms	U-95-FS-0466s
IN	Survey	USFS-Dixie	M. Jacklin	Brian Head City Maintenance Yard	U-95-FS-0467f
IN	Survey	USFS-Dixie	M. Jacklin	Lars Fork Guzzlers	U-95-FS-0662f
IN	Survey	USFS-Dixie	M. Jacklin	Blowhard Trail Reroute	U-95-FS-0696f
IN	Survey	USFS-Dixie	M. Jacklin	Brianhead Lift Expansion	U-95-FS-0697f
IN	Survey	USFS-Dixie	M. Jacklin	Sidney Valley Salvage II	U-95-FS-0698f
IN	Survey	Intersearch	B. Frank	Coal Creek Bridge Survey (UDOT)	U-95-IG-0595s
IN	Survey	Intersearch	B. Frank	Holt-Beryl BLM Lands Survey	U-95-IG-0689b
IN	Collection	Intersearch	B. Frank	Mitigation at 42In1350 for L. Enoch Water Tank	U-95-IG-0694b
IN	Survey	SWCA	F. Miller	Three Parcels in Cedar City	U-95-ST-0206p
IN	Survey	SWCA	F. Miller	Gower Construction	U-95-ST-0668p
IN	Survey	SWCA	F. Miller	Airport Road Near Cedar City	U-95-ST-0712p
IN/WS	Survey	Sagebrush	M. Polk	5 Intersections in Cedar City/St. George/Hurricane	U-95-SJ-0077p,s
JB	Survey	BYU-OPA	R. Talbot	CUP SFN-I&D Mona Pumping Plant	U-95-BC-0497p
JB	Survey	BLM-Fillmore	N. Shearin	Scipio Pass Guzzler	U-95-BL-0015b
JB	Survey	BLM-Fillmore	N. Shearin	Furner Ridge Cutting Part 2	U-95-BL-0016b
JB	Survey	BLM-Fillmore	N. Shearin	Partoun North Bench	U-95-BL-0022b
JB	Survey	BLM-Fillmore	N. Shearin	Mona Fire New Fence	U-95-BL-0091b
JB	Survey	BLM-Fillmore	N. Shearin	Cow Hollow Fence	U-95-BL-0092b
JB	Survey	BLM-Fillmore	N. Shearin	Sage Valley Travertine Mine	U-95-BL-0153b
JB	Survey	BLM-Fillmore	N. Shearin	Yuba West Beach Access Road	U-95-BL-0193b
JB	Survey	BLM-Fillmore	N. Shearin	Railroad Springs Pipeline	U-95-BL-0240b
JB	Survey	BLM-Fillmore	N. Shearin	Keg Mountain Rock Collection	U-95-BL-0325b
JB	Survey	BLM-Fillmore	N. Shearin	Turkey Fire	U-95-BL-0451b
JB	Survey	BLM-Fillmore	C. Harmon	Cherry Creek Fire Fence	U-95-BL-0510b
JB	Survey	BLM-Fillmore	N. Shearin	Cherry Creek Fire	U-95-BL-0527b

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1995 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
JB	Survey	BLM-Fillmore	N. Shearin	Death Canyon Fire	U-95-BL-0549b
JB	Survey	BLM-Fillmore	N. Shearin	Death Canyon Fire Fence	U-95-BL-0550b
JB	Survey	BLM-Fillmore	N. Shearin	Champlin Point Fire	U-95-BL-0571b
JB	Survey	BLM-Fillmore	C. Harmon	Sheeptrail Corral No. 2	U-95-BL-0644b
JB	Survey	BLM-Fillmore	C. Harmon	Sheeptrail Corral No. 3	U-95-BL-0645b
JB	Survey	BLM-Fillmore	N. Shearin	Moody Drill Holes	U-95-BL-0661b
JB	Survey	BLM-Fillmore	N. Shearin	Sand Mountain Fence	U-95-BL-0686b
JB/MD	Survey	BLM-Fillmore	N. Shearin	Sage Riders Motorcycle Race	U-95-BL-0509b
JB/MD	Survey	USFS-Fishlake	R. Leonard	Ash Grove Land Exchange	U-95-FS-0592f
KA	Survey	AERC	R. Hauck	Kanab City Utilities vic. Kanab Creek Canyon	U-95-AF-0710s
KA	Survey	BLM-Kanab	D. McFadden	Coyote Pipeline Extension	U-95-BL-0021b,s
KA	Survey	BLM-Kanab	D. McFadden	Brown Canyon Burn	U-95-BL-0069b
KA	Survey	BLM-Kanab	D. McFadden	Triad Cellular Rights of Way	U-95-BL-0070b
KA	Survey	BLM-Kanab	D. McFadden	Dunhan Wash Pipeline	U-95-BL-0220b
KA	Survey	BLM-Kanab	D. McFadden	Skutumpah Plowing	U-95-BL-0221b
KA	Survey	BLM-Kanab	D. McFadden	Skutumpah Burns	U-95-BL-0222b
KA	Survey	BLM-Kanab	D. McFadden	Marv Baker Right of Way	U-95-BL-0236b
KA	Survey	BLM-Kanab	D. McFadden	Elbow Gravel Pit Extension	U-95-BL-0262b
KA	Survey	BLM-Kanab	D. McFadden	Shinarump Cliffs Quarry	U-95-BL-0366b
KA	Survey	BLM-Kanab	D. McFadden	Coyote Pipeline Extension No. 2	U-95-BL-0367b
KA	Survey	BLM-Kanab	D. McFadden	Dry Canyon Powerline	U-95-BL-0585b
KA	Survey	BLM-Kanab	D. McFadden	Rock House Burn	U-95-BL-0777b
KA	Survey	BLM-Kanab	D. McFadden	First Point Fire	U-95-BL-0780b
KA	Survey	BLM-Kanab	D. McFadden	Nephi Deer Catchment	U-95-BL-0781b
KA	Survey	BLM-Kanab	D. McFadden	Paria Breaks Fence	U-95-BL-0782b
KA	Survey	BLM-Kanab	D. McFadden	Gravel Hills Erosion Control	U-95-BL-0783b
KA	Survey	BLM-Kanab	D. McFadden	Don Sayles Access R/W	U-95-BL-0784b
KA	Survey	BLM-Kanab	D. McFadden	Quitchupah Creek Road Corridor in Convulsion Cny.	U-95-BL-0785b
KA	Survey	CASA	L. Hammack	Rangeland Petroleum Well	U-95-CH-0569s
KA	Survey	CASA	L. Hammack	Revised Location for Rangeland Well	U-95-CH-0665s
KA	Survey	USFS-Dixie	M. Jacklin	Johnson Canyon for NCRS	U-95-FS-0160s
KA	Survey	USFS-Dixie	M. Jacklin	Swains Creek Road Project	U-95-FS-0433f

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1995 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
KA	Survey	JBR	R. Crosland	Glendale Water Improvement	U-95-JB-0714s
KA	Test	NPS-Glen Canyon	C. Goetze	Coyote Testing	U-95-NA-0627n
KA	Survey	Sagebrush	K. Montgomery	UDOT US-89 Glendale to Long Valley Junction	U-95-SJ-0265b,f,p,s
KA	Survey	SWCA	D. Purcell	US West Along US-89A From Kanab to Fredonia	U-95-ST-0462b,p,s
KA	Survey	Utah State Parks	W. Latady	Portions of Coral Pink Sand Dunes State Park	U-95-UD-0317s
KA	Survey	Utah Trust Lands	K. Wintch	North Fork Virgin River Parcels	U-95-UM-0790s
MD	Survey	AERC	G. Hadden	Balcron Cobra State 12-36 Well	U-95-AF-0107b,s
MD	Survey	AERC	R. Hauck	Cobra Fed Unit No. 42-35 vic. Gandy/Snake Valley	U-95-AF-0559b
MD	Survey	ARCON	G. Norman	Continental Lime Quarry Access	U-95-AK-0326b
MD	Survey	BLM-Fillmore	N. Shearin	Trail Canyon Wild Horse Trap	U-95-BL-0008b
MD	Survey	BLM-Fillmore	N. Shearin	Warm Creek Riparian Enhancement	U-95-BL-0009b
MD	Survey	BLM-Fillmore	N. Shearin	Flat Pasture Buried Tank	U-95-BL-0010b
MD	Survey	BLM-Fillmore	N. Shearin	North Burbank Buried Tank	U-95-BL-0011b
MD	Survey	BLM-Fillmore	N. Shearin	Rocky Knoll Spring Enhancement	U-95-BL-0012b
MD	Survey	BLM-Fillmore	N. Shearin	Henry Creek North Well Trough	U-95-BL-0013b
MD	Survey	BLM-Fillmore	N. Shearin	Long Ridge Pipeline Improvement	U-95-BL-0014b
MD	Survey	BLM-Fillmore	N. Shearin	Emerson Tank	U-95-BL-0027b
MD	Survey	BLM-Fillmore	N. Shearin	Little Valley ROW Fence	U-95-BL-0031b
MD	Survey	BLM-Fillmore	N. Shearin	Obsidian Mine BUD 4 and 5	U-95-BL-0111b
MD	Survey	BLM-Fillmore	N. Shearin	Indian Wash Gold Mine	U-95-BL-0154b
MD	Survey	BLM-Fillmore	N. Shearin	Tufa Tube	U-95-BL-0161b
MD	Survey	BLM-Fillmore	N. Shearin	Lava Ridge Guzzler	U-95-BL-0179b
MD	Survey	BLM-Fillmore	N. Shearin	Birch Creek Dredging	U-95-BL-0192b
MD	Survey	BLM-Fillmore	N. Shearin	Pavant Butte Guzzler	U-95-BL-0238b
MD	Survey	BLM-Fillmore	N. Shearin	Wilson Perlite Mine	U-95-BL-0239b
MD	Survey	BLM-Fillmore	N. Shearin	Hakman Well Pipeline Extension No. 1	U-95-BL-0266b
MD	Survey	BLM-Fillmore	N. Shearin	Antelope Valley Limestone Quarry	U-95-BL-0324b
MD	Survey	BLM-Cedar City	G. Dalley	Beaver Lake Pasture Fence	U-95-BL-0424b
MD	Excavation	BLM-Fillmore	N. Shearin	Excavation at the Thursday Site, 42Md1053	U-95-BL-0427b(e)
MD	Survey	BLM-Fillmore	N. Shearin	Spring Canyon Fire	U-95-BL-0452b
MD	Survey	BLM-Fillmore	N. Shearin	East Cricket Fire Rehab	U-95-BL-0453b
MD	Survey	BLM-Fillmore	N. Shearin	West Cricket Fire	U-95-BL-0454b

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1995 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
MD	Survey	BLM-Fillmore	N. Shearin	Clear Spot Flat Fire Rehab	U-95-BL-0507b
MD	Survey	BLM-Fillmore	N. Shearin	Cove Fort Fire Rehab	U-95-BL-0508b
MD	Survey	BLM-Fillmore	N. Shearin	Cove Fort Fire Fence	U-95-BL-0526b
MD	Survey	BLM-Fillmore	N. Shearin	Centurion Drill Hole	U-95-BL-0528b
MD	Survey	BLM-Fillmore	N. Shearin	Lava Ridge Fire	U-95-BL-0551b
MD	Survey	BLM-Fillmore	N. Shearin	Lava Ridge Fire Fences	U-95-BL-0570b
MD	Survey	JBR	R. Crosland	Two Drill Pads and Access Roads Near Black Rock	U-95-JB-0701b
MD	Survey	Desert West	K. Carambelas	Sevier Lake Federal 1-29 Drill Pad and Access Road	U-95-WZ-0047b
MD	Survey	Desert West	K. Carambelas	Balcron Oil 1995 2D Exploration in Snake Valley	U-95-WZ-0609b,s
MO	Survey	Desert West	K. Carambelas	Round Valley Borrow Pits (UDOT)	U-95-WZ-0185p
MO	Survey	Desert West	K. Carambelas	Stoddard Borrow Pit (UDOT)	U-95-WZ-0186p
MULTI	Survey	AERC	G. Hadden	Drill/Seis-Upper Huntington & Winterqrtrs CB/EM/SP	U-95-AF-0252f,p
MULTI	Survey	BLM-Richfield	C. Harmon	Dump Cleanup PI/SP/WN	U-95-BL-0110b
MULTI	Survey	Baseline	G. Norman	Zion Abandoned Mine Survey CB/GR/UN	U-95-BS-0356b,p,s
MULTI	Survey	Utah Trust Lands	J. Lobdell	Inholdings Sample Survey (13 counties)	U-95-UM-0373s
PI	Survey	ARCON	G. Norman	Support for Circleville to Junction SR-89 (UDOT)	U-95-AK-0602p,s
PI	Survey	BLM-Richfield	C. Harmon	Durkee Springs Road Realignment	U-95-BL-0314b
PI	Survey	BLM-Richfield	C. Harmon	Dry Lake Pipeline Extension	U-95-BL-0407b
PI	Survey	BLM-Richfield	C. Harmon	Old Pipe Spring Development and Pipeline	U-95-BL-0408b,s
PI	Survey	BLM-Richfield	C. Harmon	Greg Allen Pipeline	U-95-BL-0610b,s
PI	Survey	JBR	R. Crosland	Kingston North and East Bridges (UDOT)	U-95-JB-0034s
PI	Survey	SWCA	F. Miller	UDOT SR-153 Survey	U-95-ST-0385b,f,s
PI	Survey	SWCA	F. Miller	Moving Petroglyph Boulders from 42Pi337 for UDOT	U-95-ST-0791b
RI	Survey	BLM-Salt Lake	D. Melton	Murphy Ridge Range Improvements	U-95-BL-0177b,p
RI	Survey	BLM-Salt Lake	D. Melton	Sims Canyon Powerline	U-95-BL-0277b
RI	Survey	BLM-Salt Lake	D. Melton	Middle Otter Creek Reservoir	U-95-BL-0278b
RI	Survey	BLM-Salt Lake	D. Melton	SR-30 Right-of-Way Fence	U-95-BL-0335b,p
RI	Test	BLM-Salt Lake	D. Melton	Test Excavation at 42Ri57	U-95-BL-0336b
RI	Survey	BLM-Salt Lake	D. Melton	Murphy Ridge Pond	U-95-BL-0483b
RI	Survey	Baseline	A. Nielson	UDOT Borrow Pits South of Woodruff	U-95-BS-0002s
RI	Survey	Sagebrush	W. Simmons Johnson	UDOT SR-30 and SR-16 Sage Creek Junction	U-95-SJ-0464p,s
SA	Excavation	Alpine	J. Firor	UDOT Excavation along US-191 at 42Sa7660	U-95-A1-0386b(e)

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County	Activity	Organization	Field Supervisor	Project Name	Project Number
SA	Excavation	Alpine	A. Reed	Data Recovery at the Crystal Site (42Sa21063)	U-95-AJ-0405w(e)
SA	Survey	Abajo	M. Bond	UDOT US-191 Cow Canyon to SR-262 Extension	U-95-AS-0004b,p,s
SA	Survey	Abajo	J. Montgomery	Two Jays Helicopter Land Lease	U-95-AS-0035s
SA	Excavation	Abajo	D. Westfall	Excavation of Sites 42Sa17725 and 42Sa20971	U-95-AS-0088s(e)
SA	Survey	Abajo	M. Bond	San Juan County School Admin. Site in Blanding	U-95-AS-0104s
SA	Survey	Abajo	W. Davis	Bluff Airport/Herradura	U-95-AS-0165b
SA	Survey	Abajo	W. Davis	L. Johnson US-191 Bluff Bench Materials Pit (UDOT)	U-95-AS-0264s
SA	Survey	Abajo	M. Bond	Fed 9/Fed 1-3 Pipeline-Upper Little Nancy Patterson	U-95-AS-0281b,p
SA	Survey	Abajo	J. Montgomery	Riders of the Purple Sage North Cottonwood Creek	U-95-AS-0419b,p
SA	Test	Abajo	W. Davis	Great House Testing at 42Sa22674	U-95-AS-0500p
SA	Survey	Abajo	K. Montgomery	HSI Goosenecks Film Locations	U-95-AS-0503b
SA	Survey	BLM-San Juan	D. Davidson	Airport Fence	U-95-BL-0086b
SA	Survey	BLM-San Juan	D. Davidson	Laws Pipeline Extension	U-95-BL-0087b
SA	Survey	BLM-Grand	B. Louthan	Canyon Rims Entry Ramada and Sign	U-95-BL-0142b
SA	Survey	BLM-Grand	B. Louthan	SUMMO Condemnation Area Drill Holes	U-95-BL-0143b
SA	Survey	BLM-San Juan	D. Davidson	Donnelly Stables	U-95-BL-0173b
SA	Survey	BLM-San Juan	D. Davidson	Shumway Quarry	U-95-BL-0436b
SA	Survey	BLM-San Juan	D. Davidson	Legrand Johnson Sand and Gravel	U-95-BL-0437b
SA	Survey	BLM-San Juan	D. Davidson	Hole-in-the-Rock Jeep Safari Camp	U-95-BL-0600b
SA	Survey/Mon.	Baseline	J. Allison	Sunrise Blanding Natural Gas Pipeline (2 repts.)	U-95-BS-0499b,p
SA	Survey	CASA	L. Hammack	4 Aneth Chapter Homesites W of Ismay Trading Post	U-95-CH-0055i
SA	Survey	CASA	L. Hammack	Ratherford Unit Pipelines & Wells 20-34 & 21-14	U-95-CH-0056i
SA	Survey	CASA	L. Hammack	UP&L Clark/Lansing/Rockwell Lines - Aneth Chapter	U-95-CH-0057i
SA	Survey	CASA	L. Hammack	Dee Home Site	U-95-CH-0058i
SA	Survey	CASA	L. Hammack	Mobil Ratherford Unit 21-77 Well & Pipeline	U-95-CH-0059i
SA	Survey	CASA	N. Hammack	Unocal Lisbon Valley Unit No. A-712	U-95-CH-0223b
SA	Survey	CASA	L. Hammack	Eight Red Mesa Chapter Homesites	U-95-CH-0224i
SA	Survey	CASA	L. Hammack	Edison Thomas Powerline	U-95-CH-0286i
SA	Survey	CASA	L. Hammack	Woodenshoe 2	U-95-CH-0417s
SA	Survey	CASA	L. Hammack	Seven Aneth Chapter Homesites	U-95-CH-0438i
SA	Survey	CASA	L. Hammack	NTUA 95-A48 Homesite	U-95-CH-0439i
SA	Survey	CASA	L. Hammack	5 Ratherford Unit Wells/Pipelines/Powerlines/Roads	U-95-CH-0440i

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County	Activity	Organization	Field Supervisor	Project Name	Project Number
SA	Survey	CASA	L. Hammack	Lone Mountain Wash Rechannelization for Mobil	U-95-CH-0441i
SA	Survey	CASA	L. Hammack	Eight Red Mesa Chapter Homesites	U-95-CH-0442i
SA	Survey	CASA	L. Hammack	Cave Canyon Well 3-13 and Pipeline on Alkali Point	U-95-CH-0493b
SA	Survey	CASA	M. Errickson	Shiprock Homesites & Waterline Extensions	U-95-CH-0604i
SA	Survey	CASA	N. Hammack	Pipeline for Giant E & P	U-95-CH-0656b
SA	Survey	CASA	N. Hammack	100 Homesites & Waterline Extensions SA/AZ/NM	U-95-CH-0772i
SA	Excavation	Crow Canyon	R. Wilshusen	Hedley Site Excavation (42Sa22760) - 1995 and 1996	U-95-CS-0231p(e)
SA	Survey	4-Corners	C. DeFrancia	Harken Southwest West Edge 9-H-1 Pipeline Route	U-95-FE-0050i
SA	Survey	4-Corners	C. DeFrancia	Teal 33-C Well	U-95-FE-0079i
SA	Survey	4-Corners	C. DeFrancia	Petrol Exploration #1 Dalmore Federal Well	U-95-FE-0476b
SA	Survey	4-Corners	C. DeFrancia	Harken Mule Area Seis Lines 95-100/95-300/95-500	U-95-FE-0521i
SA	Survey	4-Corners	C. DeFrancia	East Lone Mt. Canyon 6-M Well (U-93-FE-0258 Addend.)	U-95-FE-0649i
SA	Survey	4-Corners	C. DeFrancia	Clay Hill 33-N Well & Road (U-91-FE-0777 Addend.)	U-95-FE-0650i
SA	Survey	USFS-Manti/La Sal	L. Hunt	US-191 Devils Canyon (UDOT)	U-95-FS-0371f,s
SA	Survey	USFS-Manti/La Sal	S. Saunders	Willow Basin Fire Rehabilitation	U-95-FS-0372f
SA	Survey	USFS-Manti/La Sal	R. Schoolfield	South Elk Ridge Salvage Sale	U-95-FS-0480f
SA	Survey	USFS-Manti/La Sal	A. Smith	Mason Draw Ditch Survey	U-95-FS-0537f
SA	Survey	USFS-Manti/La Sal	L. Hunt	North Creek/Blue Mountain Roads Survey	U-95-FS-0601f
SA	Survey	USFS-Manti/La Sal	L. Hunt	Abajo and Cold Springs Electronic Sites	U-95-FS-0659f
SA	Survey	USFS-Manti/La Sal	L. Hunt	Keith Ivins Water Line	U-95-FS-0856s
SA	Survey	JBR	S. Billat	Northern Geophysical Montezuma Canyon	U-95-JB-0198b,s
SA	Survey	JBR	S. Billat	Comb Lake 3-D Program	U-95-JB-0398b,s
SA	Survey	JBR	S. Billat	Blackbush 3-D Seismic Program in Montezuma Canyon	U-95-JB-0492b,s
SA	Survey	La Plata	L. Sesler	D.J. Simmons Pipeline	U-95-LA-0005b
SA	Survey	La Plata	S. Fuller	Papoose Limestone Mine Expansion	U-95-LA-0174s
SA	Survey	La Plata	S. Fuller	Foster Federal 19-13 Wellpad	U-95-LA-0523b
SA	Survey	Metcalf	Graham/McCargo	Lisbon Valley Copper Project & 69 KV Transm. Line	U-95-MM-0414b
SA	Survey	Moore Anthro. Res.	R. Moore	Mexican Hat Elementary School Teacher Housing Proj	U-95-MO-0209i
SA	Survey	NPS-Canyonlands	N. Coulam	Parking Lots in Davis and Lavender Canyons	U-95-NA-0032n
SA	Survey	NPS-Canyonlands	N. Coulam	Backcountry Campsites in Canyonlands	U-95-NA-0033n
SA	Survey	NPS-Glen Canyon	C. Goetze	Ecochallenge Clearance	U-95-NA-0037n
SA	Survey	NPS-Natural Bridges	N. Coulam	New Houses in Natural Bridges National Monument	U-95-NA-0253n

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SA	Survey	NPS-Canyonlands	N. Coulam	New Houses in Island-in-the-Sky District	U-95-NA-0254n
SA	Excavation	NPS-Glen Canyon	T. Burchett	Rainbow Bridge Hearth Excavation at 42Sa17329	U-95-NA-0355n
SA	Survey	Sagebrush	J. & K. Montgomery	Browning State 26-1H and Gatling Gun 13-1H	U-95-SJ-0007s
SA	Survey	Sagebrush	K. Montgomery	Moab Sportsman's Club Rifle Range	U-95-SJ-0187s
SA	Excavation	Edge of the Cedars	T. Prince	1995 Excav. at Edge of the Cedars Ruin - 42Sa700	U-95-UD-0316s(e)
SA	Survey	UDOT	S. Baker	Culverts Maint. for SR-211 N of Newspaper Rock	U-95-UT-0857b,s
SL	Survey	Baseline	A. Nielson	UDOT Highland Drive	U-95-BS-0530s
SL	Test	Baseline	J. Allison	Test Excav. at Sites 42SL223 & 230 at SL Airport	U-95-BS-0707p
SL	Survey	USFS-Wasatch/Cache	C. Thompson	Alta Five Year Plan	U-95-FS-0684f,p
SL	Excavation	JBR	L. Billat/R.Crosland	Investig. at the American Barrel Site: 42SL217	U-95-JB-0411p(e)
SL	Survey	P-III	R. Birnie	Kennecott Tailings Pond Impoundment Area	U-95-PD-0788p
SL	Survey	Sagebrush	W. Simmons Johnson	UDOT SR-209 and Wasatch Blvd. Intersection	U-95-SJ-0017p,s
SL	Survey	Sagebrush	M. Polk	Salt Lake City and Midvale Intersections (UDOT)	U-95-SJ-0094p,s
SL	Survey	Sagebrush	M. Polk	Two Bridges in Sandy (UDOT)	U-95-SJ-0164s
SL	Survey	Sagebrush	A. Polk	UDOT 600 North Additions	U-95-SJ-0469p
SL	Survey	Sagebrush	A. Polk	UDOT 2 Detention Basins/Pipelines Bangerter Hwy	U-95-SJ-0077p,s
SL	Survey	Sagebrush	A. Polk	UDOT Bangerter Hwy./I-15 Interchange	U-95-SJ-0023p,s
SL	Survey	Sagebrush	A. Polk	UDOT 600 North Additions	U-95-SJ-0522p,s
SL	Survey	Sagebrush	W. Simmons Johnson	Central Valley Water	U-95-SJ-0042p,s
SL	Survey	Sagebrush	W. Simmons Johnson	UDOT 9400 South Upgrade	U-95-SJfps
SL	Survey	Sagebrush	A. Polk	UDOT Interstate 9800 South - Bangerter Highway	U-95-SJ-0561p
SL/SM	Survey	Baseline	A. Nielson	UDOT I-80 Lamb's Canyon to Kimball Junction	U-95-BS-0139f,s
SL/TO	Survey/Test	Baseline	J. Allison	Survey & Limit Test on State Lands for Kennecott	U-95-BS-0666s
SM	Survey	BYU-OPA	R. Talbot	BOR-Rockport Reservoir Campground	U-95-BC-0320w
SM	Survey	BYU-OPA	R. Talbot	US West Echo Reservoir Cable	U-95-BC-0587w
SM	Survey	BOR	S. Larralde	Stateline Dam Test Pit and Drill Holes	U-95-BE-0415w
SM	Survey	BOR	S. Larralde	Stateline Dam Test Pit No. 2	U-95-BE-0495w
SM	Survey	Current	W. Current	Red Mountain #1	U-95-CY-0596f
SM	Survey	USFS-Ashley	B. Loosle	West Birch Creek Timber Sale	U-95-FS-0195f
SM	Survey	USFS-Wasatch/Cache	T. Scott	West Fork of the Bear Allotment	U-95-FS-0298f
SM	Survey	USFS-Ashley	B. Loosle	Poison Table Analysis	U-95-FS-0428f
SM	Survey	USFS-Wasatch/Cache	C. Thompson	Spring Canyon Campsites	U-95-FS-0682f

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County	Activity	Organization	Field Supervisor	Project Name	Project Number
SM	Survey	USFS-Wasatch/Cache	C. Thompson	Weber Canyon Road Repairs	U-95-FS-0683f
SM	Survey	USFS-Ashley	B. Asay	Blacks Fork Gravel Pit	U-95-FS-0763f
SM	Survey	USFS-Ashley	B. Asay	Christmas Meadows Spring/Waterline	U-95-FS-0764f
SM	Survey	JBR	S. Billat	Northern Rockport 3-D	U-95-JB-0406s
SM	Survey	JBR	S. Billat	3-D Seismic Locations in Rockport State Park	U-95-JB-0443w
SM/UN	Survey	USFS-Wasatch/Cache	T. Scott	Red Mountain Allotment	U-95-FS-0299f
SM/WA	Survey	BLM-Salt Lake	D. Melton	Nelson Land Exchange	U-95-BL-0182b
SP	Survey	BLM-Fillmore	C. Harmon	Sheeptrail Corral No. 1	U-95-BL-0643b
SP	Survey	Baseline	G. Norman	Central Telephone Fairview to Moroni	U-95-BS-0409b,p,s
SP	Survey	USFS-Manti/La Sal	R. Matthies	Manti Sheep Driveway 2 Watershed Project	U-95-FS-0361f
SP	Survey	USFS-Manti/La Sal	R. Matthies	Clifford Sackett Private Road	U-95-FS-0362f,p
SP	Survey	Desert West	K. Carambelas	Sanpete Seismic	U-95-WZ-0673b
SP/EM	Survey	USFS-Manti/La Sal	L. Mickelsen	Cove Mountain and Horn Mountain Debris Basins	U-95-FS-0534f
SP/SV	Survey	Desert West	D. Bird	Salina Seismic Program	U-95-WZ-0502b,f
SV	Excavation	BYU-OPA	J. Janetski	Excavation at 42Sv2229 and 42Sv2304	U-95-BC-0315f(e)
SV	Survey	BLM-Richfield	C. Harmon	South Landfill Fire	U-95-BL-0593b
SV	Survey	BLM-Richfield	C. Harmon	Langston Right-of-Way	U-95-BL-0690b
SV	Survey	USFS-Fishlake	R. Leonard	Tobian Spring Development	U-95-FS-0590f
SV	Survey	USFS-Fishlake	R. Leonard	Mid-Utah Temporary Radio Access	U-95-FS-0591f
SV	Survey	Navajo Nation	K. O'Connell	FI&R Project at the Richfield Boarding School	U-95-NK-0052i
SV	Test	P-III	A. Lafond	Backhoe for Computer Site at Sevier V. Tech. Sch.	U-95-PD-0695p
TO	Survey	AERC	G. Hadden	Two Distribution Lines vic. Low - Delle	U-95-AF-0113b
TO	Survey	BYU-OPA	L. Richens	Skull Valley Indian Reservation Reservoir	U-95-BC-0203i
TO	Survey	BLM-Salt Lake	M. Brewster	Desert Fox Motorcycle Race	U-95-BL-0038b
TO	Survey	BLM-Salt Lake	M. Brewster	Wild Horse Camping	U-95-BL-0084b
TO	Survey	BLM-Salt Lake	M. Brewster	Mulholland Falls Filming Project	U-95-BL-0115b
TO	Survey	BLM-Salt Lake	M. Brewster	Clifton Flat Mineral Notice	U-95-BL-0155b
TO	Survey	BLM-Salt Lake	M. Brewster	Sabie Valley Material Pit	U-95-BL-0171b
TO	Survey	BLM-Salt Lake	M. Brewster	Red Mountain Quarry	U-95-BL-0215b
TO	Survey	BLM-Salt Lake	M. Brewster	Hicks Land Exchange	U-95-BL-0297b
TO	Survey	BLM-Salt Lake	M. Brewster	Leppy Hills Project	U-95-BL-0399b
TO	Survey	BLM-Salt Lake	M. Brewster	Hidden Treasure Mineral Notice	U-95-BL-0425b

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County	Activity	Organization	Field Supervisor	Project Name	Project Number
TO	Survey	BLM-Salt Lake	M. Brewster	Puddle Valley EFR	U-95-BL-0505b
TO	Survey	BLM-Salt Lake	M. Brewster	Terra EFR	U-95-BL-0506b
TO	Survey	BLM-Salt Lake	D. Melton	Dugway 3 EFR	U-95-BL-0582b,p
TO	Survey	BLM-Salt Lake	D. Melton	95 Stockton	U-95-BL-0583b
TO	Survey	BLM-Salt Lake	D. Melton	Redlam 2 EFR	U-95-BL-0621b
TO	Survey	BLM-Salt Lake	D. Melton	Redlam EFR	U-95-BL-0622b,a
TO	Survey	BLM-Salt Lake	M. Brewster	Bleazard Fence	U-95-BL-0631b
TO	Survey	BLM-Salt Lake	M. Brewster	Park Land Exchange	U-95-BL-0632b
TO	Survey	Baseline	G. Norman	USPCI 23 Borrow Pits	U-95-BS-0024b
TO	Survey	Baseline	A. Nielson	Beehive Telephone Along SR-19 S and W of Terra	U-95-BS-0117s
TO	Survey	Baseline	G. Norman	Grassy Mountain Gravel & Access Rd. Locations	U-95-BS-0140b
TO	Survey	Baseline	G. Norman	Access Road to USPCI Gravel Pit + Addend. (2 repts.)	U-95-BS-0360b
TO	Survey	USFS-Uinta	S. Nelson	Log Canyon Pipeline	U-95-FS-0323b,f
TO	Survey	USFS-Uinta	M. DePietro	FY '95 Vernon Water Development	U-95-FS-0392f
TO	Survey	USFS-Uinta	C. Thompson	Harker C. A. Fire Rehab	U-95-FS-0552f
TO	Survey	Hill AFB	D. Weder	CALCM Target/VMAS Pad Enlargement	U-95-HL-0190m
TO	Survey	Hill AFB	D. Weder	WSEP Target	U-95-HL-0706m
TO	Survey	Sagebrush	H. Weymouth	Tooele Army Depot North Area	U-95-SJ-0163m
TO	Survey	Sagebrush	W. Simmons Johnson	Dugway Cosmic Ray Telescopic Array	U-95-SJ-0455m
TO	Survey	Sagebrush	A. Polk	Wendover Airport Expansion	U-95-SJ-0647p,s
TO	Survey	Weber State Univ.	B. Arkush	1995 UTTR Archaeological Survey	U-95-WC-0558m
TO	Survey	Desert West	K. Carambelas	Dugway Old River Bed Class III	U-95-WZ-0276m
TO	Survey	Desert West	K. Carambelas	Site Revisits for Dugway CR Management Plan	U-95-WZ-0429m
TO	Survey	Desert West	K. Juell	Hidden Treasure Exploration Project	U-95-WZ-0501s
TO/UT	Survey	BLM-Salt Lake	D. Melton	Group Camping Areas	U-95-BL-0054b
UN	Survey	AERC	G. Hadden	Emergency Shoyo Relief Well vic. White River	U-95-AF-0018i
UN	Survey	AERC	R. Hauck	Glen Bench Road vic. White River	U-95-AF-0083b,i
UN	Survey	AERC	G. Hadden	4 Wells, Pipelines & Access vic. White River	U-95-AF-0250i
UN	Survey	AERC	R. Hauck	Ouray Gas Gathering System	U-95-AF-0251i
UN	Survey	AERC	R. Hauck	Three Rainbow & Rock House Wells vic. White River	U-95-AF-0294b
UN	Survey	AERC	R. Hauck	6 Wells & a Compressor Station vic. White River	U-95-AF-0305i
UN	Survey	AERC	R. Hauck	USSD Glen Bench Road Addition vic. White River	U-95-AF-0307b

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County	Activity	Organization	Field Supervisor	Project Name	Project Number
UN	Survey	AERC	R. Hauck	Rockhouse 13, 14 & 15 & Acosta 1 vic. Atchee Wash	U-95-AF-0681b
UN	Monitor	AIA	J. Truesdale	Glen Bench Gravel Pit Monitor	U-95-AY-0049i
UN	Monitor	AIA	J. Truesdale	Glen Bench Gravel Pit Monitor	U-95-AY-0176i
UN	Survey	AIA	J. Truesdale	Petroglyph Operating Co. 3 Wells	U-95-AY-0217i
UN	Survey	AIA	J. Truesdale	Four Enron Wells	U-95-AY-0272b
UN	Survey	AIA	J. Truesdale	Chipeta Well CWU-479-26F	U-95-AY-0308b
UN	Survey	BYU-OPA	R. Talbot	Snyder Oil Well Pads - Leland Bench	U-95-BC-0175i
UN	Survey	BYU-OPA	H. Irvine	Moon Lake Powerline on Ouray Wildlife Refuge	U-95-BC-0260w
UN	Survey	BYU-OPA	L. Richens	Stewart Lake Survey	U-95-BC-0789b,p,s
UN	Survey	BLM-Vernal	B. Phillips	Red Fleet Dinosaur Trackway Interpretive Trail	U-95-BL-0138b,s,w
UN	Survey	BLM-Vernal	E. Moncrief	Zane Canyon	U-95-BL-0162b,s
UN	Survey	BLM-Vernal	P. Kempnich	Johnson Right of Way Application	U-95-BL-0249b
UN	Survey	BLM-Vernal	E. Moncrief	Wood Canyon Firewood Sale	U-95-BL-0270b
UN	Survey	BLM-Vernal	E. Moncrief	Jones Hole Power Facility	U-95-BL-0318b
UN	Survey	BLM-Vernal	E. Moncrief	Dry Fork Range Improvement	U-95-BL-0580b
UN	Survey	BLM-Vernal	E. Moncrief	Red Mountain Range Improvement	U-95-BL-0581b
UN	Survey	BLM-Vernal	E. Moncrief	Hungry Hollow Soil Retention Dams	U-95-BL-0611b
UN	Survey	BLM-Vernal	E. Moncrief	Snake John Reef Guzzler	U-95-BL-0660b
UN	Survey	Baseline	Allison/Nielson	Zeigler Chemical Gilsonite Mine Expansion	U-95-BS-0468s
UN	Survey	USFS-Ashley	B. Bachtel	Hunter Park Spring Development	U-95-FS-0075f
UN	Survey	USFS-Ashley	B. Loosle	Barker Spring Fence	U-95-FS-0291f
UN	Survey	USFS-Ashley	B. Bachtel	Freestone and Gartrell Spring Developments	U-95-FS-0340f
UN	Survey	USFS-Ashley	K. Malmstrom	Vernal District FY '96 Sales	U-95-FS-0478f
UN	Survey	USFS-Ashley	B. Loosle	Oaks Park Canal II	U-95-FS-0519f
UN	Survey	USFS-Ashley	B. Bachtel	Green Spring Water Development	U-95-FS-0767f
UN	Survey	USFS-Ashley	D. Wilson	Whiterocks Pinkham	U-95-FS-0768f
UN	Survey	USFS-Ashley	D. Wilson	East Park Trailhead	U-95-FS-0769f
UN	Survey	USFS-Ashley	D. Wilson	Oak Parks Dam Drilling	U-95-FS-0770f
UN	Survey	USFS-Ashley	D. Wilson	Whiterocks Quarry	U-95-FS-0771f
UN	Survey	GRI	C. Conner	Tom Patterson Canyon Wells and Access	U-95-GB-0197b,s
UN	Survey	GRI	C. Conner	EAW St. #41-2-13-24 & Long Draw St. #43-36-13-24	U-95-GB-0207b,s
UN	Survey	GRI	C. Conner	Two Wells for Amoco on Wag Mesa & Teepee Ridge	U-95-GB-0208b

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UN	Survey	GRI	C. Conner	3 Wells vic. Bitter Crk./Rat Hole Canyon & Ridge	U-95-GB-0295b,p,s
UN	Survey	GRI	C. Conner	August Canyon 41-4-14-25/Mitchell 1/State 2-13-25	U-95-GB-0296b,p,s
UN	Survey	GRI	C. Conner	Monument Ridge Water Project	U-95-GB-0484b,s
UN	Survey	Metcalf	J. Scott	West Willow Creek Federal Unit 3-24B	U-95-MM-0043b
UN	Survey	Metcalf	J. Scott	Seep Canyon State Well 24-19-12-25	U-95-MM-0044s
UN	Survey	Metcalf	J. Scott	Atchee Ridge State Well 22-32	U-95-MM-0045s
UN	Survey	Metcalf	J. Scott	Coastal Compressor Site #3	U-95-MM-0076i
UN	Survey	Metcalf	J. Scott	Consolidated Landing Strip Fed 33-10 Well + Addend.	U-95-MM-0105b
UN	Survey	Metcalf	?	Long Draw 44-36-13-24	U-95-MM-0119s
UN	Survey	Metcalf	?	Amoco EAW State 41-2-13-24	U-95-MM-0120s
UN	Survey	Metcalf	?	Atchee Ridge 12-17-12-25	U-95-MM-0121b
UN	Survey	Metcalf	?	State Line 41-36-12-25	U-95-MM-0122b
UN	Survey	Metcalf	?	Boulevard Ridge 14-24-13-24	U-95-MM-0123b
UN	Survey	Metcalf	?	Is Ridge 34-31-13-25	U-95-MM-0124b
UN	Survey	Metcalf	?	Patterson Canyon 13-22-14-24	U-95-MM-0125b
UN	Survey	Metcalf	?	TP Canyon 42-27-14-24	U-95-MM-0126b
UN	Survey	Metcalf	?	PR Canyon 33-29-14-24	U-95-MM-0127b
UN	Survey	Metcalf	?	TP Point 33-34-14-24	U-95-MM-0128b
UN	Survey	Metcalf	?	August Canyon 32-4-14-25	U-95-MM-0129b
UN	Survey	Metcalf	?	WT Mesa 11-11-14-25	U-95-MM-0130b
UN	Survey	Metcalf	?	Rat Hole Canyon 23-23-14-25	U-95-MM-0131b
UN	Survey	Metcalf	?	Rat Hole Ridge 13-35-14-25	U-95-MM-0132b
UN	Survey	Metcalf	?	TP Ridge 22-12-15-24	U-95-MM-0133b
UN	Survey	Metcalf	?	Bitter Creek 42-3-15-25	U-95-MM-0134b
UN	Survey	Metcalf	?	Moccasin Trail 23-5-15-25	U-95-MM-0135b
UN	Survey	Metcalf	C. Spath	Snyder Kidd Federal 22-11 Well	U-95-MM-0156b
UN	Survey	Metcalf	C. Spath	Snyder Kidd Federal 20-10 Well	U-95-MM-0157b
UN	Survey	Metcalf	K. McDonald	Antelope Federal Well #20-2	U-95-MM-0169b
UN	Survey	Metcalf	C. Spath	Flying J Gov't. 10-14 Well	U-95-MM-0180b
UN	Survey	Metcalf	D. Barclay	Snyder Ute Tribal 21-7E & 21-5C Wells	U-95-MM-0199i
UN	Survey	Metcalf	J. Scott	Snyder Ute Tribal 21-6, 21-8, 26-6 & 25-4 Wells	U-95-MM-0230i
UN	Survey	Metcalf	J. Scott	Chandler Glen Bench Water Injection Pipeline	U-95-MM-0282b i,s

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UN	Survey	Metcalf	J. Scott	Chandler Glen Bench Unit #8-17	U-95-MM-0302b
UN	Survey	Metcalf	J. Scott	Ute 23-3-P Well/Pipeline/Access & 24-2-M Pipe/Rd.	U-95-MM-0328i
UN	Survey	Metcalf	J. Scott	Consolidated COG Fed. 21-15, 32-15 and 41-25	U-95-MM-0353b
UN	Survey	Metcalf	M. Metcalf	Chandler Glen Beach 8-19 & Water Injection Line	U-95-MM-0511i
UN	Survey	Metcalf	M. Metcalf	Snyder Ute Tribal 26-6-B Well Pad and Access	U-95-MM-0517i
UN	Survey	Metcalf	M. Metcalf	Ute Tribal 21-4G, 22-4-I and 26-3-G Wells	U-95-MM-0525i
UN	Survey	Metcalf	M. Metcalf	NBU 233 Well	U-95-MM-0634i
UN	Survey	Metcalf	M. Metcalf	Coastal NBU 234 Well, Access Road & Pipeline	U-95-MM-0635i
UN	Survey	Metcalf	M. Metcalf	NBU CIGE 188 Well, Access and Pipeline	U-95-MM-0636i
UN	Survey	Metcalf	M. Metcalf	4 Coastal Morgan State Wells	U-95-MM-0713s
UN	Survey	NPS-Dinosaur	D. Whitman	Two Cabin Fire - 106	U-95-NA-0548n
UN	Survey	Senco-Phenix	J. Senulis	Flowline Survey	U-95-SC-0062i
UN	Survey	Senco-Phenix	J. Senulis	Prince 4 Well Pad and Access Road	U-95-SC-0066b
UN	Survey	Senco-Phenix	J. Senulis	Prince 5 Well Pad and Access Road	U-95-SC-0067b
UN	Survey	Senco-Phenix	J. Senulis	Red Wash Unit No. 309 Well and Access	U-95-SC-0112b
UN	Survey	Senco-Phenix	J. Senulis	Chevron Prince Unit No. 4 Revised	U-95-SC-0248b
UN	Survey	Senco-Phenix	J. Senulis	Util. Corridor Gypsum Hills 3 to Wonsits Battery	U-95-SC-0279i
UN	Survey	Senco-Phenix	J. Senulis	Red Wash Sample Block Survey	U-95-SC-0309b
UN	Survey	Senco-Phenix	J. Senulis	Brennan Basin Federal Unit #9 Well/Access/Pipeline	U-95-SC-0488b
UN	Survey	Senco-Phenix	J. Senulis	Brennan Basin Expansion Block Survey	U-95-SC-0624b
UN	Survey	Senco-Phenix	J. Senulis	Flowline Corridor WVFU #83 to Stagecoach 10-23	U-95-SC-0709i
UN	Survey	Sagebrush	W. Simmons Johnson	Hanging Rock Federal 1-16 & 25-13 Wells & Pipeline	U-95-SJ-0109b
UN	Survey	Sagebrush	S. Murray	Sundance State Well 5-32	U-95-SJ-0226b,s
UN	Survey	Sagebrush	S. Murray	Fort Duchesne Post Office	U-95-SJ-0274p
UN	Survey	Sagebrush	H. Weymouth	Three Wild Rose Wells South of Ft. Duchesne	U-95-SJ-0285b
UN	Survey	Sagebrush	W. Simmons Johnson	Lapaglia Pipeline	U-95-SJ-0331b
UN	Survey	Sagebrush	S. Murray	Duck Creek Pipeline	U-95-SJ-0402i
UN	Survey	Sagebrush	S. Murray	Wild Rose Federal Well 13-26	U-95-SJ-0450b
UN	Survey	Sagebrush	W. Simmons Johnson	Wildrose Pariette Federal Well No. 34-24	U-95-SJ-0637b
UN	Survey	Sagebrush	H. Weymouth	Wildrose Federal Well 14-28 and Access Road	U-95-SJ-0702b
UN	Survey	Sagebrush	H. Weymouth	Wildrose Federal Well 12-26	U-95-SJ-0703b
UN	Survey	Sagebrush	H. Weymouth	Wildrose Federal Well 43-27 and Access Road	U-95-SJ-0704b

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1995 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
UN	Survey	W. Wyoming College	K. Thompson	Island Unit 27 Pipeline	U-95-WK-0106b
UN	Survey	W. Wyoming College	K. Thompson	Questar Bonanza Juniper	U-95-WK-0426b
UN/CO	Survey	GRI	C. Conner	Stateline #52-36-12-25 Well & Access for Amoco	U-95-GB-0259s
UT	Survey	ARCON	G. Norman	Lehi Waste Treatment Plant	U-95-AK-0404s
UT	Survey	BYU-OPA	R. Talbot	DWR Provo Bay	U-95-BC-0036s
UT	Survey	BYU-OPA	R. Talbot	CUP SFN-I&D Historic Canals Survey	U-95-BC-0496p
UT	Test	BYU-Museum	Janetski/Brewster	Test Excavations at Lost Ridge (42Ut635)	U-95-BC-0613b
UT	Survey	BLM-Salt Lake	M. Brewster	McLachlan Access Road	U-95-BL-0216b
UT	Survey	BLM-Salt Lake	M. Brewster	Greeley EFR	U-95-BL-0504b
UT	Survey	Baseline	A. Nielson	Lehi Target Range	U-95-BS-0273s
UT	Survey	Baseline	A. Nielson	UDOT Garfield Bridge	U-95-BS-0430s
UT	Survey	Baseline	J. Allison	Property Evaluation for American Fork Bank	U-95-BS-0614p
UT	Survey	USFS-Uinta	A. Rosborough	Timber Mountain Timber Sale	U-95-FS-0556f
UT	Survey	USFS-Uinta	A. Rosborough	Nebo Site Evaluation	U-95-FS-0557f
UT	Survey	Sagebrush	H. Weymouth	UDOT 2 UPRR Crossing Closings near Santaquin	U-95-SJ-0085p,s
UT	Survey	Sagebrush	H. Weymouth	Three Railroad Crossings (UDOT)	U-95-SJ-0170p,s
UT	Survey	Sagebrush	H. Weymouth	UDOT 3 UPRR Crossing Closings nr. Spanish Fk./Payson	U-95-SJ-0172p,s
UT	Survey	Sagebrush	H. Weymouth	UDOT 4 UPRR Crossing Closings Near Payson	U-95-SJ-0228p,s
UT	Survey	Sagebrush	S. Murray	UDOT I-15 Widening/University Avenue in Provo	U-95-SJ-0284p,s
UT	Survey	Sagebrush	L. Langley	UDOT SR-92 from Highland to I-15	U-95-SJ-0471p,s
UT	Survey	Sagebrush	W. Simmons Johnson	UDOT 6th and 9th South Underpass	U-95-SJ-0544p
UT	Survey	Sagebrush	W. Simmons Johnson	UDOT University Avenue Wetland Mitigation	U-95-SJ-0545p
UT	Survey	Sagebrush	S. Murray-Ellis	UDOT The Highland/Alpine Interchange I-15/SR-92	U-95-SJ-0646p,s
UT	Survey	Sagebrush	H. Weymouth	UDOT One UPRR Crossing near Santaquin (Addendum)	U-95-SJ-0653p,s
UT	Survey	Desert West	K. Carambelas	Thanksgiving Point Wetlands Inventory	U-95-WZ-0669p
UT	Survey	Desert West	K. Carambelas	Lehi Wetlands Inventory	U-95-WZ-0670p
UT	Survey	Desert West	K. Carambelas	Mountain Springs Wetlands Inventory	U-95-WZ-0671p
UT	Survey	Desert West	K. Carambelas	Timpanogos Wetlands Inventory	U-95-WZ-0672p
UT	Survey	Desert West	K. Carambelas	American Fork Wetlands Inventory	U-95-WZ-0778p
WA	Survey	BYU-OPA	L. Richens	Jordanelle State Park Boundary Fence	U-95-BC-0204w
WA	Survey	Baseline	A. Nielson	UDOT Daniels Canyon Port of Entry	U-95-BS-0003s
WA	Survey	USFS-Uinta	A. Rosborough	Heber District Range Improvement	U-95-FS-0553f

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1995 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
WA	Survey	USFS-Uinta	A. Rosborough	Tar Weed Treatment	U-95-FS-0554f
WA	Survey	USFS-Uinta	A. Rosborough	Trapper Hollow	U-95-FS-0555f
WB	Survey	Hill AFB	D. Weder	Operable Unit No. 6 Construction	U-95-HL-0477p
WB	Survey	Sagebrush	M. Polk	UDOT 2700 North in Ogden	U-95-SJ-0245p
WN	Survey	BLM-Richfield	C. Harmon	Wayne County Landfill Road	U-95-BL-0046b
WN	Survey	BLM-Richfield	C. Harmon	Aspen Academy Powerline	U-95-BL-0136b
WN	Survey	BLM-Richfield	C. Harmon	Wayne County Landfill Powerline	U-95-BL-0201b
WN	Survey	BLM-Richfield	C. Harmon	Bull Creek Spring	U-95-BL-0338b
WN	Survey	USFS-Dixie	M. Jacklin	Fish Creek Dam Restoration	U-95-FS-0485f
WN	Survey	NPS-Capitol Reef	T. Clark	Firearms Range Expansion	U-95-NA-0090n
WN	Survey	NPS-Capitol Reef	L. Kreutzer	East Boundary Site Development	U-95-NA-0096n
WN	Survey	NPS-Capitol Reef	L. Kreutzer	Fiberoptic Burial at Visitor Center	U-95-NA-0116n
WN	Survey	NPS-Capitol Reef	L. Kreutzer	Blacksmith Shop Driveway Improvements	U-95-NA-0210n
WN	Survey	NPS-Capitol Reef	L. Kreutzer	J.C. Fremont Landmark Locale	U-95-NA-0612n
WN	Survey	NPS-Capitol Reef	L. Kreutzer	Historic Structure Cyclic Maintenance	U-95-NA-0641n
WN	Survey	Utah Trust Lands	K. Wintch	Presale 6936 Hanksville Landfill	U-95-UM-0100s
WN	Survey	Utah Trust Lands	K. Wintch	Boulder Cove Parcel	U-95-UM-0787s
WN	Excavation	Desert West	K. Lupo/K. Wintch	Teasdale Parcel Excavation	U-95-WZ-0393s(e)
WS	Survey	ARCON	G. Norman	Laverkin Bridge Replacement Dump (UDOT)	U-95-AK-0626p
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-02	U-95-BL-0342b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-03	U-95-BL-0343b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-04	U-95-BL-0374b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-05	U-95-BL-0375b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-06	U-95-BL-0376b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-07	U-95-BL-0377b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-08	U-95-BL-0378b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-09	U-95-BL-0379b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-10	U-95-BL-0380b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-11	U-95-BL-0381b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-12	U-95-BL-0382b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-13	U-95-BL-0383b
WS	Survey	BLM-Cedar City	G. Dalley	Gunlock Irrigation Pasture	U-95-BL-0423b

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1995 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
WS	Survey	BLM-Cedar City	G. Dalley	Watters Power Line	U-95-BL-0446b
WS	Survey	BLM-Cedar City	G. Dalley	Shela Wilson R/W Amendment	U-95-BL-0447b
WS	Survey	BLM-Cedar City	G. Dalley	Toquerville Sand Site	U-95-BL-0448b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-22	U-95-BL-0512b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-23	U-95-BL-0513b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-24	U-95-BL-0514b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-25	U-95-BL-0515b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-36	U-95-BL-0516b
WS	Survey	BLM-Cedar City	G. Dalley	Robcon Amendment	U-95-BL-0749b
WS	Survey	BLM-Cedar City	G. Dalley	Virgin International Mineral Project	U-95-BL-0750b
WS	Survey	BLM-Cedar City	G. Dalley	Divide Road R/W	U-95-BL-0751b
WS	Survey	BLM-Cedar City	G. Dalley	Rogers Pit UTU	U-95-BL-0752b
WS	Survey	BLM-Cedar City	G. Dalley	St. George R/W	U-95-BL-0753b
WS	Survey	BLM-Cedar City	G. Dalley	Rainbow Millsite	U-95-BL-0754b
WS	Survey	BLM-Cedar City	G. Dalley	Staheli Well and Pipeline	U-95-BL-0755b
WS	Survey	BLM-Cedar City	G. Dalley	Chuck Buhler Road	U-95-BL-0756b
WS	Survey	BLM-Cedar City	G. Dalley	Protective Fence - Motoqua Fire	U-95-BL-0757b
WS	Survey	BLM-Cedar City	G. Dalley	Leavitt Gravel Pit UTU-73826	U-95-BL-0758b
WS	Survey	BLM-Cedar City	G. Dalley	Bracken Pond Burn	U-95-BL-0759b
WS	Survey	BLM-Cedar City	G. Dalley	Cedar Pockets Fire	U-95-BL-0760b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-33	U-95-BL-0792b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-44	U-95-BL-0794b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-14	U-95-BL-0795b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-15	U-95-BL-0796b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-16	U-95-BL-0797b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-17	U-95-BL-0798b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-28	U-95-BL-0799b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-29	U-95-BL-0800b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-15a	U-95-BL-0801b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-19	U-95-BL-0802b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-30	U-95-BL-0803b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-31	U-95-BL-0804b

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1995 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-34	U-95-BL-0805b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-20	U-95-BL-0806b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-26	U-95-BL-0807b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-27	U-95-BL-0808b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-35	U-95-BL-0809b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-38	U-95-BL-0810b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-40	U-95-BL-0811b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-41	U-95-BL-0812b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-46	U-95-BL-0813b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-48	U-95-BL-0814b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-53	U-95-BL-0815b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-54	U-95-BL-0816b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-47	U-95-BL-0817b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-55	U-95-BL-0818b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-18	U-95-BL-0819b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-49	U-95-BL-0820b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-57	U-95-BL-0821b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-58	U-95-BL-0822b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-59	U-95-BL-0823b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-60	U-95-BL-0824b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-39	U-95-BL-0825b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-61a	U-95-BL-0826b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-52	U-95-BL-0827b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-61b	U-95-BL-0828b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-61c, d and e	U-95-BL-0829b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-61f and g	U-95-BL-0830b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-65	U-95-BL-0831b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-66	U-95-BL-0832b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-67	U-95-BL-0833b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-68	U-95-BL-0834b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-69	U-95-BL-0835b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-32	U-95-BL-0836b

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1995 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-56	U-95-BL-0837b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-63	U-95-BL-0838b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-64	U-95-BL-0839b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-45	U-95-BL-0840b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-44	U-95-BL-0841b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-42	U-95-BL-0842b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-43	U-95-BL-0843b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-70	U-95-BL-0844b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-74	U-95-BL-0845b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-75	U-95-BL-0846b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-72	U-95-BL-0847b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-71A	U-95-BL-0848b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-81	U-95-BL-0849b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-82	U-95-BL-0850b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-80	U-95-BL-0851b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-73	U-95-BL-0852b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-76	U-95-BL-0853b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-77	U-95-BL-0854b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-78	U-95-BL-0855b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-79	U-95-BL-0858b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-85	U-95-BL-0859b
WS	Survey	BLM-Cedar City	G. Dalley	Desert Tortoise Exchange Tract DTX-88	U-95-BL-0860b
WS	Survey	Baseline	A. Nielson	Leavitt Material Borrow Location near Veyo	U-95-BS-0489p
WS	Survey	Baseline	J. Allison	US West Fiberoptic Along SR-59 Near Hurricane	U-95-BS-0616b,p,s
WS	Excavation	DRI	P. Buck	Hurricane Ridge Field School	U-95-DA-0287p(e)
WS	Survey	USFS-Dixie	M. Jacklin	Santa Clara River Sites Vandalism Report	U-95-FS-0589f
WS	Survey	USFS-Dixie	M. Jacklin	Pine Park Fence	U-95-FS-0663f
WS	Survey	Intersearch	B. Frank	St. George Bike Path Survey	U-95-IG-0025s
WS	Survey	Intersearch	B. Frank	City of St. George Gunlock Drill Sites	U-95-IG-0026b
WS	Survey	Intersearch	B. Frank	Ivins Storm Sewer	U-95-IG-0237b,p,s
WS	Survey	Intersearch	B. Frank	Water Conservancy District Anderson Junction	U-95-IG-0311b
WS	Survey	Intersearch	B. Frank	Diamond Valley Gravel Pit	U-95-IG-0312p

ANTIQUITIES SECTION, UTAH DIVISION OF STATE HISTORY
1995 PROJECT NUMBERS ASSIGNED

County	Activity	Organization	Field Supervisor	Project Name	Project Number
WS	Survey	Intersearch	B. Frank	State Route 59 Encroachment Survey (UDOT)	U-95-IG-0564s
WS	Survey	Intersearch	B. Frank	Sand Hollow/BLM Pipeline Project	U-95-IG-0565b
WS	Survey	Intersearch	B. Frank	Ross-Shinob Kibe BLM Access	U-95-IG-0567b
WS	Survey	Intersearch	B. Frank	Enterprise Survey	U-95-IG-0687s
WS	Survey	Intersearch	B. Frank	Ross-Leeds BLM Access Survey	U-95-IG-0688b
WS	Survey	Intersearch	B. Frank	Hall-Hildale Powerline Corridor	U-95-IG-0691b
WS	Survey	Intersearch	B. Frank	Ross-Cannon BLM Access	U-95-IG-0692b
WS	Survey	Intersearch	B. Frank	Ross-Lee BLM Pipeline Easement	U-95-IG-0693b
WS	Survey	Knight & Leavitt	K. Knight	Red Cliff Golf Club	U-95-KG-0141l
WS	Survey	NPS-Zion	L. Naylor	Discovery Cntr./Bus Maint. Facility/Watchman Area	U-95-NA-0341n,p
WS	Survey	Sagebrush	K. Montgomery	Skyline Dr. Road Widening in St. George (UDOT)	U-95-SJ-0363b,p,s
WS	Survey	Sagebrush	K. Montgomery	Riverside Road Widening in St. George (UDOT)	U-95-SJ-0364p
WS	Test	SWCA	H. Roberts	UDOT Limited Testing at 42Ws1836 Along SR-18	U-95-ST-0420b
WS	Survey	SWCA	L. Neal	UDOT Telegraph Road Survey	U-95-ST-0498b,p,s
WS	Survey	Utah State Parks	W. Latady	Snow Canyon State Park Inventory	U-95-UD-0256s
WS	Survey	USAS-Salt Lake/Davis	C. Horting	Springdale Wastewater	U-95-US-0020p

REVIEWS

Adventures in Stone Artifacts: A Family Guide to Arrowheads and Other Artifacts, by Sandy Livoti with Jon Kiesa. Adventure Publications, Inc. Cambridge, Minnesota. 1997. Price $15.95.

Reviewed by Ronald J. Rood, Antiquities Section, Utah Division of State History, 300 Rio Grande, Salt Lake City, Utah 84101

In 1995, I was informed about instructional book for kids about arrowhead hunting. Along with other professional archaeologists, I called the publisher and voiced my opinion; that being that archaeological sites were in enough danger, we did not need an instruction book for kids on how to further destroy, remove, or otherwise collect archaeological sites. I was assured the book would be done with consideration of the laws and ethics protecting archaeological sites. Well, *Adventures in Stone Artifacts* is in print and I have tried over and over again to dislike the book in its entirety but there are aspects of the book that are well thought out, informative, educational and of use to the lay person interested in archaeology. There are other aspects of the book which are problematic, unethical in my view, and convey incorrect information.

There is a note from the publisher highlighting some of the controversy surrounding the publication of this book. It is claimed not to be a guide for looting sites, but as a guide for legal, ethnical, responsible artifact collecting. The book stresses record keeping, documentation, mapping, and reporting of archaeological finds. The authors encourage kids to become involved with archaeology through local, state, and national organizations and a fairly extensive resource guide is provided. At the same time however, the authors warn kids to expect cool, perhaps "hostile" reactions from the professional community. That statement (p. xix) sets the tone of the book and does nothing to foster a working relationship between professional archaeologists and the amateur community of which we depend on.

The book includes a section on the legal aspects of arrowhead collecting. It is clear the authors do not want readers to collect on Federal or State lands and a brief outline of Federal laws protecting archaeological sites is provided. Thankfully, the authors provide the reasoning for such laws mentioning the vast destruction of archaeological sites from looting. On page xxv, there is a chart labeled "Ethical Conduct for Arrowhead Hunters." The archaeologist in me cried foul noting there is nothing ethical about arrowhead hunting, however, the first item on the ethical conduct list is "Make the intention of your hunting to discover, record, and report." The conduct list goes on to encourage legal collecting, notification of professionals, and documenting finds with the State Historic Preservation agency. On the subject of artifact ownership, the authors state that "Ownership of finds is a matter between the landowner and you. Normally, permission to keep finds is granted with permission to hunt. Use good judgement in deciding whether you want to keep and artifact, offer it to the property owner, or lend or donate it to a museum where many others can appreciate it, too." At this point in the book, some discussion of current Native American issues would have been important. Who really "owns" those artifacts anyway?

The first three chapters provide some basic information that for the most part, is accurate. They use terms professionals use to describe attributes of projectile points and other stone tools, there is a discussion of chipped stone tool technology and methods, and there is a useful graphic showing projectile point styles. However, these professional descriptions are tempered with the use of terms like "bird points" and "war points" to describe "arrowheads less than one inch long." In later sections of the book, the term "keeper" is introduced. Again, the use of this term demonstrates the focus of the book on the pretty objects of antiquity rather than learning about the past. Every artifact is a "keeper" when properly documented, to the professional and serious avocational archaeologist.

Chapter 4 is titled "Scouting For Sites." The discussion in this chapter is where you might be likely to find artifacts. In blowouts, plowed fields, near water, on old shorelines, in rodent burrows etc. Actually, all of the places I look when I'm on a survey. The authors do encourage kids to use their imagination, to think about the geography, to think about what the land might have been like in the past. Readers are encouraged to check out "hunted out" areas because more artifacts might have been left behind and more artifacts might be exposed.

Chapter 9 is a brief overview of the culture history of the Midwestern United States. There is brief mention of the Southwest, Great Basin, Great Plains, and Arctic but the chronologies for these areas are tied to the Midwestern chronology of Paleoindian, Archaic, Woodland, and Mississippian. The chapter does offer some insight into ancient lifeways, however, the focus is on the artifacts. There are no descriptions of housing styles, mounds, site layout, and only cursory discussions of settlement and subsistence practices. This in my view is the major weakness of *Adventures in Stone Artifacts*. Readers get the impression that the *artifacts* are what is important. Not what those artifacts, studied in context and in relationship with other artifacts, geography, time, and space tell us about the people who made the artifact.

In the remaining chapters, the readers are treated to a section on what to bring while arrowhead hunting, the best time of the day, the best season of the year and how to get permission from landowners to "hunt" and even what to wear. Don't forget the sunscreen! There is also a discussion on the treatment of collected artifacts. For example, the authors discourage the "storage" of artifacts in coffee cans or shoe boxes. They recommend items to be placed in drawers or boxes wrapped in a protective cloth or tissue. They also discourage the polishing of artifacts with lanolin, varnish or grease. For complete artifacts, they recommend securing the artifact in a box by nestling it into a matching pattern cut in foam. Chapter 10 is called "Keeping a Journal" and is perhaps the best chapter in the book. On page 181, the authors write, "When you discover an artifact on the surface and decide to bring it home, you'll need to give it a meaningful future." Suggestions for labeling, and recording are presented; and these seem to be reasonable suggestions.

While the authors encourage kids to become involved with archaeological societies for networking and educational purposes, they also suggest attending artifact shows. "Be sure to go to an artifact show because you'll see many types of finds on exhibition. Amateur archaeological societies usually sponsor the shows so members can display collections, exchange information and *make sales*" (p.145, emphasis added). Earlier in the book the authors state collecting for monetary gain is unethical, yet they encourage kids to participate in the buying and selling of artifacts with this simple statement.

So, did I like the book or not? As I stated earlier, I tried hard to dislike all of it but there are some good lessons in the book and it does present a methodology for responsible collecting. Collecting is a fact of life, so some positive guidance is welcomed. At the same time, I think the authors should have presented other options to collecting such as lessons on artifact illustrations, and photography. There is nothing in this book about archaeology as a science or the scientific method. The book is about pretty objects of antiquity.

For parents, teachers, aunts and uncles, big brothers and sisters or anyone else who knows a kid of any age interested in archaeology, I would not recommend *Adventures in Stone Artifacts* as your sole source of information. I would recommend becoming involved with avocational archaeological groups, and professional organizations. Most state preservation agencies have public awareness and education programs geared toward educating the public (kids too) about historic preservation, archaeology, site stewardship and ethical treatment of archaeological materials.

Steinaker Gap: An Early Fremont Farmstead, by Richard K. Talbot and Lane D. Richens, with contributions by Shane A. Baker, Joan Brenner Coltrain, William Eckerle, Joel C. Janetski, Deborah E. Newman, Guy L. Tasa, and James D. Wilde. Museum of Peoples Cultures, Occasional Papers No. 2. Brigham young University, 1996.

Reviewed by **Ronald J. Rood**, Antiquities Section, Division of State History, 300 Rio Grande, Salt Lake City, Utah 84101

Talbot and Richens have produced an important volume on a period that is poorly understood and represented in the archaeological record, the transition from the Archaic to the Formative. The Steinaker Gap volume is organized, well written with detailed description and well thought out research questions and interpretations.

In Chapter 2, Talbot and James D. Wilde spend some time describing the subsistence and settlement patterns of the Mandan, Hidatsa, and Pawnee, three of the four historic Plains Village Tradition historic groups along the Missouri River Trench. What do the Archaic and Fremont of the Northern Colorado Plateau have to do with the village cultures of the Missouri River Trench? Well, having spent time on the Great Plains, I found the research context chapter especially interesting. Talbot and Wilde draw upon ethnographic and archaeological examples from the village cultures of the Missouri River Trench to aid understanding aspects of Archaic and early Fremont subsistence and settlement. Their analogies to the Missouri River Trench cultures were sparked, in part by the discovery of several large bell-shaped pits at Steinaker Gap, a feature type that is common along the Missouri River Trench. They assumed a primary function of storage for these features but questions concerning what were being stored and the commitment to agriculture soon emerged as significant research goals. Their approach to Steinaker Gap was based upon the following research issues. 1) People in the region were growing and using corn by 200 B.C.; 2) The storage of corn was done in deep bell-shaped storage pits; 3) They were living in semisubterranean houses often associated with bell-shaped pits. Further, using the Plains Village analogy, the authors set up a hypothetical model to interpret settlement and subsistence patterns for the Archaic to Formative transition on the Northern Colorado Plateau. They suggest a lifeway similar to that of the Hidatsa and Pawnee. The winter months were spent away from the village in pursuit of large game while the spring, summer and fall were spent in village settings tending to crops. They would store corn in the large bell-shaped pits for consumption upon returning to the village in the spring.

Their model comprises six testable proposals. First, there is the question of reliance on cultigens. How much did the occupants of Steinaker Gap rely on cultivated goods for their subsistence? Joan Brenner Coltrain analyzed human remains from the site for stable carbon and radioisotope analysis. She presents an excellent summary of the techniques and review of the literature on this subject. Her analysis of the Steinaker Gap human remains suggests cultivated crops, mainly corn, comprised approximately 50% of the total diet.

The second part of their proposal concerns the presence of pithouse villages. In many ways, this is the weakest part of their model because pithouse villages and storage features have been used on and near the Northern Colorado Plateau since Early Archaic times, a fact they acknowledge in the volume. The use of pithouse villages does not really have anything to do with the emergence of agriculture. No pithouses were found at Steinaker Gap but there is evidence of some type of architectural feature. There are pithouse villages in the vicinity leading to their conclusion of the site as a farmstead.

Third is the issue of storage. Again, storage should not be confused with the emergence of agriculture since Early Archaic pithouse villages show ample evidence of sophisticated storage features. Based upon macro botanical and pollen evidence from Steinaker Gap, the authors conclude the bell-shaped features were used for the storage of corn.

The fourth aspect of the model concerns the commitment to cultigens by the occupants of Steinaker Gap. Bell-shaped storage features suggest some level of commitment, however, as pointed out several times in this volume, a commitment to agriculture is far more then planting some seeds in the spring and returning in the fall for the harvest. The discovery of archaeological features interpreted as water control ditches leaves little doubt concerning the commitment to agriculture.

The fifth hypothesis states the people at Steinaker Gap used the large, deep bell-shaped pits for secure food storage while they were away from the area. The authors admit this is a difficult task to prove archaeologically, however, they approach it from an interesting angle. They look at questions about the need for storage and the time investment and commitment to maize agriculture. Again, using ethnographic data from both the Hidatsa and the Hopi, they suggest the need for a resident population at Steinaker for field preparation, ditch maintenance, planting, crop care and bell-shaped pit construction for at least five to six months (April/May through October). Following the Hidatsa pattern, the Steinaker Gap peoples would have been scattered throughout the region on winter large mammal (perhaps bison) hunting trips only to return to the site in the spring.

Finally, there is the question of large mammal hunting during the winter. Archaeological evidence from Steinaker Gap is inconclusive but if the site functioned as a farmstead, large mammal bone would probably not be evident in the collections from winter kills. No bison remains were found at Steinaker Gap and, the faunal material recovered from the site is inconclusive. This part of the model deserves additional thought and closer examinations at sites in the region that might represent winter hunting camps.

Overall, I enjoyed this volume and I especially enjoyed the discussion of different ideas concerning settlement and subsistence strategies for the Archaic/Formative transition. Clearly, the ideas presented in this volume in need of further analysis and discussion. Specific chapters on geomorphology by William Eckerle, human skeletal remains by Shane Baker and Guy Tasa, pollen and macrofossil analysis by Deborah E. Newman, and stable carbon and radioisotope analysis by Joan Brenner Coltrain are well organized, well written, and for the most part, jargon free, making the volume useful to both the professional and avocational.

Excavations at Steinaker Gap did not fully resolve the proposed research questions but, as with good archaeological research, we have a fresh look at some interesting subsistence/settlement issues that require careful and serious consideration for future work. A Plains archaeologist in South Dakota once jokingly told me that all archaeological questions can be answered by looking at the ethnography of the Plains Indians; maybe she was right.

MANUSCRIPT GUIDE FOR *UTAH ARCHAEOLOGY*

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Authors submitting manuscripts are requested to follow Society for American Archaeology (SAA) style in text references and bibliography (see October 1992 issue of *American Antiquity*). If you do not have access to a copy of the style guide, write to Kevin Jones requesting a photocopy. Authors are asked to submit one original and three copies of their manuscripts as all submitted articles will be reviewed by three readers. Reviewers will be selected on the basis of paper topic. Manuscripts should be double spaced with margins adequate to allow for comments and should include a short abstract if the manuscript is intended for an article rather than a report or a comment.

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Citation examples:

Beck, Charlotte, and George T. Jones
  1994 On-Site Artifact Analysis as an Alternative to Collection. *American Antiquity* 59:304-315.

Janetski, Joel C.
  1991 *The Ute of Utah Lake*. Anthropological Papers No. 116. University of Utah Press, Salt Lake City.

O'Connell, James F., Kristen Hawkes, and Nicholas Blurton-Jones
  1991 Distribution of Refuse-Producing Activities at Hadza Residential Base Camps: Implications for Analyses of Archaeological Site Structure. In *The Interpretation of Archaeological Spatial Patterning*, edited by Ellen M. Kroll and T. Douglas Price, pp. 61-76. Plenum Press, New York.

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