

Cultural Resource Inventory in Butler Flat, Needles District, Canyonlands National Park, Utah

edited and compiled by

Betsy L. Tipps

with contributions by

Robert I. Birnie, Daniel K. Newsome, Susan C. Kenzle,
Richard E. Hughes, and Thomas M. Origer



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Prepared under the supervision of

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Submitted in partial fulfillment of Contract CX 1200-4-A063

to

National Park Service
Rocky Mountain Regional Office
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Submitted by

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Cultural Resources Report 411-03-9608

1996

ABSTRACT

This document is the final technical report of an archeological inventory in the Butler Flat Area of the Needles District, Canyonlands National Park, Utah. This work was conducted as part of a multiyear cultural resource project undertaken by P-III Associates, Inc., for the National Park Service. The main objective of this multiyear effort was generating information to help refine the park's interpretive program. Other goals were collecting data to guide management actions and addressing scientific research goals.

A total of 50 sites and 32 isolated finds was documented in the 1080-acre inventory area. Like all other phases of the Canyonlands Archeological Project, results of the inventory challenge Sharrock's (1966) conclusion that the park was virtually uninhabited until Pueblo II-III. The project area witnessed a small, but significant, occupation during at least Early and Middle Archaic times by people who possessed a chipped stone technology that included northern Colorado Plateau projectile point types. However, project results do support Sharrock's suggestion that only the Anasazi occupied the area during the Formative period; no Fremont sites, features, pottery, or other types of Fremont artifacts were discovered. The Anasazi sites were used by people possessing a western Mesa Verde ceramic technology. Other sites recorded in the project area reflect occupation during the Late Prehistoric/Protohistoric period, probably by Ute groups or their ancestors, and during historic or modern times by Euroamericans.

The project area has a relatively high site density, but all occupation was short-term and intermittent. Most sites are lithic scatters and lithic source areas, sometimes with a few sherds, features, or both; there is only one site with masonry architecture in the project area. Features are simple and either developed over a short period of time (e.g., small middens) or took minimal effort to produce (e.g., hearths, fire-cracked rock concentrations, rock alignments). None exhibit long-term use or maintenance.

The area was unsuitable for agriculture and appears to have been used for generalized hunting and gathering activities during all periods of prehistory. Most sites are camps or limited-activity loci associated with the procurement, reduction, and/or manufacture of chipped stone tools from local chert. Many sites were also used for domestic activities such as camping, cooking, grinding wild plant seeds, and processing animals procured through hunting. The investigations confirmed the predictions of Tipps and Hewitt (1989) and Tipps (1995) that the source of Algalitic Chert is in the western Needles District.

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Chapter 1

INTRODUCTION

by Betsy L. Tipps

This report, the fourth in a series, presents the results of an intensive cultural resources inventory undertaken by P-III Associates, Inc. (P-III Associates), in the Needles District, Canyonlands National Park, Utah. The inventory covered 1080 acres on Butler Flat and resulted in the recordation of 50 sites and 32 isolated finds.

The Butler Flat investigations were undertaken as part of the multiyear Canyonlands Archeological Project conducted by P-III Associates for the National Park Service, Rocky Mountain Regional Office, under Contract CX-1200-4-A063. The primary purpose of the multiyear project was to collect information that can be used to refine the park's interpretive program and enhance visitor understanding of the park's human past (National Park Service 1984). Other objectives of the overall program were evaluating the existing database, collecting basic descriptive and comparative information, addressing scientific research questions, and providing data for planning and management actions. Intensive pedestrian inventory was the primary means of data collection, although other aspects of the project involved a small amount of archival and collections research (see Kenzle 1996; Lucius 1989), analyses of existing artifact collections (La Fond 1996), limited testing and radiocarbon dating (Brown 1987; Tipps 1995; Tipps and Hewitt 1989; Tipps and Schroedl 1990; Tipps et al. 1996), flotation analysis (Coulam 1989, 1995, 1996), and rock art dating (Tipps 1995).

The Canyonlands Archeological Project was part of a larger multidisciplinary, multicontractor, archeologically focused, investigative effort that was undertaken in the park during the 1980s and first half of the 1990s. This program included paleoenvironmental studies (e.g., Agenbroad and Elder 1986; Agenbroad and Mead 1992a, 1992b; Agenbroad et al. 1990; Mead and Agenbroad 1992, 1995; Mead et al. 1992), ruins stabilization (Metzger et al. 1989), rock art documentation and dating (Noxon and Marcus 1982, 1985; Tipps 1995), historic site studies (Mehls and Mehls 1986), large-scale inventories (Griffin 1984; Hartley 1980; Osborn et al. 1986), testing (Vetter 1989;

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Vetter and Osborn 1993), and data recovery excavations (Dominguez 1988, 1990, 1991, 1994; Horn 1990; Osborn 1995; Reed 1993).

Project Location

Canyonlands National Park surrounds the confluence of the Colorado and Green rivers in southeastern Utah (Figure 1). The park comprises three districts: the Needles, east of the Colorado River in San Juan County; the Maze, west of the Colorado and Green rivers in Wayne and Garfield counties; and Island-in-the-Sky, between the Green and Colorado rivers in San Juan County. The project area, called the Butler Flat Area, is in the western Needles District. It consists of a single parcel that covers most of Butler Flat, an open area bordered by Chesler Canyon Wash to the north and Butler Wash to the south and west, and extends into the Grabens, an area of block-faulted horsts and grabens. The project area abuts the southern end of the Devils Lane Area, which was inventoried during the first year of the Canyonlands Archeological Project (Tipps and Hewitt 1989). Chesler Park is to the east; Aztec, Upper Red Lake, and Red Lake canyons are to the west; and Bobbys Hole is to the southwest. Appendix A provides legal locations of the inventory area.

Butler Flat lies in the Needles midlands (Tipps et al. 1996), the open arid country above the lowland canyons of the Colorado River and below the highlands of Ruin Park and Beef Basin, as well as the higher elevation, well-watered canyons of Upper Salt and Horse creeks. The Needles midlands are surrounded by higher mountains and mesas to the east and southeast, and the Colorado River to the west. They comprise a vast open plateau of broad, open pockets and plains, locally interrupted by horsts, grabens, hoodoos, buttes, spires, fins, and ridges, and occasionally incised by drainages, most of which run only after precipitation events. Much of the area is exposed bedrock or bedrock with shallow eolian cover, although alluvial and colluvial deposits occur in some areas. Permanent water sources are rare, and overall water is scarce, except along portions of major watercourses such as Salt Creek and Squaw Canyon Wash. Low, desert scrub vegetation predominates with a sparse pinyon-juniper woodland in higher areas and along some rocky outcrops. Elevations range from 1470 to 1730 m above mean sea level (amsl), although most areas are below 1645 m, the point at which precipitation becomes adequate for dry farming (Geib 1996).

The Butler Flat Area is one of four areas inventoried by the Canyonlands Archeological Project in the Needles midlands. The other areas are the Salt Creek Pocket and Squaw Butte areas in the eastern Needles District and the adjacent Devils Lane Area in the western Needles District.

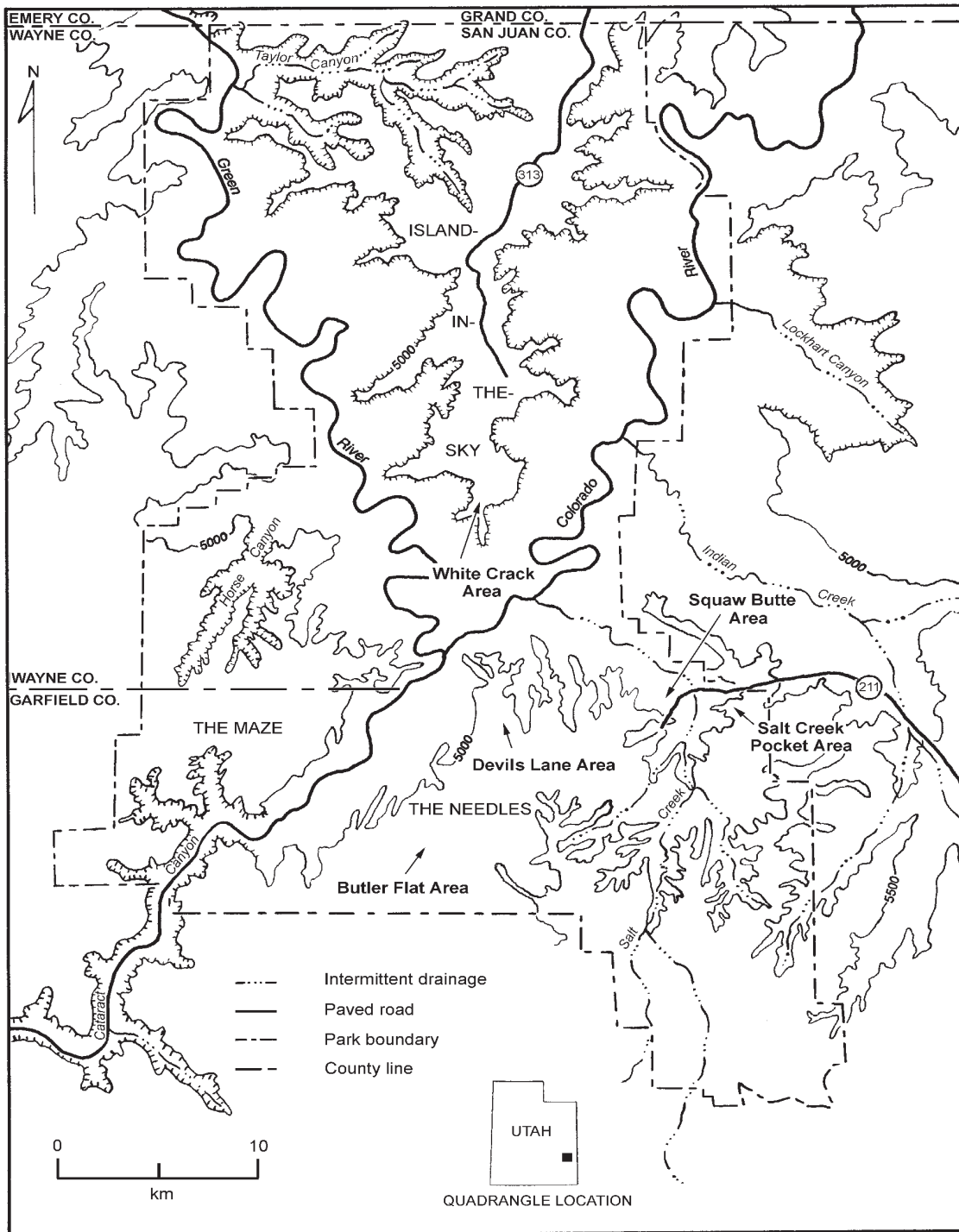


Figure 1. General location of the Butler Flat Area and several other places mentioned in the text.

Project Background

Most tasks assigned as part of the Canyonlands Archeological Project and most areas designated for inventory were conceived by the National Park Service to facilitate accomplishment of project goals. However, the contract also allowed P-III Associates to select small inventory areas to help fill data gaps and address research concerns. The Butler Flat Area was one of two areas selected by P-III Associates for inventory during the life of the multiyear project; the other was the Devils Lane Area, which includes the Devils Lane Graben and portions of the northern end of Butler Flat. The Devils Lane Area was inventoried during the first year of the Canyonlands Archeological Project (Tipps and Hewitt 1989).

P-III Associates selected the Devils Lane Area for inventory to help park personnel with management needs and because it was "undocumented archeologically, but known to have sites very different than those in the Salt Creek Archeological District . . ." (Tipps and Hewitt 1989:4). This statement referred to our suspicion that the area lacked large Anasazi cliff dwellings like those in the Salt Creek Archeological District, and instead contained numerous rock art sites and open lithic scatters. We felt that study of these different site types was crucial to understanding the full range of adaptive strategies practiced in the Needles District. In addition, rangers had reported several panels of Barrier Canyon rock art, which we believed to be of Archaic age. This, and the reports of numerous Archaic sites in areas surrounding the park (e.g., Ambler 1984; Berry 1975; Black et al. 1982; Christensen 1983; Hunt and Tanner 1960; Jennings 1980; Lindsay et al. 1968; Lucius 1976; Tipps 1983), led us to suspect that Archaic camps also would be present. Documentation of an Archaic occupation was a particularly important research concern. Sharrock (1966) found no evidence of the Archaic during his baseline inventory of the Needles District, and before our first year's work in the Devils Lane and Salt Creek Pocket areas (Tipps and Hewitt 1989), evidence for Archaic occupation was limited to a few sites with known or supposed Archaic rock art types (e.g., Glen Canyon Linear, Barrier Canyon, Great Basin Rectilinear and Curvilinear Abstract) and some probable Pinto points near Squaw Flats (Anderson 1978).

The Devils Lane Area inventory and subsequent testing of a slab-lined hearth were quite informative regarding the Archaic period. The inventory resulted in the identification of 6 Archaic components among the 46 components recorded. The testing identified an additional Archaic component for a total of 7. The slab-lined hearth yielded a radiocarbon date near the end of the Archaic (radiocarbon age: 2080 ± 60 B.P.; two-sigma, tree-ring corrected age range: 340 B.C.-A.D. 70 [Stuiver and Pearson 1993]) (Tipps and Hewitt 1989:128). These finds confirmed our suspicion of Archaic occupation in the Needles District; in addition, the radiocarbon date provided possible evidence of use at a time when Berry and Berry (1976) posit a large-scale abandonment of the

Colorado Plateau. The latter led us to theorize that the latest part of the Archaic might be characterized by different adaptational patterns and use of open, more ephemeral site types than the earlier periods. We further suspected that this, combined with previous research emphases on large cave sites, not a lack of occupation, might have led to the appearance of a hiatus. Although these issues could not be addressed at the time, they were incorporated into the Canyonlands Archeological Project research design during later investigations.

When it came time to choose a second area for inventory, we felt the most critical research need for the park was continued work on the Archaic, such as determining the nature and extent of Archaic occupation, identifying the time periods of Archaic use, and examining related issues like the purported large-scale abandonment of the Colorado Plateau at the end of the Archaic (cf. Berry and Berry 1976). Because the Devils Lane Area had a higher concentration of Archaic sites than any other area inventoried during the Canyonlands Archeological Project to date, P-III Associates proposed to inventory additional acreage in the same general area. Most of the Archaic sites in the Devils Lane Area were identified as Archaic on the basis of Barrier Canyon and Glen Canyon Linear rock art. Hoping to locate sites with diagnostic Archaic artifacts instead of just Archaic rock art, the Butler Flat Area was selected because it is farther from existing roads and heavily used campgrounds than the Devils Lane Area, and we hoped that it might have been subject to less illegal collection of diagnostic artifacts.

The Butler Flat Area was also chosen because of its potential to provide data relevant to the Anasazi-Fremont issue, that is, whether the Anasazi, Fremont, or both used the area during the Formative period. Although almost no evidence of Fremont use had been found during any of the prior inventories conducted as part of the Canyonlands Archeological Project, the western Needles District around the Devils Lane Area was deemed one of the more likely areas for Fremont habitation because of its westerly location, the presence of a Fremont rock art element at SOB Hill, and the existence of an access route between it and the Colorado River crossing at Spanish Bottom (see Hewitt et al. 1989:142-143).

Although virtually no clear evidence of Fremont occupation has been found in the Needles midlands since the Butler Flat Area inventory (Dominguez 1988, 1990, 1991, 1994; Reed 1993; Tipps 1995), the possibility of Fremont and Anasazi interaction in portions of the Needles may still be an important research topic. Owen Severance (personal communication, 1990) reports the presence of definite Fremont rock art and granaries in the lush environment along Salt Creek. Also, the puzzling question remains as to how and why there is so much Fremont rock art in Indian Creek, just east of the Needles, yet the Needles, which is intermediate between Indian Creek and the heart of Fremont country, shows so little Fremont use (Severance 1995).

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The Butler Flat Area fieldwork was accomplished during the summer of 1987 by a crew of three to five archeologists. Gary M. Brown supervised the fieldwork and initial laboratory work under the direction of Alan R. Schroedl, Principal Investigator. Larry L. Hause and Janet L. McVickar were crew members for the duration of the fieldwork. Sonja K. Duke was a crew member for one ten-day session. The park archeologist at the time, Chas Cartwright, worked with the crew for two days, the author of this chapter for one day. Mr. Brown left the company before writing up the project; this report was prepared by current staff members based on site forms, notes, maps, and photographs generated by the field crew.

Although all other inventories undertaken as part of the Canyonlands Archeological Project included limited testing of discrete features to obtain chronological and subsistence information, no such testing was undertaken on sites in the Butler Flat Area. Instead, available funding was used to evaluate the significance and character of a site in the Maze District that was threatened by arroyo cutting (the Down Wash site, 42WN1666). Based on the results of the evaluation, the site was later subject to data recovery excavations (Horn 1990).

Research Orientation

This section presents the research design that was used to structure the investigations in the Butler Flat Area and to develop information for the park's interpretive program. Like all projects, the proposed research was constrained by several factors. The most important were the limitation of fieldwork to inventory and the restriction of surface collections to rare or diagnostic artifacts and items likely to be the target of illegal surface collection. These factors limited the types of data available for study as well as the level of detail at which analyses could proceed.

The small size of the project area was another limitation. Previous work in the park has shown a very clear relationship between characteristics of the natural environment and the nature of prehistoric adaptation (Sharrock 1966; Tipps 1995; Tipps and Hewitt 1989; Tipps et al. 1996). Without data from large areas that encompass the complete range of environmental settings, there is a significant risk that the full extent of prehistoric use-patterns will not be identified or understood. A good example of this problem occurred in the eastern Needles District. Due to the lack of arable land in the 3803-acre Salt Creek Pocket Area, Anasazi use of the area was short term and intermittent, and primarily initiated by farmers from adjacent highlands who came to hunt, gather wild plant foods, and collect nonfood resources such as toolstone. Most Anasazi sites were interpreted as short-term camps (Hewitt et al. 1989:140). Due to the large size of the inventory parcel, it was suspected that this pattern applied to most of the eastern Needles District.

However, later inventory in the adjacent Squaw Butte Area revealed a wider range of Anasazi adaptive strategies, primarily due to the presence of small plots of arable land and more reliable water sources. The more favorable resource base in this area resulted "in an expanded settlement pattern that involved . . . additional site types, reduced mobility, and longer periods of occupation" (Tipps 1995:179). Most Anasazi sites were tied to the seasonal cultivation of corn, with fewer sites used for hunting, wild plant gathering, and collection of nonfood resources. Without the inventory in both areas, the wider range of Anasazi adaptive strategies in the eastern Needles District would have gone unrecognized.

Two additional constraints were the need to focus on research topics of interest to park visitors and the nature of the sites themselves. Because we expected to find mostly open lithic scatters and some rock art sites, our emphasis was much different than it would have been had we expected large Anasazi structural sites.

The original research design for the Canyonlands Archeological Project established four broad and somewhat overlapping research domains: Chronology and Cultural Affiliation, Settlement Patterns, Environmental Adaptation, and Cultural Interaction (P-III Associates, Inc. 1984). Although these general domains were set for the duration of the project, the contract specified that research questions and issues within these domains be updated as knowledge progressed throughout the course of the investigations, and that they be tailored for the types of remains expected in each inventory area. Important features of the Butler Flat Area research design, which was conceived in 1987, were largely a function of the area selected for inventory. As a background to understanding the research design, Table 1 presents the cultural chronology used for the project.

Table 1. Cultural chronology used to place sites in a cultural and temporal framework.

General Time Period	Possible Cultural Affiliations	Approximate Calendrical Age
Paleoindian	Paleoindian	12,250 B.C. - 7800 B.C.
Early Archaic	Archaic	7800 B.C. - 5100 B.C.
Middle Archaic	Archaic	5100 B.C. - 3300 B.C.
Late Archaic	Archaic	3300 B.C. - 1500 B.C.
Terminal Archaic	Archaic	1500 B.C. - 300 B.C.
Preformative	Archaic, Basketmaker II, ancestral Fremont, other	300 B.C. - A.D. 500
Early Formative	Anasazi, Fremont, other	A.D. 500 - A.D. 1000
Late Formative	Anasazi, Fremont, other	A.D. 1000 - A.D. 1300
Late Prehistoric/ Protohistoric	Ute, Paiute, Navajo, Hopi	A.D. 1100 - A.D. 1775

Chronology and Cultural Affiliation

In the Chronology and Cultural Affiliation domain, we proposed to ascertain the ages and cultural affiliations of the sites, with a particular focus on the periods and cultures not documented by Sharrock (1966) during his baseline inventory of the Needles District, that is, pre- and post-Pueblo II and groups other than the Anasazi. Based on the results of the first year's inventory in the Salt Creek Pocket and Devils Lane areas, we anticipated that all major periods of the Archaic would be at least sparsely represented and that a few sites might be attributable to Pueblo I and late Pueblo II-Pueblo III Anasazi. Although no Paleoindian sites were found during the first season's work, the possibility they might occur in the Butler Flat Area was considered given the presence of Paleoindian sites and isolates in surrounding areas (e.g., Black et al. 1982; Davis 1985; Davis and Brown 1986). Due to the scarcity of Fremont sites in the adjacent Devils Lane Area (just a single rock art element on a multicomponent site), the potential for recognizable Fremont sites was considered small, but possible. The occurrence of Late Prehistoric/Protohistoric sites was considered likely given the presence of Ute rock art in the Maze District (Hogan et al. 1975:37), rock art depicting mounted horsemen in the Needles District (Noxon and Marcus 1985:90-91), and artifacts diagnostic of Numic-speakers at sites near the park (e.g., Berry 1975:86, 89, 93; Fairley and Geib 1986:218; Hunt 1953:16; Thompson 1979:125).

Another research topic in this domain was determining which cultural-temporal framework best fit the Archaic sites: Schroedl's (1976) sequence for the northern Colorado Plateau, Irwin-Williams' (1973) Oshara Tradition, or some other, as yet undefined, tradition. Only a small number of the projectile points discovered during the first year's inventory could be identified to named types, but the few typeable specimens fit into Holmer's (1978) typology for the northern Colorado Plateau (Elko, Sudden Side-notched) or potentially represented the Desha Complex (see Lindsay et al. 1968; Tipps and Hewitt 1989:89), which Schroedl subsumes in the Archaic tradition of the northern Colorado Plateau.

Although few Formative period sites were expected, the cultural affiliation of their inhabitants was also a topic of concern. Regarding the Anasazi sites, the most basic concern was whether they represented occupation by Mesa Verdean peoples, and more specifically, whether the site inhabitants came from the Upper Salt Creek drainage, the highlands south of the park (e.g., Beef Basin, Ruin Park, canyons of the Elk Ridge Plateau area), or somewhere else. Work during the first season tentatively suggested a Mesa Verde affiliation for the Anasazi sites and that they were associated with more substantial occupation in Upper Salt Creek or the highlands south of the park, but further investigations and verification with additional information were required. We did not expect to find sufficient Fremont remains to address the issue of cultural affiliation

or which Fremont variant might be represented. Hence, no questions regarding this topic were included in the research plan.

Settlement Patterns

Correct identification of site types, intensity and duration of occupation, site seasonality, and whether sites represent palimpsests used on multiple occasions are prerequisites to reconstructing settlement patterns, which themselves are critical to interpreting shifting adaptive strategies through space and time. As such, these topics were the focus of research in this domain. Binford's (1979, 1980) middle-range theoretical model known as the forager-collector continuum provided the theoretical framework for identifying possible settlement patterns practiced by each cultural group. While we suspected that most sites would be limited-activity loci and camps based on our previous work in the adjacent Devils Lane Area, application of Binford's model required a consideration of prehistoric mobility patterns and whether inhabitants of the Butler Flat Area were using a logistical or forager adaptive strategy.

The other research issue in this domain concerned the potential size and direction of each cultural group's annual territory as indicated by the frequency and types of exotic artifacts and raw materials present. Based on the results of the first year's inventory in the Salt Creek Pocket and Devils Lane areas, we anticipated that for the collective prehistoric period, there would be evidence of resources procured from all directions and sometimes long distances. The earlier inventories had identified chert from the La Sal Junction area south of Moab and possibly from Turk's Head Bottom or Fort Bottom in the Maze, pottery from the greater Elk Ridge Plateau area to the southeast, and obsidian from presumed distant sources.

Environmental Adaptation

Research in this domain focused on identifying what natural resources were available in the project area, whether any of these resources might have been a major reason for occupation, and if the environmental setting provided any constraints on occupation (for example, a lack of water or arable land). Investigations conducted in the Salt Creek Pocket Area (of the eastern Needles District) during the first season of investigations suggested that the seasonal availability of Indian ricegrass and other seed plants, and the abundance of natural sources of chippable chert were major reasons for occupation of the area. Due to a lack of arable land, Anasazi use of the area was short-term and intermittent, primarily for hunting, gathering wild plant foods, and collecting nonsubsistence resources.

The Devils Lane Area, in the western Needles District, was similar to the Salt Creek Pocket Area in its lack of arable land, but it had fewer desirable plant resources,

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no chipped stone sources, and no permanent water. It was suspected that the Devils Lane Area presented more limitations to prehistoric peoples than the Salt Creek Pocket Area. Indeed, some occupation of the Devils Lane Area was attributed to groups traversing the area while traveling to farmsteads along the Green and Colorado rivers (Hewitt et al. 1989:141) instead of people coming to harvest specific resources.

A review of the topographic maps suggested that arable land and permanent water sources would be lacking in the Butler Flat Area, thus limiting the nature and extent of Anasazi occupation. However, the variety and abundance of other resources were unknown. Due to the small size of the Devils Lane Area (455 acres), it was uncertain whether it showed the full range of environmental conditions typifying the western Needles District.

The other research issue in this domain was determining whether the source(s) of Algalitic Chert is somewhere in Butler Flat or the surrounding area, and whether it derives from the Cedar Mesa Formation. During the first year's inventory, Algalitic Chert was discovered in small quantities on 6 percent of the sites in the Salt Creek Pocket Area. It was the primary material on approximately 15 percent of the sites in the Devils Lane Area, and a minor material on several others. Based on the general concept of distance falloff (Renfrew 1977), it was suspected that the material occurs naturally somewhere in or near the Grabens. Supporting this hypothesis, several clasts of unflaked Algalitic Chert were discovered in a natural setting on a talus slope in the Devils Lane Graben, and nodules of what appeared to be the same material were embedded in a nearby Cedar Mesa Formation cliff. We proposed to search for the source(s) of this material in the Butler Flat Area. If no such sources were found, we proposed to evaluate the possible distance and direction to the source(s) based on assessments of Algalitic Chert flake types and the frequencies and types of cortex on Algalitic Chert debitage.

Cultural Interaction

A major topic in the Cultural Interaction domain concerns intermingling between cultural groups. Canyonlands lies in what traditionally was viewed as a transitional zone between the northern San Juan Anasazi and San Rafael Fremont cultural spheres (Rudy 1955), although more recent research by Sharrock (1966), Hartley (1980), and Tipps and Hewitt (1989) found little evidence of Fremont presence other than Fremont-style rock art. Despite the absence of Fremont structural sites and camps, Lucius (Hewitt et al. 1989:142-143) suggests that the Fremont may have still used the area, but left few cultural markers due to the ephemeral nature of their visits. He states:

Because this [the Devils Lane] area was not intensively occupied by Anasazi groups and was apparently used by them as a natural resource procurement zone, it may have also been available to Fremont groups crossing the river on procurement expeditions. These trips were perhaps limited to hunting or lithic material gathering— activities that are not likely to result in the deposition of characteristic Fremont diagnostics. The Fremont rock art may be related to these activities, perhaps simply signifying that these people passed through the area. . . . While the main area of Fremont occupation still appears to be somewhere north and west of the park, it is possible that Anasazi and Fremont groups encountered each other within the park. Many of the unwatered arid zones not used by the Anasazi for agriculture might have been areas of common use by both groups, areas where the groups exchanged ideas and resources. This is obviously an avenue for further research.

As the research topic in this domain, we proposed to assess the evidence for Fremont presence and evaluate Lucius' hypothesis of joint use of the western Needles by Anasazi and Fremont peoples.

Methods

Most field methods used for this project were the same as those used for other inventory projects conducted during the Canyonlands Archeological Project (see Tipps 1995; Tipps and Hewitt 1989), the major exception being that artifacts were more routinely collected. The methods are reviewed below for the reader's convenience.

The inventory was conducted on foot, in adjacent transects that were spaced no more than 15 m apart. The outer edge of each sweep was marked with pin flags. These flags were used to orient the return sweep, thus insuring complete ground coverage; the flags were retrieved as the return transect progressed. The orientation of the sweeps occasionally had to be changed to accommodate the sometimes rugged horst and graben

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topography. Other than this minor difficulty, the inventory proceeded smoothly. Ground visibility was excellent throughout the project area.

Because the project area had no formal, a priori boundaries and cadastral markers are extremely scarce, an effort was made to use easy-to-relocate drainages and cultural features for most inventory boundaries. The project area boundaries were plotted on a U.S.G.S. topographic map as the inventory proceeded.

When cultural materials were identified, the crew marked their location and searched the area for additional cultural remains. Following procedures established at the outset of the Canyonlands Archeological Project (Tipps and Hewitt 1989), sites were defined as (1) any concentration of 10 or more artifacts or cultural items in a discrete scatter, (2) concentrations of fewer than 10 artifacts if accompanied by at least one feature, and (3) isolated features such as architecture or rock art. Lesser occurrences of cultural remains were designated as isolated finds. Isolated finds were recorded as they were discovered by assigning the find a sequential isolated find (IF) number, briefly documenting it on a list, and plotting it on the project area U.S.G.S. topographic map. Selected isolated artifacts were drawn. Their locations were not marked in the field.

If the inventory crew determined that the cultural remains constituted a site, artifacts, concentrations of artifacts, and features within the width of the current sweep were marked with pin flags to delineate site boundaries and help determine the density of cultural debris. If the site extended beyond the transect in progress, flagging continued during subsequent sweeps until all cultural remains had been marked. After several sites had been located and completely flagged in this manner, recording took place.

Sites were recorded on Intermountain Antiquities Computer System (IMACS) site forms, photographed with black and white film, and mapped using a compass and pacing. Selected sites, artifacts, and features were also photographed with color slide film. The site plan maps show the extent of surface artifacts, artifact concentrations, tool locations, features, modern disturbances such as roads, natural features such as hoodoos and drainages, and the location of the site datum. The site datum was marked in the field with a flat aluminum tag inscribed with "P-III Associates, 1987" and the sequentially assigned temporary site number (3-1, 3-2, 3-3, etc.). Upon return to the laboratory, permanent Smithsonian site numbers were obtained from the Utah State Historical Society, Antiquities Section. Appendix B correlates the temporary field numbers with the permanent Smithsonian site numbers.

Because the project was a noncollection inventory, most artifacts were identified and described in the field. However, at the direction of the Contract Officer's Representative, unique and diagnostic artifacts and items likely to be collected by park visitors were retrieved. These items were plotted on the site maps, individually collected, and assigned a unique field specimen (FS) number. Sequences of FS numbers

(e.g., FS 1-99+) are site specific. The collected artifacts were later catalogued into the National Park Service Automated National Catalog System (ANCS).

A reasonable attempt was made to locate all pottery, lithic tools, and unusual artifacts. Due to their small numbers, these items were individually examined and recorded. A sample of these artifacts, particularly those with diagnostic value, was illustrated. All lithic tools were numbered using an alphanumeric system. Groundstone artifacts, for example, were referred to by the descriptor "GS" with each groundstone implement on a site being sequentially numbered, e.g., GS 1, GS 2, GS 3, etc. The descriptor for projectile points was "PP." IMACS artifact codes were used as the descriptors for other artifact types. Projectile point identifications followed Hayes and Lancaster (1975), Holmer (1978, 1986), Holmer and Weder (1980), Lindsay et al. (1968), and Tipps and Hewitt (1989). Other lithic artifacts were classified using the categories established at the outset of the project (Tipps and Hewitt 1989). All tools were plotted on the site plan maps.

Although each sherd was individually recorded, ceramic artifacts were not numbered. To the extent possible in a field setting, in-field pottery identifications were based on criteria and types established by Breternitz et al. (1974), Colton (1956), and Madsen (1977). Debitage, the largest class of artifacts on most sites, was inspected to ascertain material types, technologies, and flaking stages, as well as overall density and abundance. Features were assigned unique feature numbers on a site-by-site basis (e.g., Feature 1, Feature 2) and individually described. Some were also photographed.

All sites were plotted on a 15' U.S.G.S. topographic map, the only scale of topographic map of the project area available at the time of fieldwork. When 7.5' minute maps became available subsequent to the inventory, site locations and the project area boundaries were transferred to the larger scale maps at the request of the National Park Service. All locational information on the 7.5' maps should be considered approximate until field checked. After transferring the site locations to 7.5' maps, it was noticed that some of the UTM coordinates computed from the original 15' maps were incorrect due to the small scale and the lack of UTM gridlines on the 15' map. These coordinates were recomputed using the larger scale maps and addenda were prepared for the original site forms, which had already been submitted to the appropriate agencies.

Site forms, including artifact drawings, plan maps, photographs, and topographic map plots, were submitted to the appropriate agencies (Canyonlands National Park; Utah State Historical Society, Antiquities Section; and National Park Service, Midwest Archeological Center) shortly after the conclusion of the fieldwork. Because of the requirement that the forms be submitted so quickly, there was no time to draft the artifact drawings, carefully edit the site forms, or review each site form to make sure that artifacts and sites had been categorized in exact accordance with procedures established at

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the project outset (Tipps and Hewitt 1989). Therefore, the addenda mentioned above also corrected these deficiencies.

The addenda include drafted artifact illustrations and site plan maps as well as an information page. The latter identifies corrections for typographical and other errors, provides information that was inadvertently omitted when the site forms were typed from the originals (e.g., elevation, artifact number [e.g., GS 1, PP 2]), and reports any modifications needed as a result of laboratory analysis of collected specimens (e.g., changing an Elko Side-notched to a reworked Northern Side-notched projectile point; changing a scraper to a modified flake). Also noted are changes that had to be made to insure compliance with project procedures, thus ensuring consistency through all phases of the project; these changes usually pertained to categorization of tips and midsections of possible projectile points and site age/cultural affiliation. Project procedures specified that chipped stone tools must have at least some portion of the haft element intact to be considered projectile points; otherwise, they were to be recorded as bifaces (Tipps and Hewitt 1989:54). A few such tools were inadvertently recorded as indeterminate projectile points in the field. To make the Butler Flat data comparable with all other phases of the Canyonlands Archeological Project, these items were recoded as bifaces. Project protocol required that Archaic sites be identified via radiocarbon dates or diagnostic artifacts (e.g., projectile points) or features (e.g., Glen Canyon Linear style rock art) (Tipps and Hewitt 1989:52-53). In the field, a few sites were suggested as Archaic based on chipped stone flaking techniques and reduction strategies, the presence of ground-stone artifacts used to process wild seeds, or Elko points, which can date anytime between approximately 6000 B.C. and A.D. 1000 (Holmer 1986). While many of these sites may indeed be Archaic, these characteristics are not reliable indicators of the Archaic and were not used as Archaic diagnostics during other phases of the Canyonlands Archeological Project. To insure compatibility of all data collected during the multiyear effort, the cultural affiliation and age of these sites were changed to unknown aboriginal and prehistoric, respectively.

Curation

All topographic maps (7.5' and 15'), photographs, and negatives generated by the project are curated at the Southeast Utah Group Museum in Arches National Park, Moab, Utah. The site forms are stored at Canyonlands National Park headquarters, also in Moab. Duplicate copies of the maps and site forms are on file at the National Park Service, Midwest Archeological Center, Lincoln, Nebraska. Copies of the site forms are also curated at the Utah State Historical Society, Antiquities Section, in Salt Lake City. Artifacts collected during the project were catalogued into the National Park Service ANCS and are curated with the other original project records at the museum in Arches National Park.

Report Organization

Chapter 2, by Robert I. Birnie, summarizes the environmental setting of the project area with an emphasis on identifying resources that might have been attractive to prehistoric peoples. Chapter 3, most of which was written by Daniel K. Newsome, provides basic descriptions of each site. This chapter also includes an introduction and summary by Tipps. Chapter 4 provides basic descriptions of the artifacts and features recorded on the Butler Flat Area sites; it was written by Susan C. Kenzle, with sections by Tipps. The final chapter summarizes the work and discusses project results relative to the research design presented above. Appendices A-F present supporting information.

Chapter 2

THE ENVIRONMENTAL SETTING

by Robert I. Birnie

This chapter presents a summary of the geologic, pedogenic, hydrologic, climatic, and biologic settings of the project area, concentrating on the late Quaternary environments. This information provides baseline data that can be used to place the sites in an environmental context and to discuss any significant temporal changes in these environmental factors.

Geologic and Physiographic Setting

The project area is in the Needles District of Canyonlands National Park, in the Inner Canyonlands subdivision of the Colorado Plateau physiographic province (Hunt 1974; Stokes 1977). The Butler Flat Area lies in a transitional physiographic zone between "the Grabens," an area of steep, block-faulted horsts and grabens, and an eroded area with numerous hoodoos, bedrock exposures, dissected bedrock formations, and deeply incised drainages. Topography is bedrock controlled.

The project area is bordered by Chesler Canyon on the north and Butler Wash to the south and west. Chesler Canyon is a northwest-flowing intermittent drainage that is relatively deeply entrenched in bedrock. Butler Wash is a north- to northwest-flowing intermittent drainage, portions of which are also entrenched in bedrock. Chesler Canyon and Butler Wash come to a confluence in a deeply incised channel at the northwestern end of the project area (Figure 2). Elevations in the inventory area range from approximately 1470 m amsl near the confluence of Chesler Canyon and Butler Wash to 1730 m amsl near Horsehoof Arch.

The project area can be subdivided into two physiographic zones, with a shallow, intermittent drainage in the center of the project area forming the north-south dividing line between the sections. The eastern section of the project area is highly dissected and consists of eroded, exposed bedrock and bedrock with shallow, eolian sand cover.

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Figure 2. Topography near the confluence of Butler Wash and Chesler Canyon, looking northwest.

Topography is diverse with small flats, incised drainages, steep cliffs, overhangs, and narrow bedrock ridges (Figure 3). Horseshoe Arch, numerous hoodoos, fins, and spires are present in this area. The northern portion of this section consists primarily of extensively jointed and faulted bedrock formations in a series of northwest- to southeast-trending ridges. The few extant drainages consist of short, intermittent washes that flow into Chesler Canyon or into the unnamed intermittent drainage in the center of the project area.

The western section of the project area consists of Butler Flat and Butler Wash (Figures 4 and 5). Butler Flat is a relatively broad (500- to 800-m-wide), elongated, slightly elevated sandstone platform composed of shallow, eolian sands overlying bedrock. The eolian sediments are in sheet sands and only a few small dunes and small coppice dunes are present. The area has a gentle north-to-northwest slope and a relatively flat to slightly undulating topography. A concentration of hoodoos is present in the center of the section, and a smaller number are present in the southern portion (Figure 6). Vertical relief is relatively gentle, except around the hoodoos, and the gradient often does not exceed 3 percent. The broad, relatively flat Butler Flat has several small, short, intermittent drainages on its lateral margins. These flow into Butler Wash, Chesler Canyon, or the unnamed intermittent drainage in the center of the project area.



Figure 3. Topography in the south-central portion of the project area, looking northwest. Butler Flat is in the background.

The grabens are the dominant physiographic and structural landforms in the area. They consist of relatively flat-bottomed, steep-sided, southwest-northeast-trending "valleys" formed by the down-dropping and upthrusting of large fault blocks as a result of subsurface salt formation movement (Baars 1983; Barnes 1978:122; Graf et al. 1987; Patton et al. 1991). The upthrust blocks form long, parallel, steep-sided ridges. Vertical relief on the margins of these ridges ranges from 30 to 120 m.

Bedrock in the project area consists of flat-lying, Permian-age sedimentary rocks of the Cutler Formation (Huntoon et al. 1982). These include red arkosic sandstones and white marine sandstones interbedded with red shales. Flat-lying rocks of the Elephant Canyon Formation and Halgaito Shale are exposed at and around the confluence of Butler Wash and Chesler Canyon. The Halgaito Shale Formation consists of reddish brown and purple arkosic sandstone, red siltstones, claystones, and conglomerates with thin limestone beds. The Elephant Canyon Formation contains gray, cherty and chalky limestones and dolomites interbedded with red sandstone, siltstones, and anhydrite (Huntoon et al. 1982). Cutler Formation sandstones are extensively jointed, faulted, and eroded, resulting in a distinctive erosional landscape with numerous hoodoos, deeply incised drainages, bedrock ridges, spires, fins, and arches (Lohman 1974).

Quaternary formations consist of alluvium on drainage floors and eolian sediments on landforms above the drainages. Sediments on the graben floors consist of



Figure 4. Topography in the northern end of Butler Flat, looking north.

colluvium interbedded with eolian sand. Talus formations are present along the steep cliffs that define the margins of the grabens. No formal mapping or descriptions of the Quaternary landforms have been completed in the project area.

The geologic history of the area indicates that, with the exception of erosion and deposition of alluvium in the valley floors and some eolian activity on landforms above the valley floors, the nature of the landforms has remained essentially unchanged during the Late Pleistocene and Holocene. The geologic formations and geomorphic settings in the area provide numerous rock overhangs and rockshelters that are suitable for habitation. They also provide numerous areas that can be used as game lookouts. The lag deposits of chert are not as readily available as in other portions of the park (Tipps 1995; Tipps and Hewitt 1989; Tipps et al. 1996).

Water Resources

Water is a relatively scarce resource in the project area. There are a few springs in the surrounding area but they are widely separated. One spring occurs in Cyclone Canyon, approximately 2 km to the west; another spring is located at the northern end of Devil's Pocket, approximately 2 km to the north; and Soda Spring is about 5 km to the northeast (Tipps and Hewitt 1989:77). No springs or seeps were identified during the inventory. Surface water is available on a seasonal basis in Butler Wash and Chesler



Figure 5. Topography in Butler Flat, looking north-northwest.

Canyon. However, no flow was observed in Chesler Canyon or Butler Wash during the inventory, even after several days of thundershowers. It is likely that flow in these drainages is a seasonal occurrence and, even then, only on an intermittent basis following major precipitation events. Surface water may also be available in bedrock hollows and depressions following precipitation events (rainstorms or snow). The Colorado River, approximately 4.2 km to the west, and Salt Creek, approximately 15.0 km to the northeast, are the closest permanent water sources, but the journey to both sources is long and arduous. Access to the Colorado River can be gained by traveling northwest down the Butler Wash drainage and then north through Red Lake Canyon to Lower Red Lake Canyon. Lower Red Lake Canyon is very steep but does provide access to the Colorado River. A pack trail is in the canyon today, and it is possible that prehistoric access to the river followed a similar route.

Drainage patterns in the project area are influenced by the structural geology, the depth to bedrock, and the soils. Drainages in the Grabens area generally flow parallel to the long axis of the grabens, i.e., along a southwest to northeast axis. There are only a few places where streams cross-cut or flow southeast to northwest through the Grabens. The Butler Wash area is one of these locations. Two intermittent streams, Butler Wash and Chesler Canyon, form the western and northeastern boundaries of the inventory area. A smaller, unnamed intermittent stream flows north into Chesler Canyon on the eastern side of Butler Flat. The bedload in these drainages is predominantly sand.

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Figure 6. Hoodoos and topography in the southern portion of Butler Flat, looking northeast.

Chesler Canyon is incised into bedrock along most of its length through the project area, and there are no preserved alluvial terraces in the project area. Butler Wash is also incised into bedrock, but not as deeply or as extensively as Chesler Canyon. There also appear to be no well-developed or preserved alluvial terraces along Butler Wash.

The soils in the Grabens area appear to be relatively deep and well drained with little available surface water. Soils in the project area are also well drained, but bedrock is present at shallow depths (generally 0.5-1.5 m) across most of the area. The presence of shallow bedrock and the absence of springs and marshy or cienega habitats indicate that groundwater and springwater are probably not present in significant amounts.

Climate

Canyonlands National Park has a semiarid continental climate. The area has low humidity and low annual average precipitation. Climatic data recorded from a 20-year period (1965-1984) at the Needles Ranger Station (elevation 1536 m) indicate a precipitation average of 22.3 cm per year (Lammers 1991:Table 1). The total average annual snowfall is 40.4 cm. Most of the precipitation occurs from July through December. February is the driest month (1.0 cm) and June is the second driest month (1.2 cm). Winter precipitation is generally associated with frontal storms, and summer precipitation

occurs primarily during afternoon thundershowers (Lammers 1991). The summers are hot and the winters are relatively cold. Monthly temperature averages range from -2.7° C (27.9° F) in January to 25.8° C (78.5° F) in July. Daily highs in June-August often exceed 37.7° C (100.0° F) with an average daily range from 16.4° C (61.6° F) to 35.2° C (95.3° F) in July. Daily temperatures in January range from -9.7° C (14.6° F) to 4.1° C (39.3° F). The growing season extends from May through September.

Soils

Soils in the project area are relatively shallow and have formed primarily in eolian sediments. Five soil associations have been identified (Lammers 1991). These are Mido Loamy Fine Sand, Ignacio-Leanto Fine Sandy Loam, the Rock Outcrop-Ustic Torripsamment Complex, the Rock Outcrop-Rizno Complex, and the Rizno-Rock Outcrop Complex.

The Mido Loamy Fine Sand association occupies approximately 28 percent of the project area and occurs along Chesler Canyon and on relatively flat benches and interfluves above the drainages. These are deep, well-drained soils classified as mixed, mesic, ustic torripsamments that have formed in sandy, eolian deposits. The depth to bedrock generally exceeds 1.5 m. The agricultural potential of this soil is limited by its loamy fine sand texture, low water capacity, and unconsolidated nature (Lammers 1991:52). The potential natural vegetation on this soil association has an average productivity of 272.7 kg dry weight per acre per year and includes Indian ricegrass (20 percent of the total productivity), four-wing saltbush (10 percent), and needle-and-thread grass (10 percent) as the predominant species (Lammers 1991:Table 4). Sandhill muhly, Mormon tea, and sagebrush are also present in significant amounts.

Soils of the Ignacio-Leanto Fine Sandy Loam association occupy approximately 8 percent of the project area and are restricted primarily to a broad flat on the eastern side of Butler Wash. Ignacio soils are classified as coarse-loamy, mixed, mesic, ustollic camborthids that have formed on structural benches in eolian deposits. The depth to bedrock ranges from 0.5 to 1.0 m. Leanto soils are classified as loamy, mixed, mesic, lithic camborthids. These are shallow, well-drained soils formed in eolian deposits. The depth to bedrock generally ranges from 0.25 to 0.50 m. The agricultural potential of Ignacio and Leanto soils is limited by shallow soil depth and very low water capacity (Lammers 1991:47). Ignacio soils have a vegetational productivity of 227.3 kg dry weight per acre per year. The potential natural vegetation on the Ignacio soils includes Indian ricegrass (20 percent of the total productivity), needle-and-thread grass (15 percent), sand dropseed (10 percent), four-wing saltbush (10 percent), and Mormon tea (10 percent) as the predominant species. Winterfat is also present. The vegetational productivity of Leanto soils averages 136.4 kg dry weight per acre per year. The primary

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natural species are galleta grass (20 percent of the total productivity), shadscale (15 percent), sagebrush (10 percent), and Indian ricegrass (10 percent). Needle-and-thread grass, Mormon tea, and snakeweed are also present.

Soils of the Rock Outcrop-Ustic Torripsamment Complex occupy approximately 30 percent of the project area. Approximately 45 percent of areas mapped within this association are rock outcrops. Ustic torripsamments form approximately 30 percent of this association. Other soils (Ignacio Fine Sandy Loam, Rizno Gravelly Fine Sandy Loam, and Arches Fine Sand) constitute the remaining 25 percent. The torripsamments are moderately deep to deep, well-drained soils that have formed in eolian sand. Depth to bedrock ranges from 0.5 to more than 1.5 m. Agricultural productivity averages 272.7 kg dry weight per acre per year and is limited by the unconsolidated nature of the soil, its shallow depth, and its very low water capacity. The primary natural species include Indian ricegrass (20 percent of the total productivity), needle-and-thread grass (10 percent), and four-wing saltbush (10 percent) (Lammers 1991). Mormon tea, drop-seed, sandhill muhly, sand sagebrush, globemallow, and buckwheat are also present.

Soils of the Rock Outcrop-Rizno Complex occupy approximately 29 percent of the project area. Approximately 65 percent of this association consists of rock outcrops. Rizno soils form approximately 20 percent of this association, whereas Mido Loamy Fine Sand and Arches Fine Sand constitute the remaining 15 percent. Rizno soils are classified as loamy, mixed (calcareous), mesic, typic torriorthents (Lammers 1991). They are shallow, well-drained soils that formed in eolian sediments. The depth to bedrock ranges from 0.2 to 0.5 m. Agricultural productivity averages 159 kg dry weight per acre per year and is limited by the shallow soil depth, alkalinity, and low water capacity. The primary species under natural conditions include blackbrush (35 percent of the total productivity) and Mormon tea (10 percent). Utah juniper, pinyon pine, galleta grass, and Indian ricegrass are also present.

The fifth soil association is the Rizno-Rock Outcrop Complex which occupies approximately 4 percent of the project area. Characteristics and vegetation of Rizno soils are discussed above.

In summary, soils in the project area are predominantly shallow and formed in eolian sediments overlying shallow bedrock. Small areas of alluvial sediments are present on the floors of the drainages but do not form a significant soil component in the area. More than 60 percent of the project area is mapped within the Rock Outcrop-Rizno, Rock Outcrop-Ustic Torripsamment, and Rizno-Rock Outcrop associations, which indicates that there are extensive areas with shallow soils and exposed bedrock. Although vegetation productivity in the area is relatively low, several species are present that may have attracted aboriginal people, as discussed below.

Vegetation

The project area is in the Great Basin Desertscrub Biome (Turner 1982). Modern vegetation maps of Canyonlands National Park indicate that three vegetational communities are present in the Butler Flat Area. These are the Indian Ricegrass/Needle-and-Thread Grass-Blue Grama Grass Community on mesas and ridges, the Sagebrush-Saltbush Community on alluvial flats and benches, and the Pinyon-Juniper Community in upland settings (National Park Service 1985). The majority of the project area supports the Sagebrush-Saltbush and the Indian Ricegrass/Needle-and-Thread Grass-Blue Grama Grass communities. Pinyon pine, Utah juniper, and Gambel's oak are present on the ridges and in protected areas against the cliffs but are relatively sparse and open.

A diversity of species was identified in the area during the inventory (Table 2). The predominant species over most of the project area are Indian ricegrass, sagebrush, saltbush, and needle-and-thread grass. Cheatgrass is also relatively common. The association of specific vegetational types with soils in the area has been previously discussed.

The modern vegetational environment and the effects of grazing have been discussed for the nearby Squaw Butte Area (Tipps and Heath 1995) and a similar situation may be present in the project area. Cheatgrass is an introduced species, and the dominance of sagebrush may be related to the effects of grazing rather than a natural plant successional sequence. Local species that may have provided food and other resources for prehistoric peoples include pinyon pine, Utah juniper, sagebrush, saltbush, rabbitbrush, Indian ricegrass, buckwheat, peppergrass, dropseed, buffaloberry, serviceberry, snowberry, and cliffrose. Snakeweed, globemallow, winterfat, Mormon tea, blackbrush, sagebrush, and grasses would have provided forage for animals.

Fauna

Canyonlands National Park is in the Abajo Mountain Subcenter of the Southern Rocky Mountain Faunal Area and in the San Juan Subcenter of the Canyonlands Province in the Colorado Plateau Faunal Area (Durrant 1952). Animals documented as present in the region during the Late Holocene include 12 species of bats, 3 lagomorph species, 29 rodent species, 11 carnivore species, and 4 artiodactyl species (Table 3). Few animals were observed during the inventory, and these sightings were limited primarily to birds, rabbits, and small rodents. Fish species occur in the nearby Colorado River. Gray wolf, mountain sheep, and bison inhabited the area during the early historic period or during Late Prehistoric and Protohistoric times, but are not present today. Cattle (*Bos* spp.) were introduced to the area during the historic period. Several species such as beaver, river otter, and muskrat are associated with riparian habitats and would have

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Table 2. Plant taxa identified in the project area.

Common Name	Scientific Name
Actinea	<i>Hymenoxys</i> spp.
Bigelow sagebrush	<i>Artemisia bigelovii</i>
Blackbrush	<i>Coleogyne ramosissima</i>
Black sagebrush	<i>Artemisia nova</i>
Bladderpod	<i>Eriogonum inflatum</i>
Blue grama	<i>Bouteloua gracilis</i>
Brickellbush	<i>Brickellia</i> spp.
Buffaloberry	<i>Shepherdia rotundifolia</i>
Cheatgrass	<i>Bromus tectorum</i>
Cliffrose	<i>Purshia mexicana</i>
Dropseed	<i>Sporobolus</i> sp.
Fine-branched eriogonum	<i>Eriogonum cernuum</i>
Fishhook cactus	<i>Sclerocactus whipplei</i>
Four o' clock	<i>Abronia</i> spp.
Four-wing saltbush	<i>Atriplex canescens</i>
Fremont barberry	<i>Berberis fremontii</i>
Galleta grass	<i>Hilaria jamesii</i>
Gambel's oak	<i>Quercus gambelii</i>
Globemallow	<i>Sphaeralcea</i> sp.
Greasewood	<i>Sarcobatus vermiculatus</i>
Hoary townsendia	<i>Townsendia</i> sp.
Indian ricegrass	<i>Stipa hymenoides</i>
Indian paintbrush	<i>Castilleja</i> spp.
Larkspur	<i>Delphinium</i> sp.
Mariposa lily	<i>Calochortus aureus</i>
Milk vetch	<i>Astragalus</i> spp.
Mormon tea	<i>Ephedra</i> sp.
Mountain mahogany	<i>Cercocarpus ledifolius</i>
Mutton grass	<i>Poa fendleriana</i>
Narrowleaf yucca	<i>Yucca angustissima</i>
Needle-and-thread grass	<i>Stipa comata</i>
Nevada bluegrass	<i>Poa nevadensis</i>
Peppergrass	<i>Lepidium</i> sp.
Pinyon pine	<i>Pinus edulis</i>
Prairie junegrass	<i>Koeleria pyramidata</i>
Prickly pear cactus	<i>Opuntia</i> spp.
Prince's plume	<i>Stanleya integrifolia</i>
Rabbitbrush	<i>Chrysothamnus</i> sp.
Rockcress	<i>Arabis</i> spp.
Sacred datura	<i>Datura stramonium</i>
Sandhill muhly	<i>Muhlenbergia pungens</i>
Sand sagebrush	<i>Artemisia filifolia</i>
Sego lily	<i>Calochortus flexuosus</i>
Serviceberry	<i>Amelanchier utahensis</i>
Shadscale	<i>Atriplex confertifolia</i>
Singleleaf ash	<i>Fraxinus anomala</i>

Table 2. Plant taxa identified in the project area (continued).

Common Name	Scientific Name
Snakeweed	<i>Gutierrezia</i> sp.
Snowberry	<i>Symphoricarpos oreophilus</i>
Squirreltail grass	<i>Elymus elymoides</i>
Stemless woolybase	<i>Hymenoxys acaulis</i>
Utah juniper	<i>Juniperus osteosperma</i>
Utah penstemon	<i>Penstemon uintahensis</i>
Vetch	<i>Vicia ludoviciana</i>
Wild Buckwheat	<i>Eriogonum</i> spp.
Winterfat	<i>Eurotia lanata</i>
Wyoming big sagebrush	<i>Artemisia wyomingensis</i>
Yellow cryptantha	<i>Cryptantha flava</i>

NOTE: Taxa listed on this table were identified in the project area by the field crew during the inventory.

been present along the Colorado River. Species of potential economic importance to prehistoric inhabitants include mule deer, pronghorn antelope, mountain sheep, bison, desert cottontail, Nuttall's cottontail, and black-tailed jackrabbit. The canyons and grabens in the area would have provided natural migration and transportation routes through the area that may have been utilized by the larger, more mobile species such as deer, antelope, bison, and mountain sheep.

A wide variety of bird species is present in the area or is known to pass through Canyonlands on a seasonal basis. A partial listing of these species is presented by Birnie (1996). Gambel's quail is the only potential upland game bird that would have been present in the area and available for prehistoric exploitation. Waterfowl would have been present along the Colorado River. Rattlesnakes (*Crotalus viridis*) and horned lizards (*Phrynosoma* spp.) are the main reptiles that probably inhabit the area.

Paleoenvironmental Summary

Early Holocene

The Early Holocene (10,000-6,500 B.P.) on the Colorado Plateau was apparently cooler than the modern environment, but with more effective precipitation than the Late Pleistocene (17,000-10,000 B.P.) or the modern period (Currey 1990; Currey and James 1982; Dean et al. 1985; Euler et al. 1979; Spaulding et al. 1984; Thompson 1984). Summer and cool-season precipitation were becoming more important, with a shift away from the winter-dominated Late Pleistocene pattern. The latter portion of the Early

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Table 3. Mammals known to inhabit Canyonlands National Park.

Common Name	Scientific Name
CHIROPTERA—Bats	
Vespertilionidae-Insectivorous Bats	
Little brown bat	<i>Myotis lucifugus</i>
Long-legged bat	<i>Myotis volans</i>
California bat	<i>Myotis californicus</i>
Small-footed myotis	<i>Myotis subulatus</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Western canyon bat	<i>Pipistrellus hesperus</i>
Big brown bat	<i>Eptesicus fuscus</i>
Red bat	<i>Lasiurus borealis</i>
Hoary bat	<i>Lasiurus cinereus</i>
Townsend's big-eared bat	<i>Plecotus townsendii</i>
Pallid bat	<i>Antrozous pallidus</i>
Molossidae-Free-tailed Bats	
Brazilian free-tailed bat	<i>Tadarida brasiliensis</i>
LAGOMORPHA—Rabbits and Hares	
Leporidae-Rabbits and Hares	
Nuttall's cottontail	<i>Sylvilagus nuttallii</i>
Desert cottontail	<i>Sylvilagus audubonii</i>
Black-tailed jackrabbit	<i>Lepus californicus</i>
RODENTIA—Rodents	
Sciuridae-Squirrels	
White-tailed antelope squirrel	<i>Ammospermophilus leucurus</i>
Rock squirrel	<i>Spermophilus variegatus</i>
Spotted ground squirrel	<i>Spermophilus spilosoma</i>
Abert's squirrel	<i>Sciurus aberti</i>
Red squirrel	<i>Tamiasciurus hudsonicus</i>
Colorado chipmunk	<i>Eutamias quadrivittatus</i>
Least chipmunk	<i>Eutamias minimus</i>
Whitetail prairie dog	<i>Cynomys leucurus</i>
Gunnison's prairie dog	<i>Cynomys gunnisoni</i>
Yellow-bellied marmot	<i>Marmota flaviventris</i>
Geomyidae-Pocket Gophers	
Botta pocket gopher	<i>Thomomys bottae</i>
Northern pocket gopher	<i>Thomomys talpoides</i>
Heteromyidae-Pocket Mice and Kangaroo Rats	
Apache pocket mouse	<i>Perognathus apache</i>
Ord kangaroo rat	<i>Dipodomys ordii</i>
Silky pocket mouse	<i>Perognathus flavus</i>

Table 3. Mammals known to inhabit Canyonlands National Park (continued).

Common Name	Scientific Name
Castoridae-Beaver	
Beaver	<i>Castor canadensis</i>
Cricetidae-New World Rats and Mice	
Western harvest mouse	<i>Reithrodontomys megalotis</i>
Canyon mouse	<i>Peromyscus crinitus</i>
Deer mouse	<i>Peromyscus maniculatus</i>
Brush mouse	<i>Peromyscus boylii</i>
Pinon mouse	<i>Peromyscus truei</i>
Northern grasshopper mouse	<i>Onychomys leucogaster</i>
Long-tailed vole	<i>Microtus longicaudus</i>
White-throated wood rat	<i>Neotoma albigula</i>
Desert wood rat	<i>Neotoma lepida</i>
Mexican wood rat	<i>Neotoma mexicana</i>
Bushy-tailed wood rat	<i>Neotoma cinerea</i>
Muskrat	<i>Ondatra zibethicus</i>
Erethizontidae	
Porcupine	<i>Erethizon dorsatum</i>
CARNIVORA—Carnivores	
Procyonidae-Racoons	
Ringtail	<i>Bassariscus astutus</i>
Mustelidae-Weasels, Skunks, Badgers, etc.	
Badger	<i>Taxidea taxus</i>
Eastern spotted skunk	<i>Spilogale putorius</i>
Striped skunk	<i>Mephitis mephitis</i>
Canidae-Coyotes, Wolves, and Foxes	
Coyote	<i>Canis latrans</i>
Gray wolf (e)	<i>Canis lupus</i>
Kit fox	<i>Vulpes macrotis</i>
Red fox	<i>Vulpes vulpes</i>
Gray fox	<i>Urocyon cinereoargenteus</i>
Felidae-Cats	
Cougar	<i>Felis concolor</i>
Bobcat	<i>Felis rufus</i>

THE ENVIRONMENTAL SETTING

Table 3. Mammals known to inhabit Canyonlands National Park (continued).

Common Name	Scientific Name
ARTIODACTYLA—Deer, Antelope, Mountain Sheep, and Bison	
Cervidae-Deer	
Mule deer	<i>Odocoileus hemionus</i>
Antilocapridae-Pronghorn	
Pronghorn	<i>Antilocapra americana</i>
Bovidae-Bison and Sheep	
Mountain sheep	<i>Ovis canadensis</i>
Bison	<i>Bison bison</i>

SOURCES: Field notes and Burt (1976), Durrant (1952), and Van Gelder (1982). Taxonomy follows Shaffer and Baker (1992).

(e) = Extirpated.

Holocene was a period of gradual warming and drying until environmental conditions characteristic of the mid-Holocene and Altithermal periods were reached.

There was probably little geomorphic change during the Early Holocene in the Butler Flat Area and most landforms were stable. Water may have been available on a more frequent basis in Butler Wash and Chesler Canyon. However, there is no evidence of any increased spring activity or the formation of any marsh or cienega (seep and wetland) areas.

The modern vegetational assemblage was essentially in place by the end of the Early Holocene (Betancourt 1984; Mehringer 1985) with the exception of pinyon pine and modern, introduced species (e.g., cheatgrass). The extinction of Pleistocene megafauna (e.g., musk ox [*Symbolos* spp.], horse and onager [*Equus* spp.], Harrington's mountain goat [*Oreamnos harringtoni*], camel [*Camelops* cf. *hesternus* and *Hemiauchenia* spp.], Columbian mammoth [*Mammuthus columbi*], and bison [*Bison antiquus* and *Bison* spp.]) was completed during the Late Pleistocene-Early Holocene transition (Agenbroad and Mead 1992a; Madsen et al. 1976; Miller 1979). Some modern bison and antelope may have roamed the area throughout the Holocene. By the end of the Early Holocene, the faunal assemblage was similar to that of today.

Middle Holocene

During the Middle Holocene or Altithermal period (approximately 6500-3500 B.P.), temperatures were warmer with less effective precipitation than modern conditions. The deposition of dune sands provides evidence for increased eolian activity. Vegetation was similar to that of the modern period, with the absence of historically

introduced non-native species (e.g., cheatgrass, tamarisk). Pinyon pine was present in Canyonlands National Park by 5150 B.P. (Mead and Agenbroad 1992). The mid-Holocene faunal assemblage was essentially the same as has been recorded historically.

Late Holocene

The environmental conditions during most of the Late Holocene (3500 B.P. to present) were the same as in the modern environment with several minor fluctuations. The Neoglacial (approximately 3500-1800 B.P.) and the Little Ice Age (A.D. 1400-1850) may have had slightly cooler temperatures and more effective precipitation than at present. Dune sands were probably stabilized with some soil development occurring during the beginning of this period. Eolian activity may have increased at approximately 2200 B.P. (Ahlbrandt et al. 1983; Stokes et al. 1991; Wells et al. 1990). The vegetational assemblage was probably the same as today, with the exception of historically introduced species and effects caused by grazing (see vegetation and pregrazing vegetation discussions, above). A larger number of animals and greater productivity of the vegetational assemblage may have occurred in response to the cooler and more mesic conditions during the Neoglacial and Little Ice Age. The dominance of species such as cheatgrass, rabbitbrush, and sagebrush in the modern vegetation assemblage may be a result of overgrazing and widespread human disturbance rather than a natural succession. It is likely that native species, such as Indian ricegrass, saltbush, juniper, Nevada bluegrass, and pinyon pine, were more prevalent than at present. The modern faunal assemblage was also in place, although species not normally found in the area today, such as bison, bighorn sheep (Chandler 1988), and wolf, were likely to have been present. Bison remains that date to a transitional protohistoric-historic period have been recovered from Arches National Park (Mead et al. 1991).

It is probable that the Butler Flat Area was a marginal area for prehistoric agriculture because of the low precipitation, shallow soils, extensive areas of exposed bedrock, and low water capacity of the soils. Most precipitation events in the area would result in extensive runoff into the drainages. The incised nature of Butler Wash and Chesler Canyon does not provide an advantageous setting for floodwater or runoff-based agriculture. Reed (1993:19-21) argues that the Salt Creek area was suitable for agriculture from A.D. 500 to 800 and again from A.D. 900 to 1100. The Butler Flat Area is not comparable in terms of the availability of groundwater or surface water, and it is unlikely that agriculture could have been successfully practiced in the area at this or other times.

Summary

The Butler Flat Area has several natural resources that may have made it an attractive location for prehistoric occupation, at least on an occasional basis. Lithic resources (e.g., cherts) are available in the area in the form of small clasts. Raw material suitable for use as groundstone tools is also present. The eroded rock formations form numerous hoodoos and cliffs with overhangs and rockshelters suitable for use as camps or habitations. High points on the bedrock formations provide suitable lookout locations that could be used when hunting game animals. The rock faces also provide locations for the execution of rock art.

The availability of water is a limiting factor on the vegetation, fauna, and possible human occupation in the area. It is likely that water was available only on a seasonal basis or in drainages, bedrock depressions, and hollows following precipitation events. The shallow soils and low water availability indicate that prehistoric agriculture was not a viable pursuit in the Butler Flat Area. Nevertheless, the local soils probably support a diverse array of plant resources that could have been used by aboriginal people. The seasonal availability of seeds and other plant resources could have provided a predictable resource base. Pinyon pine, prickly pear cactus, saltbush, shadscale, serviceberry, snowberry, buffaloberry, and cliffrose were probably available as plant foods, as were Indian ricegrass, Mormon tea, and buckwheat. A variety of different plants may also have provided nonfood resources such as fibers, fuel, construction material, paint, and medicinal remedies. Faunal resources may have included cottontail and Nuttall's cottontail, jackrabbits, and a variety of rodents, in addition to larger game animals such as deer, antelope, bison, and bighorn sheep, although it is doubtful that animal life was ever very abundant.

Although the semiarid climate and shallow soils would have functioned as a limiting factor on the diversity of species and the numbers of individuals present, the Butler Flat Area has a series of relatively reliable and predictable resources that would have attracted prehistoric humans and fauna. The grabens would have provided natural transportation routes through the region that faunal species may have utilized. Prehistoric humans may also have used this area as a transportation route while traveling north or south through the grabens or as an access route to the Colorado River.

Chapter 3

SUMMARY OF THE SITES

Introduction

by Betsy L. Tipps

This chapter presents information on the sites recorded during the inventory. It begins with a discussion of site density. This is followed by a brief review of site types as well as their ages and cultural affiliations. The chapter concludes with a description of each site.

A total of 50 sites and 32 isolated finds (IFs) was documented during the 1080-acre Butler Flat Area inventory. This is an average of .05 sites and .03 isolated finds per acre, or 30 sites and 19 isolated finds per square mile. These densities are considerably lower than those recorded in the adjacent Devils Lane (Tipps and Hewitt 1989) and nearby Squaw Butte (Tipps 1995) areas also inventoried as part of the Canyonlands Archeological Project. The lower density of sites in the Butler Flat Area may relate to the relative availability of resources in the various inventoried areas. For example, the Squaw Butte Area has more lag deposits of chippable chert and more seasonal water sources than the Butler Flat Area. It also has a perennial watercourse (Salt Creek) and small patches of arable alluvium that attracted a small Anasazi farming community; both of these resources are lacking in the Butler Flat Area. The Devils Lane Area environment is similar to that of the Butler Flat Area except that it lacks natural sources of moderate to high-grade toolstone, but it may have more sites because it lies along a natural travel corridor through the Grabens. Devils Lane contains numerous rock art panels which may be marking an aboriginal trail. Although Butler Flat is near a pack trail that is believed to date from aboriginal times, the trail does not traverse Butler Flat, which may account for the lower density of sites, particularly rock art sites. Differences in recording procedures may also partially explain the reduced site density in the Butler Flat Area. The Butler Flat field crew appears to have lumped more cultural manifestations into larger sites than was done on all other years of the Canyonlands Archeological Project.

SUMMARY OF THE SITES

All 50 sites recorded during the inventory have prehistoric remains; 3 also have minor historic or modern components. The historic/modern components consist of charcoal scatters from campfires, woodpiles, or weathered poles that may have once formed a crude livestock pen. None of these have associated artifacts. The prehistoric sites are mostly lithic scatters sometimes with a few sherds and/or features; there is one small masonry architecture site consisting of a crude, one-room, dry-laid structure abutted to the back wall of a shallow overhang. Almost half of the sites are simple lithic scatters; most of these, and in fact most of the Butler Flat Area sites, are in open settings. Approximately one-fifth of the sites are lithic scatters with low-investment features such as hearths, ash and charcoal stains, ash and rock concentrations, fire-cracked rock scatters, rock alignments, or rock art. Six sites are lithic scatters with a few sherds; half of these also have simple features analogous to those noted above. Five sites are lithic source areas, some of which have features, sherds, or both. These sites contain lag deposits of mainly yellow-brown and tan-brown Algalitic Chert. With few exceptions, the site types in the Butler Flat Area are consistent with short-term, transient occupation by people traveling through the area or staying no more than a few weeks at a time.

The 50 sites have 59 identifiable components. Only 21 (36 percent) components can be assigned to a time period or time period and cultural group, and these assignments are frequently based on just one or two diagnostic phenomena such as a projectile point, a Shoshonean knife, or a few pieces of pottery. As noted in previous reports on the Canyonlands Archeological Project (Tipps 1995; Tipps and Hewitt 1989; Tipps et al. 1996), assigning site age and affiliation on the basis of a few surface artifacts can result in misclassifications because of prehistoric artifact scavenging and recycling, selective illegal collection of diagnostic artifacts by park visitors, and portions of sites being buried by postoccupational deposits, etc. However, there was no alternative means of compiling information on the chronology of occupation and identity of cultural groups that inhabited the area. Certain sites may be individually misclassified, but the overall trends are probably accurate.

It should also be noted that some sites appear to have additional components but lack the time- and culture-sensitive artifacts and features needed to designate additional components. For example, several large lithic scatters have a few pieces of Anasazi pottery, suggesting some Anasazi utilization. However, they also have numerous one-hand manos, basin metates, finely crafted bifaces manufactured using a bifacial reduction technology, and nonlocal materials acquired from great distances (50 km), all of which are more characteristic of the Archaic period. These sites lack artifacts and features that are diagnostic of only the Archaic; therefore, they could only be coded as Anasazi. This same situation occurs on some sites that have no time- or culture-diagnostic artifacts or features. The site descriptions in the second part of this chapter identify sites

that appear to be Archaic, even though they lack the necessary evidence to designate them as Archaic.

The large size of many sites also suggests the presence of additional unrecognized components. First, sites with definite multiple components are considerably larger than the average for all sites (60,594 m² versus 13,150 m²). Second, 60 percent of the Butler Flat Area sites are up to 70 times larger than modern, single-use, hunter-gatherer sites of analogous type. Tipps et al. (1996) suggest that short-term camps and residential bases occupied by prehistoric hunter-gatherers should be of similar size to single-occupation, modern hunter-gatherer sites of analogous type, if they also represent single occupations. Following this line of reasoning, Tipps et al. (1996) researched the size of short-term camps and residential bases for a variety of modern hunter-gatherer groups around the world. Among these groups, short-term camps cover 5-100 m². Residential bases typically range from 44 to 1,400 m², although there is one outlying group, the Ngatatjara Aborigines of Western Australia, whose residential bases range from 9,497-152,776 m² (Gould and Yellen 1987:Table 1). Site size in the Butler Flat Area ranges from 28 to 97,860 m². Approximately 36 percent cover less than 1400 m², the maximum size of residential bases among all but one modern hunter-gatherer group in the comparison. Another 32 percent are 1,800-9,700 m² each and the remaining 32 percent are all larger than 10,000 m². If the assumption that prehistoric and modern hunter-gatherer sites of analogous type should be of similar size is valid, many more sites in the Butler Flat Area are multicomponent than can be definitively identified from surface indications.

Based on projectile point types, six sites and components are Archaic. Three date to the Early Archaic, two to the Middle Archaic, and one to the generalized Archaic period (Table 4). In addition, a Middle Archaic projectile point fragment was discovered as an isolated find. The Archaic sites and components include two lithic source areas, one with an ash and rock concentration, and four lithic scatters, one with an unlined hearth, a slab-lined hearth, and a midden (Table 5). The lithic source area with the ash and rock concentration is multicomponent, so the feature may not date to the Archaic. Despite the midden on one site, the Archaic sites all appear to be the result of short-term, transient occupation, probably by people practicing a mobile lifeway. Common activities appear to have included procurement and processing of the local Algalitic Chert toolstone, probable toolstone heat treatment, primary manufacture of chipped stone tools, tool maintenance, restocking mobile toolkits, and generalized camp and subsistence activities such as hunting, wild plant processing, hide working, etc. The projectile point types on the Archaic sites are typical of northern Colorado Plateau assemblages. The presence of San Rafael Side-notched points may signify influence or association with the Plains (Holmer 1978:69).

SUMMARY OF THE SITES

Table 4. Frequency of sites and recognized components by age and cultural affiliation.

Time Period	Archaic	Anasazi	Numic	Aboriginal	Euroamerican	Total
Early Archaic	3	-	-	-	-	3
Middle Archaic	2	-	-	-	-	2
Archaic	1	-	-	-	-	1
Pueblo II-III	-	5	-	-	-	5
Pueblo III	-	4	-	-	-	4
Formative	-	1	-	3	-	4
Late Prehistoric/Protohistoric	-	-	2	-	-	2
Prehistoric	-	-	-	35	-	35
Historic/Modern	-	-	-	-	3	3
Total	6	10	2	38	3	59

The presence of Mesa Verde pottery identifies ten sites and components as Anasazi. Four are believed to date to Pueblo III because they have predominantly Pueblo III white wares such as McElmo and Mesa Verde Black-on-white. The ceramic artifacts on five others can only be ascribed to the more generalized Pueblo II-III period (e.g., corrugated pottery), although it is possible they date to just Pueblo III. The tenth property has plain gray ware pottery that could date anytime from Basketmaker III to Pueblo III. The ten Anasazi sites and components consist of six sherd and lithic scatters, three with features, and four lithic source area and sherd scatters, three with features. Feature types include the following: hearth, ash and charcoal stain, ash and rock concentration, fire-cracked rock concentration, midden, oblong slab-lined feature, rock alignment, and petroglyph. Because some of the Anasazi sites are clearly multicomponent, some of these features may be associated with occupation by other cultural groups during other time periods. Even so, and even if the one masonry structure found in the project area is attributed to the Anasazi, the features are insubstantial; none required much effort to create or maintain. These features are consistent with short-term, transient occupation that is best categorized as camping.

Pueblo II-III Anasazi were heavily dependent on an agricultural subsistence strategy, but there is no indication that they (or anyone else) ever grew corn or other domesticates in the Butler Flat Area. Seasonal habitation sites, farmsteads, and granaries are entirely lacking and tools for processing large-grained foods such as corn are scarce. In addition, the environmental setting would not have been conducive to raising crops. The project area lies well below the elevation where dry-farming is possible, and there are no locations in the project area where crops could have been supported by flood or irrigation water. Like the eastern Needles District (Tipps 1995; Tipps and Hewitt 1989), the greater Grabens/Butler Flat area may contain small plots of land that could have been successfully farmed in prehistoric times, but none exist in the project area. Most

Table 5. Frequency of sites and components by time period and descriptive site type.

Time Period	Lithic Source Area	Lithic Source Area with Feature(s)	Lithic Scatter	Lithic Scatter with Feature(s)	Sherd and Lithic Scatter	Sherd and Lithic Scatter with Feature(s)	Lithic Source Area and Sherd Scatter	Lithic Source Area and Sherd Scatter with Feature(s)	Masonry Architecture Site	Historic/Modern Site	Total
Early Archaic	-	1	1	1	-	-	-	-	-	-	3
Middle Archaic	1	-	1	-	-	-	-	-	-	-	2
Archaic	-	-	1	-	-	-	-	-	-	-	1
Pueblo II-III	-	-	-	-	3	2	-	-	-	-	5
Pueblo III	-	-	-	-	-	1	1	2	-	-	4
Formative	1	-	1	-	-	-	-	1	1	-	4
Late Prehistoric/Protohistoric	-	1	1	-	-	-	-	-	-	-	2
Prehistoric	1	-	24	10	-	-	-	-	-	-	35
Historic/Modern	-	-	-	-	-	-	-	-	-	3	3
Total	3	2	29	11	3	3	1	3	1	3	59

SUMMARY OF THE SITES

Anasazi use of the Butler Flat Area appears to have been geared toward toolstone procurement, hunting, and wild plant gathering. This type of adaptation is analogous to that observed in the Salt Creek Pocket Area of the eastern Needles District (Tipps and Hewitt 1989). Although some groups may have come to the area to procure specific resources, most were probably passing through and briefly camped before moving on. As noted above, the project area lies near a known aboriginal trail that leads to the Colorado River crossing at Spanish Bottom and into what is now the Maze District.

The ceramic assemblage on the Anasazi sites is entirely Mesa Verdean with the exception of a single Tusayan Series gray ware sherd. These artifacts appear to represent the western Anasazi, dark-paste ceramic complex manufactured in the general Elk Ridge Plateau area, a short distance to the south and southwest. Given the transient nature of the Anasazi occupation, it is unlikely that pottery was ever produced in the project area.

Two sites date to the Late Prehistoric/Protohistoric period and were probably used by Numic speakers such as the Ute or their ancestors. These two sites were identified on the basis of a Desert Side-notched projectile point and a Shoshonean knife. One site is a large, multicomponent lithic source area with several thermal features and an oblong slab-lined phenomenon. The other is a small lithic scatter with just a single known component; cultural remains on this site are sparse (just 20 artifacts), but diverse (1 Shoshonean knife, 1 medium side-notched projectile point, 3 biface fragments, 2 modified flakes, and 13 pieces of debitage), suggesting that it was used as a short-term camp. The nature of occupation on the multicomponent site is uncertain.

The cultural status of the 38 remaining prehistoric sites and components is unknown. Three evidently date to the Formative period based on the presence of architecture on one site and Rose Spring projectile points on two others; the age of the other 35 is unknown, although some, as previously mentioned, have characteristics that are usually associated with the Archaic. Finally, there are three minor Euroamerican components that are historic or modern. These components are typified by campfires, woodpiles, and in one case, some weathered poles that may have once formed a small enclosure for livestock. These components are extremely ephemeral and probably associated with recreational activities or with livestock herding before the creation of the park.

In summary, the Butler Flat Area appears to have been used frequently throughout prehistory, beginning no later than the Early Archaic. Aboriginal use continued into Late Prehistoric/Protohistoric times. Despite the frequent and long history of use, almost all occupation was short-term and transient. Procurement and processing of the local toolstone and gathering and processing of seed plants were probably the primary activities, along with some hunting. It is very unlikely that farming was undertaken in the project area. A few project area occupants were probably on logistical forays or visited

the area while traveling through as part of a biseasonal residence pattern. However, most were probably practicing a mobile hunting and gathering lifeway during the majority of the year and stopped in the Butler Flat Area for a short period of time during their annual round.

Site Descriptions

by Daniel K. Newsome

This section provides information on the location, setting, and characteristics of the sites documented in the Butler Flat Area. At the request of the National Park Service, specific locational information has been omitted.

Site Number: 42SA18363

Descriptive Site Type: Lithic source area and sherd scatter with features

Cultural Affiliation: Anasazi

Periods of Occupation: Formative

Site Size: 315 m by 150 m

Site Setting: The site is on a bench in Butler Flat, overlooking the confluence of Butler and Chesler Canyon washes. The depositional context is colluvium composed of fine-grained, reddish tan, sandy sediment with an abundance of sandstone detritus. Blackbrush is the most common flora, followed by pinyon and juniper. Mormon tea, four-wing saltbush, globemallow, peppergrass, prince's plume, and miscellaneous grasses are also fairly common.

Site Description: This site is a large but relatively sparse lithic source area and sherd scatter with features. It has 8 cores, 2 unifaces, 4 scrapers, 3 bifaces, 1 modified flake, 1 plain gray ware sherd, and 3 features. The lithic source material occurs as outcropping tan to brown Algalitic Chert and orange to reddish brown Cedar Mesa Chert within a limestone matrix.

Much of the lithic debitage at the site is contained within two concentrations. The most extensive of these is Concentration 1, which includes several chipped stone tools and the single gray ware sherd. Lithic debitage in this concentration is made up of approximately equal proportions of Cedar Mesa Chert and Algalitic Chert, with minor quantities of agate and other cherts. Core reduction debris is prevalent, with much of the local material occurring as large quarry flakes. At least 100-150 items occur in Concentration 1. Concentration 2 consists entirely of Algalitic Chert. Quarrying, decortication, and core reduction debris are predominant, but there are some small flakes and at least one tool. Approximately 150 pieces make up the localized concentration. Knapping seems to have been oriented toward quarrying and bifacial reduction from cores, rather

SUMMARY OF THE SITES

than simple core/flake production as with Concentration 1. In addition to Cedar Mesa Chert and Algalitic Chert, there is some agate, black chert, and Dakota Quartzite.

The three features observed at the site include Feature 1, a small crack in an alcove tightly stuffed with small stones of a very different color than the sandstone forming the alcove, and two heavily weathered logs (Features 2 and 3). The area in and around Feature 1 is extremely eroded due to runoff from above so that no function or further attributes could be distinguished. The two weathered logs lie to the north and south of Feature 1, and may have formed a modern livestock enclosure at one time. However, the extant remains are insufficient to accurately ascertain this function.

The site appears to have served as a limited multiple use area that included chert procurement and possibly hunting and game processing. Concentration 1 may have been a camp location due to the presence of the sherd and the variety of tools.

Site Number: 42SA18364

Descriptive Site Type: Lithic source area

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 33 m by 38 m

Site Setting: The site is on a gently sloping ridge top above Butler and Chesler Canyon washes. The depositional context is residual with decomposing sandstone and limestone detritus constituting the site surface. Vegetation in and around the site includes black-brush, needle-and-thread grass, Mormon tea, globemallow, sego lily, prince's plume, cheatgrass, and several other species that are very sparse.

Site Description: This site consists of a small but heavy scatter of chert debitage associated with naturally occurring chert detritus outcropping in a light gray limestone matrix. The chert is mainly reddish brown to brown Cedar Mesa Chert, but there is some tan to brown Algalitic Chert. Much of the debris may be due to the extensive natural fracturing of the rock but there are at least 100-500 pieces of debitage attributable to quarrying and preliminary core reduction activity. The site has no tools or cores, and no features were noted. The site appears to be a limited episode quarry and primary reduction locus.

Site Number: 42SA18365

Descriptive Site Type: (1) Lithic source area with feature; (2) Lithic source area and sherd scatter with feature

Cultural Affiliation: (1) Archaic; (2) Anasazi

Periods of Occupation: (1) Early Archaic; (2) Pueblo III

Site Size: 132 m by 100 m

Site Setting: The site is on a slope and bench below Butler Flat and above Chesler Canyon. The depositional context consists of light reddish tan, silty sand on the bench

above the wash and red-brown, silty sand on the slope below Butler Flat. The vegetation includes blackbrush, juniper, pinyon, singleleaf ash, snowberry, rabbitbrush, Mormon tea, actinea, yellow cryptantha, wild buckwheat, cheatgrass, Indian ricegrass, old man prickly pear, and other, less abundant forbs and shrubs.

Site Description: This site is a rather extensive lithic scatter composed of 100-500 flakes, 28 chipped stone tools (1 Northern Side-notched projectile point, 19 bifaces, 3 scrapers, 2 unifaces, and 3 modified flakes), 6 cores, 1 hammerstone, 2 pieces of groundstone, 1 McElmo Black-on-white bowl sherd, and a concentration of oxidized sandstone and ash covering a 1.3- by 1.0-m area. The site is associated with limestone talus debris that contains Algalitic Chert as well as Cedar Mesa Chert. There are small amounts of gray chert, brown chert, white chert, black chert, quartzite, and obsidian. There is some generalized quarrying debris scattered around the site area and three concentrations of lithic material. The site shows varied use, probably for short time periods, with field camp and lithic working activities apparent.

Concentration 1 is the heaviest. It consists mainly of coarse, large-sized Cedar Mesa Chert quarrying debris, but decortication, core reduction, thinning, and retouch flakes are also present, as are numerous tools and several cores. Various cherts accompany the Cedar Mesa and Algalitic cherts in this area, and there are some agates and a piece of obsidian. There are at least 100 pieces of debitage in Concentration 1. The Northern Side-notched point as well as the McElmo Black-on-white sherd were found in Concentration 1.

Concentration 2 is smaller and less dense. Bifacial thinning flakes predominate, followed by core reduction and pressure flakes. Algalitic Chert is accompanied by Cedar Mesa Chert, additional cherts, and quartzite. The ash and rock concentration is within Concentration 2 and is spatially associated with the hammerstone and the two pieces of groundstone. There are probably less than 50 artifacts in this concentration.

Concentration 3 is the smallest and lightest of the concentrations. It has no more than 25 flakes, but displays all stages of flakes from decortication to pressure. Bifacial thinning, however, is dominant, as is Algalitic Chert. There is also a variety of other cherts, Cedar Mesa Chert, and agate. No tools or diagnostic materials were noted in this concentration.

Site Number: 42SA18366

Descriptive Site Type: (1) Lithic source area and sherd scatter with features; (2) Lithic source area with features

Cultural Affiliation: (1) Anasazi; (2) Numic

Periods of Occupation: (1) Pueblo III; (2) Late Prehistoric/Protohistoric

Site Size: 300 m by 240 m

SUMMARY OF THE SITES

Site Setting: The site is on the top and slope of a ridge overlooking the confluence of Chesler Canyon and Butler washes. The depositional context is colluvium composed of light reddish tan, sandy soil that contains an abundance of sandstone detritus. Vegetation is dominated by blackbrush. Other taxa include pinyon, juniper, Mormon tea, actinea, rockcress, Indian ricegrass, and a few other unidentified forbs.

Site Description: This site is an extensive lithic scatter dominated by knapping debris of predominantly tan and brown Algalitic Chert, which occurs naturally on the site along with minor amounts of white chert. There are numerous cores, tested nodules, and pieces of fractured chert, along with lag deposits of naturally occurring chert clasts and debris evidently derived from a limestone matrix that has been weathered away. Much of the material is quarrying debris, but there are also many tools and there is considerable diversity in the large, obviously multicomponent site. Other toolstones on the site include Cedar Mesa Chert, other cherts, agate, and quartzite.

There are seven main lithic concentrations, with generally sparse cultural materials and a few features scattered between. Most of the concentrations appear to be localized knapping areas probably generated by one or two individuals working the locally outcropping materials. Other concentrations may represent camps. The site is mainly an eroded and deflated surface scatter, but cultural deposition and buried features occur in two of the concentrations and elsewhere on the ridge slope. Five features were observed at the site: one oblong slab-lined feature measuring 1.0 by 4.3 m; one concentration of ash and rock covering 1.7 by 1.2 m; two ash and charcoal stains that are less than 2 m across; and one concentration of oxidized sandstone measuring 1.5 m in diameter. The surface assemblage consists of 6 projectile points (1 Elko Side-notched projectile point, 1 Elko Corner-notched projectile point, 1 large-eared projectile point, 1 Rose Spring projectile point, 1 Desert Side-notched projectile point, and 1 medium corner-notched projectile point), 1 side-notched knife, 40 bifaces, 5 flake tools, 14 cores, 3 groundstone tools, 1 hammerstone, and 4 worked sherds, along with thousands of pieces of lithic debitage.

The variety of materials and features in different parts of the site reflect a diversity of generally short-term occupations through time. Both primary and secondary lithic reduction, short-term encampment, and probably other limited activity occupations are represented. In addition, the site area contains abundant, naturally occurring chert along with quarrying debris indicative of lithic procurement.

Site Number: *42SA18367*

Descriptive Site Type: (1) Sherd and lithic scatter with features; (2) Historic/Modern site

Cultural Affiliation: (1) Anasazi; (2) Euroamerican

Periods of Occupation: (1) Pueblo II-III; (2) Historic/Modern

Site Size: 32 m by 10 m

Site Setting: The site occupies sloping terrain above Chesler Canyon Wash at the northern end of Butler Flat. The depositional context is colluvium composed of light reddish tan, sandy soil that contains an abundance of sandstone detritus. Juniper is the predominant vegetation in the area. Other plant taxa include blackbrush, Gambel's oak, singleleaf ash, pinyon, Mormon tea, cheatgrass, actinea, yellow cryptantha, rockcress, and snakeweed.

Site Description: The site is a sparse lithic scatter composed of approximately 25 flakes, 6 chipped stone tools, 1 Mesa Verde White Ware sherd, and 3 features. The flakes consist primarily of Algalitic Chert core reduction debitage, although a few flakes of Cedar Mesa Chert, gray chert, and white chalcedony, as well as one flake of obsidian, are also present. The tools include one uniface, three modified flakes, and two side scrapers. The 3 features include a low, linear rock alignment beneath a talus boulder that provides a low overhang, a wood pile that consists of approximately 25 weathered pieces of ax-cut juniper, and an eroded charcoal scatter measuring roughly 2 m in diameter. The deteriorated pile of firewood and the charcoal scatter appear to be historic or modern in age, probably twentieth century. However, no historic or modern artifacts were noted with these two features.

Site Number: 42SA18368

Descriptive Site Type: Lithic scatter with features

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 12 m by 14 m

Site Setting: The site is on an eroded slope in a valley that forms a bench above Butler Wash. Sediments consist of light yellowish red, silty, eolian sand. The vegetation is mostly blackbrush. Also present are rabbitbrush, rockcress, snakeweed, cheatgrass, Indian ricegrass, and a sparse scattering of other forbs and grasses.

Site Description: This small site consists of approximately 25 flakes, 1 modified flake, 1 mano, 1 metate, and 2 fire-cracked rock concentrations that are heavily eroded. The debitage is predominantly Algalitic Chert thinning and retouch flakes, but includes a few pieces of gray chert, Dakota Quartzite, and other quartzite. The cultural materials occur in a blowout, but there seems to be little potential for buried cultural resources in uneroded areas and for in situ cultural depth. One feature is a cluster of heat-altered and fire-cracked limestone cobbles measuring approximately 2 m in diameter. The other consists of burned pieces of tabular sandstone over a 1- by 2-m area. The minimal assemblage and localized nature of the site suggest a brief occupation. Although none of the materials is diagnostic, the character of the groundstone assemblage, type of features, and absence of pottery suggest an Archaic age for the site.

SUMMARY OF THE SITES

Site Number: 42SA18369

Descriptive Site Type: Lithic scatter with features

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 78 m by 69 m

Site Setting: The site is on a sloping dune on the first bench above Butler Wash in a down-faulted valley. Sediments are composed of fine-grained, light yellowish red, silty sand with some sandstone detritus. The vegetation includes blackbrush, pinyon, juniper, greasewood, needle-and-thread grass, Indian ricegrass, Mormon tea, and several other forbs and grasses.

Site Description: The site is a sparse lithic scatter with one core and two features. Most of the lithic material is within two concentrations, although there is scattered material between them. Concentration 2 consists of approximately 15-20 core reduction and thinning flakes of gray-brown chert and a core fragment. Concentration 1 contains about 15 core reduction flakes of Algalitic Chert, 1 limestone flake, and the 2 features. Feature 1 is an eroded concentration of fire-cracked rock covering a 1- by 2-m area. Feature 2 is a slab-lined hearth with intact ash and charcoal deposits. Gray-brown chert and Algalitic Chert occur in approximately equal proportions and account for most of the toolstone. There is some gray chert, white chalcedony, and limestone. The site apparently served as a field camp location with associated lithic reduction activity. Whether the two concentrations are associated is not certain; neither could be dated using inventory data.

Site Number: 42SA18370

Descriptive Site Type: (1) Lithic scatter; (2) Historic/Modern site

Cultural Affiliation: (1) Aboriginal; (2) Euroamerican

Periods of Occupation: (1) Prehistoric; (2) Historic/Modern

Site Size: 135 m by 95 m

Site Setting: The site is in a tributary canyon to Butler Wash, on the slopes of Butler Flat, primarily on a dune slope and partially on a mesa slope. Sediments consist of fine-grained, yellowish red, sandy soil in the dune area, and poorly sorted sand with grayish brown sandstone detritus on the mesa slope. The vegetation includes blackbrush, Mormon tea, juniper, pinyon, singleleaf ash, peppergrass, actinea, rockcress, yellow cryptantha, and a few additional forbs.

Site Description: The site is a lithic scatter composed of approximately 150 pieces of debitage, 5 bifaces, 1 knife, and 2 cores. Most artifacts are made of Algalitic Chert. There is a small amount of Cedar Mesa Chert and Dakota Quartzite. In addition to the lithic debitage and tools, a charcoal scatter was observed. However, the charcoal scatter appears to be of recent origin, even though no modern artifacts were found in association with it. The primary activities apparent at the site include secondary lithic reduction

and utilization of bifacial tools. Although there is no surface evidence of prehistoric features, subsurface cultural deposition may be present. The site is interpreted as a limited-activity area or short-term camp.

Site Number: 42SA18371

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 8 m by 8 m

Site Setting: The site is within a small overhang just below a mesa top. The depositional context is colluvium composed of fine-grained, yellowish red, silty sand with some sandstone detritus. The primary vegetation consists of snowberry, wild buckwheat, Indian ricegrass, Utah penstemon, actinea, and cheatgrass. Also present are Mormon tea and singleleaf ash.

Site Description: The site consists of a small, sparse scatter of 10-25 Algalitic Chert flakes in a small sandstone overhang below the Butler Flat rimrock. No tools or features are present on the surface. Core reduction flakes make up most of the assemblage, along with a few primary and secondary decortication flakes and one bifacial thinning flake. The debitage indicates that the protected, shady location was used for primary reduction of local lithic material.

Site Number: 42SA18372

Descriptive Site Type: (1) Lithic scatter; (2) Sherd and lithic scatter

Cultural Affiliation: (1) Archaic; (2) Anasazi

Periods of Occupation: (1) Middle Archaic; (2) Pueblo III

Site Size: 380 m by 260 m

Site Setting: The site is on a predominantly sloping ridge on top of Butler Flat. The depositional context is colluvium composed of fine-grained, yellowish red, silty sand with some sandstone detritus. The vegetation includes blackbrush, juniper, pinyon, Mormon tea, four-wing saltbush, larkspur, rockcress, peppergrass, Indian ricegrass, and several other forbs and grasses.

Site Description: The site is an extensive artifact scatter consisting of seven main concentrations with a light, diffuse scatter between the concentrations. More than 500 pieces of debitage, representing primarily core reduction activities, were observed. Algalitic Chert is the most abundant material type, followed by Cedar Mesa Chert, gray chert, and gray-brown chert, with some Summerville Chalcedony, Cedar Mesa Chalcedony, Dakota Quartzite, and black chert. The lithic tool assemblage consists of 3 San Rafael Side-notched projectile point fragments, 2 Elko Eared projectile points, 1 Elko Side-notched projectile point, 33 bifaces, 5 scrapers, 2 unifaces, 1 modified flake,

SUMMARY OF THE SITES

10 cores and utilized cores, 2 hammerstones, and 2 manos. In addition to the lithic debitage and tools, six Mesa Verde Gray Ware sherds (four corrugated and two plain) were found in one of the concentrations. No features were noted and there is no evidence of substantial buried cultural resources anywhere on the site. The site was obviously occupied by various groups at different times. Although surface concentrations are evident, none of the occupations produced heavy accumulations of refuse.

Site Number: 42SA18373

Descriptive Site Type: (1) Lithic source area; (2) Lithic source area; (3) Lithic source area and sherd scatter

Cultural Affiliation: (1) Archaic; (2) Aboriginal; (3) Anasazi

Periods of Occupation: (1) Middle Archaic; (2) Formative; (3) Pueblo III

Site Size: 445 m by 280 m

Site Setting: The site is on Butler Flat and extends from the rim of Butler Wash onto a low ridge line on the mesa top. Several low dunes occur between the rim and the ridge line, and exposed bedrock occurs with increasing frequency near the rim. The depositional context is predominantly colluvial, although eolian deposits occur in the dune areas. Generally, the soil is a fine-grained, yellowish red, silty sand. The occurrence of sandstone detritus increases in the rim area and around exposed bedrock. Vegetation in and around the site includes blackbrush, pinyon, juniper, Mormon tea, actinea, cliffrose, narrowleaf yucca, prickly pear cactus, yellow cryptantha, and a few additional forbs and shrubs.

Site Description: This site is an extensive, but generally diffuse, scatter of lithic artifacts. More than 500 pieces of Algalitic Chert core reduction debitage were observed. The core reduction debris is associated with naturally occurring Algalitic Chert nodules. A moderate amount of Cedar Mesa Chert and small quantities of nonlocal lithic materials also are present, such as gray chert, gray-brown chert, Summerville Chalcedony, and quartzite. Besides the debitage, there are 4 projectile points (1 San Rafael Side-notched projectile point, 1 Rose Spring projectile point, and 2 Elko Corner-notched projectile points), 17 bifaces, 4 scrapers, 3 modified flakes, 1 hammerstone, and numerous cores and tested chert nodules. One McElmo/Mesa Verde Black-on-white bowl sherd was noted along the site perimeter. There is a moderately dense lithic concentration in the center of the site that contains both Archaic and Formative period projectile points. No features are evident, and the possibility of significant subsurface cultural remains appears to be negligible. The sparse nature of the surface scatter and character of the assemblage reflect limited-activity occupations through time; these were associated primarily with local lithic procurement and stone working. Furthermore, the absence of groundstone and features suggests that camping was a minor site function.

Site Number: 42SA18374

Descriptive Site Type: Lithic scatter with feature

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 216 m by 115 m

Site Setting: The site is on a gently sloping dune ridge on Butler Flat. The depositional context is predominantly eolian with sediments consisting of reddish tan, silty sand and an abundance of sandstone detritus. Blackbrush dominates the site and surrounding area, with sparse pinyon and juniper. Also present are Mormon tea, actinea, peppergrass, and a few four-wing saltbushes.

Site Description: The site is a large, diffuse lithic scatter composed of approximately 100 flakes, 10 tools, and a 50-cm-in-diameter, unlined hearth that contains ash, charcoal, and fire-burned pieces of sandstone. The flakes are predominantly tertiary debitage, although core reduction and secondary flakes were also observed. The tool assemblage consists of two biface fragments, one uniface, two scrapers, two cores, two modified flakes, and one formal drill. Algalitic Chert is the predominant material. There is a small amount of Cedar Mesa Chert, some Dakota Quartzite, and a few miscellaneous cherts. Although no diagnostic tools were found at the site, the overall assemblage suggests a preceramic occupation.

Site Number: 42SA18375

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Numic

Periods of Occupation: Late Prehistoric/Protohistoric

Site Size: 105 m by 57 m

Site Setting: The site is on the slope of a small ridge on Butler Flat. The depositional context is colluvium composed of light reddish tan, silty sand that contains sandstone detritus. The sediments are intermittently stabilized by cryptogamic soil. Blackbrush dominates the site, with lesser amounts of pinyon and juniper. Also present are actinea, rockcress, hoary townsendia, narrowleaf yucca, peppergrass, Mormon tea, and a few additional grasses and forbs.

Site Description: The site is a small, sparse lithic scatter composed of 13 flakes, 3 biface fragments, 2 modified flakes, 1 Shoshonean knife, and 1 medium, side-notched projectile point base fragment. The flakes consist of seven thinning flakes, five core reduction flakes, and one pressure flake. Material types include Algalitic Chert, Cedar Mesa Chert, and gray chert. The small size and sparseness of the scatter suggest limited activity and short duration of occupation. However, the relatively large and varied tool assemblage indicates that the site may have been used as a short-term camp.

SUMMARY OF THE SITES

Site Number: 42SA18376

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 130 m by 95 m

Site Setting: The site is on the slope of a ridge in the northern portion of Butler Flat. The depositional context is colluvium composed of reddish tan, silty sand with abundant sandstone detritus. Although blackbrush is abundant on the site, there is a good secondary occurrence of both pinyon and juniper. Also present are actinea, narrowleaf yucca, peppergrass, snakeweed, yellow cryptantha, old man prickly pear, Mormon tea, rockcress, and a small amount of Indian ricegrass, cheatgrass, and larkspur.

Site Description: This site is a large lithic scatter composed of approximately 150 flakes, 1 Elko Corner-notched point, 2 scrapers, 4 modified flakes, 1 hammerstone, 1 biface, 3 biface fragments, and 1 uniface. Most of the artifacts are contained within two concentrations. The area between the two concentrations is very sparse, making the boundary between the concentrations clear. Concentration 1 has 4 of the tools and approximately 100 flakes. Most of the flakes in this concentration are tertiary thinning flakes, although there are a few core reduction and secondary flakes. Material types in Concentration 1 include Algalitic Chert, Cedar Mesa Chert, quartzite, limestone, and gray and tan chert. Concentration 2 contains 3 tools and approximately 30 thinning and core reduction flakes. The materials types in this concentration include Algalitic Chert, gray and tan chert, some Summerville Chalcedony, and Dakota Quartzite. The site may have depth. Although no diagnostic artifacts were found, the wide-base Elko Corner-notched point may indicate an Archaic age.

Site Number: 42SA18377

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 117 m by 77 m

Site Setting: This site is on a gentle ridge slope on Butler Flat. The depositional context is colluvium composed of light reddish tan, silty sand and sandstone detritus. The sediments are shallow, as evidenced by the abundance of exposed bedrock, and well covered with cryptogamic growth. Pinyon and juniper slightly dominate the blackbrush at the site. Additional taxa include actinea, yellow cryptantha, Mormon tea, snakeweed, mountain mahogany, rockcress, peppergrass, singleleaf ash, and a small amount of narrowleaf yucca.

Site Description: The site is a lithic scatter composed of two slight concentrations separated by a sparse scatter of material. One of the concentrations has approximately 5 core

reduction flakes; the other concentration has 35 to 40 flakes. Algalitic Chert accounts for approximately 90 percent of the toolstone. There is a small amount of gray chert and lesser amounts of quartzite, other cherts, and white chert. The tool assemblage consists of six biface fragments and one scraper. The tools are on the periphery of the site, away from both concentrations. No features or temporally diagnostic artifacts were noted.

Site Number: 42SA18378

Descriptive Site Type: Sherd and lithic scatter

Cultural Affiliation: Anasazi

Periods of Occupation: Pueblo II-III

Site Size: 120 m by 115 m

Site Setting: The site is on Butler Flat, on the slope of a ridge line at the end of a mesa. The depositional context is colluvium composed of light reddish tan, slightly silty sand with sandstone detritus. The dominant vegetation is blackbrush with lesser amounts of pinyon and juniper. The associated vegetation includes Mormon tea, rockcress, actinea, peppergrass, singleleaf ash, and yellow cryptantha.

Site Description: This site is an extensive, but light, surface artifact scatter composed of approximately 75 flakes, 6 biface fragments, 2 utilized cores, 1 core fragment, 2 unifaces, 1 drill, 1 modified flake, and 2 Mesa Verde Gray Ware corrugated jar sherds. Most of the cultural material is contained within two slight concentrations. Concentration 1 has approximately 20 Algalitic Chert core reduction flakes, whereas Concentration 2 has 20 bifacial thinning flakes, 5 core reduction flakes, and 2 tools, most made of Dakota Quartzite with lesser amounts of Algalitic Chert and gray chert. The two sherds are also in this area. The two corrugated sherds indicate a Pueblo II-III occupation. However, the majority of material on the site probably reflects multiple occupations rather than a single Pueblo II-III occupation. On the overall site, Algalitic Chert accounts for approximately 70 percent of the toolstone, Dakota Quartzite approximately 20 percent, and gray chert and miscellaneous chert the remainder.

Site Number: 42SA18379

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 45 m by 33 m

Site Setting: The site is on Butler Flat, on a gentle slope that commands a good view of the canyon bottom and surrounding area. Sediments are composed of light grayish tan, silty sand with abundant sandstone detritus. Primary vegetation includes pinyon, juniper, blackbrush, cliffrose, mountain mahogany, yellow cryptantha, actinea, and snakeweed.

SUMMARY OF THE SITES

Site Description: The site is a fairly extensive artifact scatter composed of 100-500 flakes, 32 biface fragments, 4 unifaces, 1 drill, and 5 cores. The debitage is dominated by biface and core reduction flakes, although a few thinning flakes were also observed. Algalitic Chert is the prevalent material type with small amounts of gray quartzite, Cedar Mesa Chert, other miscellaneous chert, and Summerville Chalcedony, in descending order of frequency. The site lacks features and temporally diagnostic artifacts, but the large quantity of bifacial tools suggests that the site may be Archaic or at least preceramic in age.

Site Number: 42SA18380

Descriptive Site Type: Lithic scatter with feature

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 18 m by 20 m

Site Setting: The site is in a small canyon on an eroded alluvial remnant isolated from a cliff edge by two drainages. Sediments consist of light reddish tan, silty sand that has become somewhat stabilized by cryptogamic growth. The immediate site area is covered by blackbrush and cheatgrass. Other taxa are prince's plume, globemallow, peppergrass, and four-wing saltbush.

Site Description: This site is a small but fairly dense lithic scatter associated with a semicircular rock alignment composed of small, eroded, sandstone slabs. The alignment is approximately 1 m long with vegetation growing on the interior, possibly obscuring more of the feature. There is no evidence of burning, although there may have been before erosion of the site surface occurred. The function of the feature is unknown.

The artifact assemblage consists of 25-100 pieces of chipped stone debitage and 19 tools: 17 biface fragments, 1 large side-notched dart point fragment, and 1 drill fragment. Although none of the tools is diagnostic per se, the biface reduction technology, which is distinguished by excellent soft hammer thinning of large, thin, lanceolate bifaces, appears Archaic in character. Furthermore, the thinly flaked point fragment also suggests an Archaic occupation. Algalitic Chert accounts for more than 30 percent of the toolstone. There are small amounts of Cedar Mesa Chert, miscellaneous cherts and agate, and Summerville Chalcedony. White chert, gray chert, red-white agate, and variegated chert occur in the tool assemblage.

Site Number: 42SA18381

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 105 m by 93 m

Site Setting: The site is on top of Butler Flat and straddles a gently sloping ridge line that parallels the rim of a canyon. The depositional context is colluvium composed of yellowish red, silty sand intermixed with sandstone and limestone detritus. The vegetation includes blackbrush, Mormon tea, rockcress, Indian ricegrass, peppergrass, cheatgrass, squirreltail grass, juniper, pinyon, and a few other forbs and grasses.

Site Description: The site is a moderately dense lithic scatter characterized by a greater abundance of nonlocal materials than is typical of other sites in the Butler Flat Area. More than half of the materials are local Algalitic and Cedar Mesa cherts. Gray chert and gray-brown chert account for approximately 10 percent each. A significant diversity of nonlocal cherts, agates, and quartzite, as well as two pieces of obsidian, account for the remainder of the toolstone. The number of flakes observed is approximately 100, most of which are tertiary reduction debitage. In addition to the debitage, two biface fragments and four cores were noted. The site lacks temporally diagnostic artifacts and features. Moreover, it is unlikely that buried features are present, although there is a possibility of some cultural depth.

Site Number: 42SA18382

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 58 m by 40 m

Site Setting: The site is on Butler Flat on a gently sloping dune, the top of which is at the eastern edge of the site. Sediments consist of yellowish red, silty sand with some sandstone detritus. The depositional context is both colluvial and eolian. Vegetation includes blackbrush, four-wing saltbush, Indian ricegrass, needle-and-thread grass, juniper, Mormon tea, hoary townsendia, squirreltail grass, snakeweed, rockcress, and a few additional grasses and forbs.

Site Description: The site is a rather small, diffuse lithic scatter composed of approximately 50 chert flakes and 1 biface fragment in two slight concentrations. The lithic technology appears to be oriented mainly toward biface manufacture, and the debris is evidently the result of one or more episodes of short-term lithic reduction activity. Algalitic Chert predominates with small amounts of gray chert and other chert. No temporally diagnostic artifacts were noted, and there is no evidence of features.

Site Number: 42SA18383

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 13 m by 13 m

SUMMARY OF THE SITES

Site Setting: The site is on the top of a small ridge that gently slopes below the rim of Butler Flat. Sediments are composed of reddish tan, silty sand with some sandstone detritus. They are heavily covered with cryptogama. Vegetation includes pinyon, blackbrush, juniper, Mormon tea, actinea, snakeweed, and yellow cryptantha.

Site Description: The site is a small, concentrated lithic scatter composed of approximately 28 flakes of Algalitic Chert and 1 modified flake. The debitage is predominantly thinning and core reduction flakes, although three secondary decortication flakes were also observed. No temporally diagnostic tools or features are present, and there is little probability of significant buried cultural remains. Judging from the scarcity of cultural remains, the site use, which was oriented mainly around lithic reduction, was probably of brief duration.

Site Number: 42SA18384

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 7 m by 10 m

Site Setting: The site is associated with a dune on the top of a ridge with a commanding view of the Needles. The tan, sandy sediments are both eolian and colluvial in origin, and appear to be of substantial depth. The dominant vegetation is blackbrush. Pinyon, juniper, Mormon tea, peppergrass, and actinea comprise the secondary growth. Other vegetation present includes rabbitbrush, yellow cryptantha, and singleleaf ash.

Site Description: The site is a lithic scatter composed of 28 flakes and 1 biface fragment. Thinning flakes are dominant, but secondary and core reduction flakes are also common. Nearly all of the toolstone is Algalitic Chert, but there is a small amount of Cedar Mesa Chert. The site lacks temporally diagnostic artifacts and datable features. Although the sediments are quite deep, the eroded condition and surficial distribution of artifacts precludes significant cultural depth.

Site Number: 42SA18385

Descriptive Site Type: (1) Lithic scatter; (2) Sherd and lithic scatter

Cultural Affiliation: (1) Archaic; (2) Anasazi

Periods of Occupation: (1) Archaic; (2) Pueblo II-III

Site Size: 105 m by 53 m

Site Setting: The site is on the edge of a large, relatively flat mesa and extends along a minor drainage. Eolian sand and deteriorated sandstone compose the light reddish tan, sandy sediments. The vegetation is predominantly blackbrush. Also present are pinyon, juniper, Mormon tea, Indian ricegrass, actinea, peppergrass, rabbitbrush, yellow cryptantha, four-wing saltbush, and hoary townsendia.

Site Description: The site is composed of 200-500 pieces of lithic debitage, 9 biface fragments, 6 unifaces, 4 scrapers, 1 modified flake, 1 large stemmed projectile point, 1 core, 8 Mesa Verde Gray Ware sherds (3 plain and 5 corrugated), and 1 indeterminate gray ware sherd. No features or groundstone were observed at the site.

Most of the artifacts are contained within three concentrations. Concentration 1 has about 100 flakes, 14 tools, and 7 pieces of pottery. Lithic materials in this concentration are mainly Algalitic Chert; Cedar Mesa Chert, gray and white chert, and quartzite are also present. Concentration 2 has about 75 flakes, 3 tools, and no pottery. Materials are mainly Algalitic Chert, Cedar Mesa Chert, white and gray chert, and quartzite. Concentration 3 has about 12 flakes, 1 core, 1 tool, and 2 pieces of pottery. Material types in this concentration are mainly Algalitic Chert, with some white chert and Cedar Mesa Chert. An ephemeral wash through Concentrations 1 and 3 has redeposited cultural materials, although the two areas appear to have some spatial separation. Overall, Algalitic Chert accounts for approximately 90 percent of the toolstone. Cedar Mesa Chert, white chert, Dakota Quartzite, and miscellaneous cherts account for the remainder.

At least two components are represented at the site. The stemmed projectile point suggests an Archaic occupation and several of the sherds indicate a Pueblo II-III occupation.

Site Number: 42SA18386

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 160 m by 127 m

Site Setting: The site is on Butler Flat and on the ridge of a prominent rock outcrop and the gentle slope of a dune. The yellowish red, silty sand contains some sandstone detritus and is of eolian and colluvial origin. The vegetation is predominantly blackbrush. Also present are juniper, pinyon, peppergrass, snakeweed, rockcress, yellow cryptantha, Indian ricegrass, and a few additional forbs and grasses.

Site Description: This site consists of a fairly extensive lithic scatter with three loci of debitage. Locus A, a concentration, contains approximately 100 flakes representing tool manufacture and/or maintenance activities. A variety of raw materials occur in this area including nonlocal types. Locus B is a more diffuse flake scatter with four tools: a groundstone fragment, a hammerstone, a biface, and a partial Elko Corner-notched projectile point. Locus B was probably utilized as a short-term camp. Locus C is a sparse scatter of flakes. Algalitic Chert, Cedar Mesa Chert, and gray chert account for approximately one-quarter of the toolstone each. Obsidian, Dakota Quartzite, chalcedony, agate, and miscellaneous cherts account for the remainder. This site may contain some cultural depth.

SUMMARY OF THE SITES

Site Number: 42SA18387

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Archaic

Periods of Occupation: Early Archaic

Site Size: 82 m by 63 m

Site Setting: The site is on Butler Flat around a prominent rock outcrop and along the top and slope of a small dune. The dune area is between a larger ridge and the rock outcrop. Sediments consist of yellowish red, silty sand that contains an abundance of sandstone detritus. The sediments in the dune area are predominantly eolian in origin, whereas the sediments around the outcrop area are both eolian and colluvial. The vegetation includes blackbrush, peppergrass, juniper, four-wing saltbush, pinyon, cheatgrass, needle-and-thread grass, actinea, larkspur, yellow cryptantha, snowberry, snakeweed, and additional grasses, shrubs, and forbs.

Site Description: The site is an extensive but generally sparse lithic scatter composed of debitage, three projectile point fragments including a Pinto point and two large side-notched projectile points, four biface fragments, one scraper, three unifacial tools, two modified flakes, and one core. No features are evident.

Most of the artifacts are contained within two concentrations. Concentration 1 is situated in a shallow overhang. It consists of about 25-30 pieces of debitage, mainly interior flakes of Algalitic Chert and Cedar Mesa Chert. Concentration 2 has approximately 20-25 flakes, most of which are core reduction flakes of Algalitic Chert. A generally light scatter of lithic material occurs between the concentrations and throughout the site area. Overall, Algalitic Chert accounts for approximately 60 percent of the toolstone and Cedar Mesa Chert approximately 30 percent. The remainder consists of other cherts including brown, gray, gray-brown, and chalcedonies including Summerville and milky white. The size of this site and additional, adjacent sites suggest multiple reuse of the area. However, there is little chance of buried features or significant subsurface cultural deposition due to the site's surficial nature. The Pinto point suggests an Early Archaic occupation, although additional occupations are likely. Activities that occurred during use of the site appear to be limited mainly to secondary lithic reduction.

Site Number: 42SA18388

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 75 m by 70 m

Site Setting: The site is on top of Butler Flat along the edges of a rock outcrop. The sediments consist of yellowish red, fine-grained sand, both colluvial and eolian in origin. The vegetation includes juniper, blackbrush, pinyon, four-wing saltbush, Mormon

tea, Indian ricegrass, needle-and-thread grass, yellow cryptantha, and cheatgrass. A few additional forbs, shrubs, and grasses are also present, but less common.

Site Description: This site consists of up to 500 pieces of debitage, 1 biface, 1 core, 2 hammerstones, and 2 groundstone artifacts scattered in three separate overhangs. Locus A, which is associated with a cliff face that provides a slight overhang, contains 50-60 interior flakes, mainly retouch flakes. Locus B has a similar quantity of debitage, with more Algalitic Chert core reduction debris and one biface fragment. Locus C consists of a heavy debitage scatter in an overhanging rock outcrop. Locus C also contains a broken mano blank, a mano, a utilized core, and two hammerstones. Loci B and C are surface manifestations that are clearly limited to lithic reduction and tool manufacture. In addition, Locus C was evidently used to manufacture groundstone tools from the local sandstone. Whether or not the three loci are related is unclear. Overall, Algalitic Chert composes approximately half of the toolstone, and Cedar Mesa Chert approximately one-quarter. Gray chert, gray-brown chert, miscellaneous agates, and other materials (e.g., Summerville Chalcedony, other cherts, and quartzite) account for the remainder. Several chunks of charcoal are scattered about the site along with cow dung, but it is questionable as to whether the charcoal is of prehistoric age. No smoke blackening was observed in any of the overhangs.

Site Number: 42SA18389

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 40 m by 30 m

Site Setting: The site is on top of Butler Flat, on a small dune at the edge of a drainage that flows into Chesler Canyon. The sediments consist of light yellowish red, silty, eolian sand. The vegetation in and around the site includes blackbrush, pinyon, juniper, needle-and-thread grass, snakeweed, actinea, narrowleaf yucca, and a few additional shrubs, forbs, and grasses.

Site Description: The site is a small, light lithic scatter composed of 1 biface and approximately 15 flakes of Algalitic Chert, Cedar Mesa Chert, and other chert. The debitage includes thinning and reduction flakes from discoidal cores along with additional core reduction debitage. There is no indication of cultural features, but additional cultural resources could be buried in the shallow dune deposit that covers the site. Although the site may have been used as a brief encampment, only limited activity can be inferred from the surface indications.

SUMMARY OF THE SITES

Site Number: 42SA18390

Descriptive Site Type: Lithic scatter with features

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 100 m by 100 m

Site Setting: The site is on Butler Flat. It surrounds three rock outcrops and extends into nearby dunes. There are several overhangs in the rock outcrops that are associated with the site. In the dune areas, the sediments consist of fine-grained, yellowish red, silty, eolian sand. Around the rock outcrops, the depositional context is colluvium with medium- to large-grained, silty sand intermixed with pieces of decomposing sandstone. Vegetation includes blackbrush, pinyon, juniper, prince's plume, Indian ricegrass, snakeweed, cheatgrass, singleleaf ash, Mormon tea, actinea, and several additional unidentified forbs and grasses.

Site Description: The site is an extensive artifact scatter composed of up to 500 pieces of lithic debitage, 2 utilized cores, 1 core, 6 bifaces, 1 medium corner-notched projectile point, 1 medium side-notched projectile point, 1 modified flake, 1 mano, 1 indeterminate piece of groundstone, and 2 features. Most of the cultural materials are contained within five concentrations. Concentration 1 is a small and light scatter on a ledge above the main site area. It contains a core and 15-20 Algalitic Chert core reduction flakes. The heaviest concentration, 2, consists of several hundred pieces of debitage associated with a dune blowout. There are both core reduction and thinning flakes of various cherts. Concentration 3 is in an overhang and consists of a small, moderately dense flake scatter of approximately 50 interior flakes and a few tools. Concentration 4 is small and sparse, consisting of about 15 Algalitic Chert interior flakes just outside the dripline of a low overhang. Concentration 5 is a sparse scatter to the northwest of the main site area. There are 50-60 interior flakes of mostly Algalitic Chert, with some Cedar Mesa Chert and gray chert. Across all the concentrations, Algalitic Chert, gray-brown chert, and Cedar Mesa Chert account for approximately one-quarter of the tool-stone each. Gray chert and other miscellaneous cherts, agates, and quartzite compose the remainder.

Feature 1 is a concentration of oxidized and fire-cracked sandstone associated with a few pieces of burned bone. Feature 2 is a hearth associated with several partially buried pieces of oxidized sandstone. The main part of Feature 1 measures 1 m wide by 4 m long, but additional material extends 3 m to the south and 8 m to the northwest as a result of sheetwash erosion. Feature 2 is more discrete, measuring 1.0 m by 1.25 m.

Based on the two medium-size projectile point fragments, the site may date to the Archaic period. The bone fragments in Feature 1 and the presence of groundstone tools indicate domestic activity. However, the intensity of occupation was probably low.

Site Number: 42SA18391**Descriptive Site Type:** Lithic scatter**Cultural Affiliation:** Aboriginal**Periods of Occupation:** Prehistoric**Site Size:** 40 m by 10 m

Site Setting: The site is on top of a ridge formed by a rock outcrop between two drainages. The depositional context is colluvium composed of light grayish brown sediments with an abundance of decaying sandstone clasts. The sediments are very shallow and bedrock outcrops across most of the site area. The primary vegetation is pinyon, cliffrose, juniper, blackbrush, actinea, Mormon tea, and snakeweed.

Site Description: This site is a very small, sparse lithic scatter composed of 1 core and approximately 15 core reduction flakes of Algalitic Chert. The lack of temporally diagnostic materials precludes a determination of age and cultural affiliation, and there is no potential for buried cultural deposits. However, the excellent view from this prominent location suggests that the site may have been used as a short-term hunting stand for a group working the local lithic material.

Site Number: 42SA18392**Descriptive Site Type:** Lithic scatter**Cultural Affiliation:** Aboriginal**Periods of Occupation:** Prehistoric**Site Size:** 10 m by 4 m

Site Setting: The site is on a small bench along Butler Wash below the rim of Butler Flat. Sediments at the site are shallow and consist of yellowish red sand. The main plant taxa are cheatgrass, snakeweed, needle-and-thread grass, four-wing saltbush, blackbrush, and juniper.

Site Description: This site is a small, sparse lithic scatter consisting of approximately 25 flakes of local chert, mainly Algalitic Chert with a small amount of Cedar Mesa Chert. Both core reduction and tool manufacturing debitage are relatively common. No tools, temporally diagnostic materials, or features are present, and the shallow depth of the deposits precludes the possibility of buried features or significant subsurface cultural remains. The site appears to represent a brief, limited-activity occupation.

Site Number: 42SA18393**Descriptive Site Type:** Lithic scatter with feature**Cultural Affiliation:** Aboriginal**Periods of Occupation:** Prehistoric**Site Size:** 65 m by 25 m

SUMMARY OF THE SITES

Site Setting: The site is on Butler Flat on the crest and slope of a ridge and the side of a rock outcrop. The slope of the site varies, as there are several small dunes and washes within its perimeter. The depositional context is colluvium composed of yellowish red, fine-grained, silty sand. Vegetation includes blackbrush, actinea, juniper, pinyon, peppergrass, yellow cryptantha, Indian ricegrass, and a few additional forbs.

Site Description: The site consists of up to 100 lithic artifacts and a single isolated feature, a hearth. Approximately 20-25 secondary and tertiary flakes occur in a concentration. The other flakes are scattered around the general area to the south and southeast. Approximately half of the toolstone is Algalitic Chert. Another quarter is gray chert. The remainder is Cedar Mesa Chert and other cherts of unknown origin. The hearth, which is partially exposed along an ephemeral drainage on Butler Flat, is manifest by one partially burned slab of oxidized sandstone, scattered pieces of oxidized sandstone, and ash and charcoal. It measures 55 cm in diameter. Some ash is also eroding downslope to the northwest. No artifacts are directly associated with the feature. The feature is 45 m away from the artifact concentration and it is not clear that they are associated. The only tool found at the site is a projectile point fragment. Although not diagnostic, this large side-notched point may suggest an Archaic occupation. Some additional cultural resources may be buried, but the sparse and diffuse nature of the site suggest that the encampment was very brief.

Site Number: 42SA18394

Descriptive Site Type: Sherd and lithic scatter with features

Cultural Affiliation: Anasazi

Periods of Occupation: Pueblo II-III

Site Size: 135 m by 230 m

Site Setting: The site encompasses multiple terrains. It is on top of Butler Flat, primarily on sloping dune surfaces. Much of the site is also near the edges of rock outcrops. The site lies near a major canyon head. The dominant depositional context is eolian with sediments of red-brown, silty sand intermixed with abundant sandstone detritus. In the dune areas, the soil is a yellowish red, silty sand. Vegetation includes blackbrush, cheatgrass, needle-and-thread grass, pinyon, juniper, Mormon tea, snakeweed, peppergrass, Indian ricegrass, globemallow, serviceberry, snowberry, and a few other, less prevalent shrubs, forbs, and grasses.

Site Description: The site is an extensive artifact scatter with up to 500 pieces of debitage, 7 chipped stone tools, 1 core, 1 hammerstone, 15 pieces of groundstone, and 5 features. It is associated with several rock overhangs within a prominent sandstone outcrop. Most of the cultural remains occur in two loci manifest as fairly large lithic scatters.

Locus A is next to the rock outcrop and in an adjacent dune area. Most of the cultural remains at the site, including approximately 200-250 flakes, 11 pieces of groundstone, 1 core, a few stone tools, 1 hearth with an associated rock concentration, 1 rock alignment, and 2 fire-cracked rock concentrations, occur in the dune area of Locus A. Most of the flakes are of local cherts. The rock alignment is 2.5 m long and 1.4 m wide and is composed of 11-12 medium-sized sandstone slabs. The fire-cracked rock concentrations are 3.0 by 1.2 m and 2.75 by 1.5 m. Neither has associated visible ash on the surface. Two Mesa Verde White Ware sherds and a light lithic scatter were also observed in a small alcove in the outcrop at the eastern end of Locus A. Although this overhang appears to represent an Anasazi occupation, the groundstone assemblage and overall character of the dune occupation in Locus A are more reminiscent of Archaic open camps.

Locus B is smaller and more localized than Locus A, but it also contains an abundance of cultural materials. It is adjacent to a cliff face with a slight overhang. A moderate artifact scatter is present in this area including four pieces of groundstone; four bifaces; a sand-tempered, plain Kayenta gray ware sherd; and a variety of decortication, core reduction, and tool manufacturing debitage. Also present on the rock face at the western end of Locus B is a single petroglyph depicting the head of a bighorn sheep. To the left of the bighorn sheep is some light scratching and abrading. Between the petroglyph and the scratching and abrading is some graffiti inside a rectangle consisting of a possible livestock brand. On the site as a whole, Algalitic Chert, Cedar Mesa Chert, and gray chert account for approximately one-quarter of the toolstone each. Other cherts and agates compose the remainder.

Site Number: 42SA18395

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Formative

Site Size: 200 m by 160 m

Site Setting: The site is on the edge of Butler Flat, on a bench slope that extends onto a small point above Butler Wash. The depositional context is colluvium composed of yellowish red, silty sand with considerable decomposing sandstone. Bedrock is close to the surface and exposed often. The vegetation includes pinyon, juniper, blackbrush, actinea, snakeweed, narrowleaf yucca, Indian ricegrass, singleleaf ash, cheatgrass, and a few additional forbs and grasses.

Site Description: The site consists of an extensive, generally diffuse lithic scatter with several slight concentrations and one heavy concentration with more than 25 artifacts per m². Cultural manifestations include up to 500 decortication and core reduction flakes and pieces of tool manufacturing debitage; 11 bifaces; 1 scraper; 1 Rose Spring

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projectile point; and 1 Elko Corner-notched projectile point. Algalitic Chert accounts for approximately half of the assemblage. Cedar Mesa Chert, gray chert, gray-brown chert, other miscellaneous chert, and agate account for the remainder. Some depth is evident, but most of the site is obviously surficial and extremely sparse.

Site Number: 42SA18396

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 70 m by 65 m

Site Setting: The site is on a ridge on Butler Flat. The soil is fine-grained, yellowish red, silty sand and quite shallow. Considerable bedrock is exposed. The vegetation includes blackbrush, pinyon, juniper, Gambel's oak, snakeweed, four o'clock, Indian rice-grass, Mormon tea, and a few other forbs.

Site Description: This site is a surface scatter composed of approximately 100 flakes of mainly Algalitic Chert and some Cedar Mesa Chert, a single biface fragment, and a modified flake tool. Although dominated by secondary and tertiary knapping debris, the flake tool suggests some additional activity besides tool manufacture. There is no sign of features or other datable material. Moreover, the presence of significant subsurface cultural deposits is not likely due to the site's geomorphological context.

Site Number: 42SA18397

Descriptive Site Type: Sherd and lithic scatter with features

Cultural Affiliation: Anasazi

Periods of Occupation: Pueblo III

Site Size: 230 m by 135 m

Site Setting: The site is on Butler Flat around and between several rock outcrops. The sediments consist of light reddish tan, silty, eolian sand. The vegetation includes pinyon, juniper, Gambel's oak, Fremont barberry, actinea, yellow cryptantha, Utah penstemon, cheatgrass, needle-and-thread grass, sacred datura, and a few additional shrubs, forbs, and grasses.

Site Description: This large site consists of several slight to moderate artifact concentrations associated with features and rock overhangs among a series of fairly prominent sandstone outcrops. The rather extensive, but generally light and diffuse, scatter was subdivided into two main areas (Loci A and B).

Locus A consists of 40-50 interior flakes and a sherd from a Mesa Verde White Ware bowl. The artifacts are associated with opposing overhangs linked by a small crawlhole through the large boulder forming the shelter. Additional debitage occurs

around an overhang to the north. This area appears to be a Pueblo III Anasazi limited-activity area, or possibly a short-term camp.

Locus B has two lithic concentrations in a sheltered dune area between low bedrock outcrops. Unlike Locus A, the scatters include numerous pieces of groundstone and each is associated with a burned feature (Features 1 and 2). The northernmost concentration has up to 30 artifacts per m². Numerous flakes were observed in Locus B, most of which are thinning and retouch flakes. Feature 1 consists of a concentration of fire-cracked rock and metate fragments covering a 1.8- by 1.0-m area. Feature 2 is an ashy midden that measures 4 by 5 m. Although no diagnostic materials were observed in Locus B, the character of the groundstone assemblage and absence of pottery in the heavy surface scatter suggest a possible Archaic affiliation.

A slight lithic scatter between the two principal loci appears to be a knapping area. Whether it is related to one or the other of the main occupations, or represents a third, limited-activity occupation, is unknown. The same is true of a small alcove at the southeastern corner of the site where a mano and metate are associated with two flakes.

Flaking at the site emphasized tertiary reduction, but all stages of lithic debris are present. Cedar Mesa Chert accounts for approximately half of the toolstone, and Algalitic Chert, approximately 20 percent. There are lesser amounts of Summerville Chalcedony, gray chert, Dakota Quartzite, agate, and other cherts.

In addition to the various prehistoric cultural resources, a modern livestock corral is present in Locus A. It was made by employing an expedient juniper-log construction technique to barricade gaps between naturally occurring boulders and outcrops. Upright posts are present only where a bailing wire and log fence was built into the structure. The age of the structure, inferred from its condition and the presence of deteriorated plastic, is believed to be recent, so it is not interpreted as an historic cultural resource.

Site Number: 42SA18398

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 200 m by 70 m

Site Setting: The site is on a mesa top between a drainage and a rock outcrop. The sediments consist of yellowish red, silty sand. They are shallow with considerable exposed bedrock. Pinyon and juniper are the dominant vegetation. Also present are blackbrush, Mormon tea, peppergrass, actinea, snowberry, snakeweed, and a few additional forbs.

Site Description: The site is a lithic scatter of moderate size and density with a slight concentration at one end. At least 50 interior flakes were observed in the concentration.

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Across the site as a whole, 150-200 core reduction and large thinning flakes of mainly Algalitic Chert were observed. Other materials are Cedar Mesa Chert, gray chert, quartzite, and other cherts in order of descending frequency. Also found were five biface fragments and a drill. No temporally diagnostic artifacts or features are present, and there is little probability of significant cultural depth. The site has a good view and was evidently utilized for lithic reduction and tool manufacture.

Site Number: 42SA18399

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 128 m by 105 m

Site Setting: The site is on a mesa top, in a dune area on several small slopes. Although eolian in origin, the yellowish red, silty sand has been redeposited. The vegetation includes pinyon, juniper, blackbrush, snowberry, Mormon tea, actinea, peppergrass, four o'clock, Indian ricegrass, cheatgrass, prickly pear, and a few additional forbs.

Site Description: The site is a sparse, rather diffuse lithic scatter with one biface, one uniface, and a slight concentration toward the center of the site. There are about 50 flakes in the concentration, mainly interior flakes. Several core reduction flakes occur in an overhang and around the site area. Algalitic and Cedar Mesa cherts predominate. There are small amounts of gray chert, Dakota Quartzite, and miscellaneous chalcedonies. The cultural material is largely associated with eroded areas, suggesting a possibility of shallow deposition. However, there is no indication of substantial cultural deposits or features.

Site Number: 42SA18400

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 370 m by 230 m

Site Setting: The site is on a mesa top. The main part of the site is on the top and slope of a ridge. The depositional context is colluvium composed of yellowish red, silty sand. The vegetation includes blackbrush, peppergrass, pinyon, juniper, snakeweed, Gambel's oak, Indian ricegrass, rockcress, and a few additional forbs.

Site Description: The site is an extensive lithic scatter that appears to represent numerous overlapping, limited-activity occupations, with some possibility of occasional short-term encampment. In addition to 100-500 mainly interior flakes, a variety of tools was observed including 2 Elko Corner-notched projectile points, 1 medium corner-notched projectile point, 3 bifaces, 1 scraper, 1 utilized core, and 1 mano. Algalitic Chert

predominates with smaller amounts of Cedar Mesa Chert, gray-brown chert, gray chert, and other materials. The site appears to have buried remains.

Site Number: 42SA18401

Descriptive Site Type: Lithic scatter with feature

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 450 m by 200 m

Site Setting: The site is on the side of a small mesa, on open sloping areas and around rock outcrops. The depositional context is colluvium composed of light reddish yellow, silty sand. Vegetation includes blackbrush, pinyon, juniper, Gambel's oak, actinea, cheat-grass, larkspur, singleleaf ash, narrowleaf yucca, globemallow, and a few additional forbs and grasses.

Site Description: The site consists of an extensive, but generally sparse and diffuse lithic scatter in and around a modern campground. There is a light scatter of lithic materials within the campground itself, along with slight and moderate surface concentrations outside the campground. The sparse materials are divided into two loci, A and B. Locus B has been heavily impacted by campground improvements and use, making it hard to interpret. It is especially difficult to evaluate the extent to which cultural materials may have been collected by modern campers. A scatter of flakes, two chipped stone tools, and a core were found in Locus B. Locus A has a heavier scatter of artifacts but has also been impacted, both by camping and road construction; therefore, it is also somewhat difficult to interpret. Within Locus A is scattered debitage, a biface, and a hearth consisting of a rather extensive ash and charcoal stain exposed in a road cut. Across the site as a whole are 100-500 pieces of debitage, predominately secondary and tertiary flakes. Algalitic Chert accounts for three-fourths of the toolstone. Cedar Mesa Chert, gray chert, gray-brown chert, other chert, Summerville Chalcedony, other chalcedony, and quartzite also occur. Tools consist of two bifaces and one flake tool; there is also one core. It seems likely that this large site was occupied repeatedly, with all occupations of a transient nature.

Site Number: 42SA18402

Descriptive Site Type: Lithic scatter with feature

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 58 m by 15 m

Site Setting: The site is on top of a dune that is on a gently sloping ridge between sandstone outcrops. The sediments consist of light yellowish red, silty sand with abundant sandstone detritus. The vegetation includes blackbrush, Gambel's oak, an unidentified

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rayless yellow composite, snakeweed, Mormon tea, pinyon, juniper, four-wing saltbush, singleleaf ash, and sparse additional forbs.

Site Description: The site consists of a very sparse lithic scatter associated with a hearth and three groundstone tools. Less than 10 Algalitic Chert, agate, and chalcedony flakes were observed; most derive from tool manufacture. Groundstone artifacts include a one-hand mano and two basin metates. The hearth is manifest by a concentration of oxidized sandstone, ash, and charcoal over a 0.9- by 1.7-m area. It lies in a shallow wash and is actively eroding. Although additional cultural resources may be buried, the limited suite of remains indicates a brief encampment.

Site Number: 42SA18403

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 20 m by 14 m

Site Setting: The site is on a mesa top and on the slope of a dune ridge. Sediments consist of light yellowish red, silty, eolian sand. The vegetation includes blackbrush, peppergrass, actinea, Indian ricegrass, Mormon tea, rockcress, larkspur, and a few additional forbs and grasses.

Site Description: The site is a sparse lithic scatter composed of 25-100 pieces of debitage. Algalitic Chert core reduction and thinning flakes are prevalent, but there are a few other debitage and toolstone types. Although there is no good indication of significant subsurface cultural resources, there could be some cultural depth. The assemblage reflects generalized reduction and tool manufacture activities.

Site Number: 42SA18404

Descriptive Site Type: Lithic scatter with feature

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 35 m by 21 m

Site Setting: The site is on a mesa top, at the bottom of a ridge slope and near the edge of a cliff. Sediments consist of light yellowish red, silty, eolian sand with some sandstone detritus. The vegetation includes blackbrush, actinea, pinyon, juniper, Mormon tea, cheatgrass, and a few additional forbs and grasses.

Site Description: The site consists of a sparse debitage scatter and a feature. There are approximately 50-60 flakes, consisting mainly of interior flakes, with a few thinning flakes. Approximately 85 percent of the toolstone is mottled milky white and pink Summerville Chert. The remainder is Algalitic Chert and gray chert. No tools or diagnostic artifacts were observed. The feature, which appears to be a hearth, consists of a

small (50- by 75-cm) ash stain with no charcoal. Trowel probing indicates that it is fairly shallow in depth (about 5 cm). It also contains several small fragments as well as one large chunk of oxidized sandstone. This feature is in a drainage and actively eroding. The site is interpreted as a limited-activity locus or a short-term encampment.

Site Number: 42SA18405

Descriptive Site Type: Lithic scatter with features

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 50 m by 50 m

Site Setting: The site is on the top and sloping sides of a dune on a ridge on Butler Flat. Several sandstone outcrops surround the site. The sediments consist of light yellowish red, silty sand. Vegetation includes blackbrush, pinyon, juniper, snakeweed, milk vetch, rockcress, yellow cryptantha, Indian ricegrass, and prickly pear. Additional forbs are present but sparse.

Site Description: The site consists of a sparse scatter of 20 pieces of debitage, 3 chipped stone tools, and 1 piece of groundstone associated with 3 hearths (Features 1-3). Feature 1 is a long, narrow ash stain with some charcoal. It appears to be washing downslope and is fairly shallow. Feature 2 is a 50-cm-in-diameter surface ash stain with no apparent charcoal. Feature 3 is a 150- by 100-cm ash stain with considerable charcoal. It appears to be fairly shallow.

Each feature is associated with several flakes, and there are a few scattered artifacts and pieces of oxidized sandstone in the general area. Debitage consists mainly of thinning flakes, but includes everything from a large decortication flake to a pressure flake. A variety of raw material is also represented, including Algalitic Chert, gray-brown chert, and white chalcedony in approximately equal proportions, with some other materials. The tools consist of 1 Elko Side-notched projectile point, 2 biface fragments, and 1 metate fragment. The cultural material indicates temporary field camp activity. Because the site is in a dune area, there is a high probability of subsurface cultural deposits.

Site Number: 42SA18406

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 15 m by 17 m

Site Setting: The site is at the end of a ridge top in a narrow pass between sandstone monoliths. There are numerous minor overhangs and nooks in the rock outcrop and associated boulders in the site area, but there is no real rockshelter. The depositional

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context is colluvium composed of yellowish tan sand with an abundance of sandstone detritus eroding from the surrounding sandstone formation. Some cryptogamic soil is present. Vegetation consists of snakeweed, brickellbush, pinyon, Mormon tea, cheat-grass, yellow cryptantha, Indian ricegrass, actinea, old man prickly pear, cliffrose, and serviceberry.

Site Description: The sparse surface scatter consists of a biface fragment that may have been part of a dart point, a unifacial flake tool, and three Algalitic Chert interior flakes. The possible dart point fragment suggests possible preceramic usage, and the limited assemblage indicates that the occupation was of very brief duration. There is little possibility of significant subsurface cultural resources.

Site Number: 42SA18407

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 27 m by 14 m

Site Setting: The site is on top of a gently sloping ridge near some large, towering rocks. The depositional context is colluvium composed of light tan sand with substantial sandstone detritus. Sandstone bedrock is frequently exposed, indicating shallow deposition. A pinyon-juniper community characterizes the site vegetation. Also present are blackbrush, actinea, Mormon tea, peppergrass, singleleaf ash, snakeweed, fishhook cactus, and yellow cryptantha.

Site Description: The site is a sparse lithic scatter composed of 13 Algalitic Chert flakes, 1 Elko Corner-notched projectile point, and 1 modified flake. The debitage consists of 2 secondary decortication flakes and 11 interior flakes. All artifacts are made from local Algalitic Chert. The limited quantity of cultural materials, homogeneity of the assemblage, and absence of features imply limited activity. The site commands a spectacular view of the surrounding area. The location of the site and the presence of sandstone prominences suggest the possibility that the site was used as a hunting stand.

Site Number: 42SA18408

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 35 m by 17 m

Site Setting: The site is on a ridge slope near the rim of a small mesa that overlooks a small graben drainage. The depositional context is colluvium composed of light grayish tan, silty sand with sandstone detritus. The surface is partially stabilized by cryptogama. Sandstone bedrock is exposed on one edge of the site. The site vegetation consists

primarily of blackbrush, pinyon, juniper, and actinea. Secondary taxa are four-wing saltbush, rockcress, yellow cryptantha, and singleleaf ash.

Site Description: The site consists of a small but dense scatter of chipped stone debitage and tools. Between 25 and 100 flakes representing all stages of lithic reduction were observed. Toolstone is predominantly Algalitic Chert, although some Cedar Mesa Chert is also present. The tool assemblage includes one core, one drill, and two modified flakes. No temporally diagnostic artifacts or features are present on the site surface, and there is little indication of buried cultural resources.

Site Number: 42SA18409

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

Site Size: 63 m by 50 m

Site Setting: The site is on top of a gently sloping bench above Chesler Canyon Wash. The cryptogamic soil consists of light reddish tan, silty sand. It is mainly reworked eolian sediment mixed with sandstone detritus. Deposition is shallow with exposed bedrock along the edges of the site. The primary vegetation includes blackbrush, juniper, rabbitbrush, and bunch grass. Secondary vegetation includes peppergrass, pinyon, four-wing saltbush, Mormon tea, actinea, fishhook cactus, larkspur, rockcress, Indian paintbrush, hoary townsendia, and bladderpod.

Site Description: The site is a light but fairly extensive lithic scatter. The main portion of the scatter consists of 50-60 secondary and tertiary flakes, 1 Elko Corner-notched projectile point base, 1 biface fragment, and 3 modified flakes. There is another small, light flake scatter to the north of a low overhang and a few additional interior flakes northwest of the main scatter. Reddish brown Cedar Mesa Chert is the most abundant toolstone at the site (approximately 80 percent). Mottled, opaque, tan-brown Algalitic Chert accounts for approximately 10 percent. Summerville Chalcedony and other miscellaneous chert compose the remainder. The projectile point base is a medium-sized, oblique, corner-notched Elko point that suggests a possible Basketmaker or Archaic occupation. Some deposition is present in parts of the site, but there is little probability of substantial cultural deposits. The limited quantity of cultural materials, absence of features, and relatively homogeneous assemblage suggest a limited-activity occupation, although the site could be a short-term camp.

Site Number: 42SA18410

Descriptive Site Type: Lithic scatter

Cultural Affiliation: Aboriginal

Periods of Occupation: Prehistoric

SUMMARY OF THE SITES

Site Size: 93 m by 70 m

Site Setting: The site is on a bench on top of a small ridge. The sediments consist of light reddish tan, slightly silty sand and sandstone detritus. The sediments are very shallow, with much exposed bedrock. Cryptogamic growth has helped maintain the extant soil. Pinyon and juniper predominate on the site. Blackbrush is also abundant. Additional vegetation includes Mormon tea, actinea, four-wing saltbush, peppergrass, yellow cryptantha, narrowleaf yucca, singleleaf ash, and mariposa lily.

Site Description: The site is a lithic scatter composed of two concentrations with a few flakes between them. Concentration 1 contains 5 biface fragments and approximately 13 flakes. The debitage is all Algalitic Chert core reduction flakes, with the exception of two Cedar Mesa Chert thinning flakes. Concentration 2 contains approximately eight core reduction flakes, most of Algalitic Chert. Gray chert was also noted. In addition to the bifaces, a large corner-notched projectile point that was probably used as a hafted knife was found on the edge of Concentration 1. No additional tools or diagnostic artifacts were noted, and there is no evidence of features. The site lacks depth and the potential for further investigation. Its limited, homogenous assemblage suggests a limited-activity locus. It is not known whether the two lithic concentrations are related.

Site Number: 42SA18411

Descriptive Site Type: (1) Masonry architecture site; (2) Historic/Modern site

Cultural Affiliation: (1) Aboriginal; (2) Euroamerican

Periods of Occupation: (1) Formative; (2) Historic/Modern

Site Size: 135 m by 85 m

Site Setting: The site is on a bench in a small valley between rock outcrops. The depositional context is colluvium composed of yellowish red, silty sand with sandstone detritus. The vegetation includes pinyon, juniper, blackbrush, four-wing saltbush, actinea, snowberry, rockcress, snakeweed, narrowleaf yucca, and a few other shrubs and forbs.

Site Description: The main characteristic of this site is a deteriorated, one-room, dry-laid structure constructed under an overhang of gray sandstone. The structure measures 3.5 m north-south by 3.0 m east-west. Fire blackening is evident on the ceiling and alcove back, but there is no charcoal or evidence of features. Water runoff has caused some deterioration. There are some ax-cut juniper logs in the overhang indicating recent use of the shelter, probably associated with livestock grazing before establishment of the park.

In addition to the features, the site also contains 25-100 pieces of lithic debitage, 2 biface fragments, 1 scraper, and 1 core. The debitage is predominately secondary and tertiary flakes of mainly Algalitic and Cedar Mesa cherts. Other miscellaneous materials include white chalcedony, gray chert, and Dakota Quartzite. No temporally diagnostic

materials were found at the site, but the architecture suggests a possible Anasazi occupation.

Site Number: 42SA18412

Descriptive Site Type: Lithic scatter with features

Cultural Affiliation: Archaic

Periods of Occupation: Early Archaic

Site Size: 68 m by 48 m

Site Setting: The site lies in a small, irregularly shaped valley between rock outcrops on an eroded dune and beneath a small overhang. The depositional context is colluvium composed of light reddish tan, silty sand. The vegetation includes blackbrush, pinyon, juniper, Mormon tea, actinea, peppergrass, snakeweed, Indian ricegrass, greasewood, cheatgrass, and a sparse occurrence of a few additional shrubs, forbs, and grasses.

Site Description: The site consists of a sparse, diffuse lithic scatter associated with three features (Features 1-3). Approximately 20-25 flakes of Algalitic, Cedar Mesa, and gray-brown cherts were observed. The debitage represents primarily secondary core reduction activities. The tool assemblage is composed of three metates, one core tool, one biface, and one possible Sand Dune Side-notched projectile point. Subsurface cultural materials are also undoubtedly present, especially in proximity to the features. The sparsity of material indicates short-term occupation.

Feature 1 is a fairly extensive charcoal-stained midden exposed by a gully. Undisturbed fill probably occurs in adjacent uneroded areas. The 3 metates and about 10 flakes occur on the surface in this stained area. Feature 2 is a charcoal stain 2 m in diameter associated with about 10 pieces of tabular sandstone. This eroded hearth is still largely buried and cannot be effectively evaluated without testing. Feature 3 is a slab-lined hearth composed of an upright sandstone slab, two small slab fragments, and a faint soil stain to the west of the upright slab. It is also largely buried and probably in good condition.

Chapter 4

SUMMARY OF THE ARTIFACTS AND FEATURES

by Susan C. Kenzle

The Butler Flat inventory resulted in the documentation of a variety of artifacts and features. The observed artifact types include chipped stone, groundstone, miscellaneous stone, and pottery. The features consist of thermal phenomena (e.g., hearths), middens, rock alignments, a surface structure, wood piles, a petroglyph, and others. Most of these features were quickly assembled, although a few represent moderate time investments. More substantial features may be buried. Most of the features are in open settings, although a few features are in sheltered locations under overhangs.

Artifacts

The assemblage includes 418 chipped stone tools, 54 groundstone tools, 13 hammerstones, 82 cores and utilized cores, and 29 ceramic artifacts. The chipped stone artifacts include, in order of descending frequency, bifaces, cores and utilized cores, projectile points, modified flakes, scrapers, unifaces, drills, knives, and a graver. The groundstone assemblage consists of manos and mano fragments, metates and metate fragments, and indeterminate groundstone artifacts. All the ceramic artifacts are sherds. Additionally, lithic debitage was estimated at over 12,000 pieces. Most of these artifacts were observed on sites. A total of 19 chipped stone artifacts, 2 pecked stone tools, 4 cores and utilized cores, and more than 50 pieces of lithic debitage was documented as isolated finds.

Chipped Stone Artifacts

Various formal and informal chipped stone tools were observed in the Butler Flat Area, along with cores and utilized cores, and debitage. Chipped stone artifacts—the most numerous type in the inventory area—are dominated by debitage. Also included are bifaces (n=266), cores and core tools (n=82), projectile points (n=39), modified

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flakes (n=39), scrapers (n=35), unifaces (n=29), drills (n=6), knives (n=3), and a graver (n=1).

Chipped Stone Lithic Materials

by Betsy L. Tipps

This section provides a brief summary of the raw materials used for chipped stone tools in the Butler Flat Area. This information is presented as background to understanding prehistoric adaptive patterns, including lithic procurement strategies, annual mobility, settlement practices, and trade networks, although detailed analyses of these topics are beyond the scope of work for this project. Material type designations follow the classification scheme developed for the Needles District by Tipps and Hewitt (1989) and Tipps (1995). The primary material types in order of descending frequency are: Algalitic Chert, Cedar Mesa Chert, and gray chert. Gray-brown chert, Summerville Chalcedony, Dakota Quartzite, white chalcedony, white chert, and Cedar Mesa Limestone occur in lower frequencies.

Based on the results of the Devils Lane Area inventory conducted during the first year of the Canyonlands Archeological Project (Tipps and Hewitt 1989), it was suspected that the source(s) of Algalitic Chert might be somewhere in the western Needles District. We also suspected that Algalitic Chert might derive from the Cedar Mesa Formation (Tipps 1995:42). Six sites documented in the Butler Flat Area are Algalitic Chert lithic source area sites consisting of lag deposits evidently weathered from a limestone matrix. The field notes do not specify whether the lag deposits of Algalitic Chert derive from the Cedar Mesa Formation, although it is the only geologic formation exposed in the area (Huntoon et al. 1982). While it is possible that the lag deposits are from a younger geologic formation that has completely weathered away, it is suspected they originated in the Cedar Mesa Formation (Tipps 1995:42). Most of the Algalitic Chert is similar to that reported in the Devils Lane Area (Tipps and Hewitt 1989:84-85), although some is described as tan and brown instead of yellow and brown. It is of moderate to high quality.

Algalitic Chert occurs on every site recorded in the project area. It is the only material on 10 percent of the sites, the dominant material on another 62 percent, and one of two to three primary materials on an additional 22 percent of the sites. On only three sites is Algalitic Chert present in just moderate or small amounts (Table 6). The predominance of this material in the local assemblages is not surprising given its availability.

The next most common material is Cedar Mesa Chert of the colors and varieties previously defined in the Devils Lane Area and the eastern Needles District (Tipps and Hewitt 1989; Tipps 1995). While it occurs on 74 percent of the sites in the Butler Flat

Table 6. Number and percent of sites by selected chipped stone materials and relative abundance.

Material Type	Only Material Present		Dominant Material		One of Three Primary Materials		Present in Moderate Amounts		Rare Material		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
Algalitic Chert	5	10	31	62	11	22	1	2	2	4	50	100
Cedar Mesa Chert	-	-	2	4	10	20	15	30	10	20	37	74
Gray chert	-	-	-	-	2	4	4	8	16	32	22	44
Gray-brown chert	-	-	-	-	4	8	1	2	7	14	12	24
Summerville Chalcedony	-	-	1	2	-	-	-	-	8	16	9	18
Dakota Quartzite	-	-	-	-	-	-	1	2	8	16	9	18
White chalcedony	-	-	-	-	1	2	-	-	3	6	4	8
Obsidian	-	-	-	-	-	-	-	-	4	8	4	8
White chert	-	-	-	-	-	-	1	2	2	4	3	6
Cedar Mesa Limestone	-	-	-	-	-	-	-	-	2	4	2	4

SUMMARY OF THE ARTIFACTS AND FEATURES

Area, it is present in lower frequencies, often much lower frequencies, than Algalitic Chert on all but two sites (4 percent). It co-occurs with Algalitic Chert (and sometimes other cherts) as a primary material on 20 percent of the sites. It appears in small to moderate amounts on 50 percent of the sites. This material does not appear to be naturally available in the Butler Flat Area; it was probably transported into the project area in a partially reduced form and then further reduced. Numerous sources of this material occur in the Needles District, east of the Butler Flat Area, as well as in the Maze District.

Gray chert is a relatively common material, occurring on 44 percent of the sites. It usually appears in small or moderate amounts, but on two sites, it is one of two to three primary materials, co-occurring with Algalitic Chert or Algalitic Chert and Cedar Mesa Chert. In the White Crack Area in the Island-in-the-Sky District, gray chert occasionally grades into Cedar Mesa Chert; however, very little gray chert has been observed in the Cedar Mesa Chert lag deposits examined in the Needles District (Tipps and Hewitt 1989; Tipps 1995). Gray chert becomes progressively more common on sites from east to west across the Needles District, suggesting it is from a source somewhere in the western Needles or perhaps from river gravels along the Colorado River.

The Honaker Trail Formation is a known source of gray chert. This formation outcrops along Lower Red Lake Canyon, less than 10 km northwest of the Butler Flat Area. A well-established pack trail that was used in aboriginal times (Dellenbaugh 1908:118) leads down Lower Red Lake Canyon to the Colorado River crossing at Spanish Bottom. Thus, if the gray chert is exposed in this portion of the Honaker Trail Formation, it would have been readily available to people traveling to and from the crossing. This trail can be accessed a short distance north of the project area, just across Chesler Canyon Wash in Cyclone Canyon. It would be less than a day's walk from Butler Flat to Lower Red Lake Canyon.

Gray-brown chert is present on approximately one-quarter of the Butler Flat Area sites, usually in small or medium amounts, but it is one of two or three primary materials on four sites (8 percent), always co-occurring with Algalitic Chert. Gray-brown chert is present on 29 percent of the sites in the adjacent Devils Lane Area, and is a primary material on another 15 percent. It is uncertain whether this material is a variation of Algalitic Chert, Cedar Mesa Chert, gray chert, or a separate, distinctive material. That it occurs on more sites and in larger frequencies in the Devils Lane Area than in the Butler Flat Area suggests a source toward the north. This does not rule out the possibility that it derives from the Cedar Mesa Formation, although the Elephant Canyon and Honaker Trail formations are also possibilities.

The next most common material in terms of the number of sites on which it occurs is Summerville Chalcedony. This nonlocal material derives from the basal unit of

SUMMARY OF THE ARTIFACTS AND FEATURES

the Morrison Formation, Tidwell Member (Baars 1995:65). The closest known outcrops are in the vicinity of La Sal Junction, approximately 50 km to the northeast. This distinctive material is dominant on one site (2 percent) in the Butler Flat Area and present in small amounts on eight sites (16 percent), slightly lower percentages than in the adjacent Devils Lane Area (Tipps and Hewitt 1989:84). Approximately 18 percent of the projectile points are made of Summerville Chalcedony, but only 3 percent of the bifaces and no cores are made of this exotic material. This difference is because most of the cores and a large proportion of the bifaces were manufactured in or near the project area from local materials for immediate use or for transport as part of a mobile toolkit (cf. Kuhn 1994). In contrast, a large percentage of the points are proximal fragments that were probably manufactured at other lithic toolstone sources encountered earlier in the annual round and discarded in the Butler Flat Area during retooling episodes using the local material (cf. Gramly 1980).

The field crew recorded Dakota Quartzite in medium to small amounts on 18 percent of the sites. This material is not local to the project area. The closest known outcrop of the Dakota Formation is in the Abajo Mountains (Huntoon et al. 1982), almost 50 km to the southeast. Light gray quartzite that may be the same material is present on 17 percent of the Devils Lane Area sites, and is common on 5 percent of these sites. As these percentages are not significantly different than those of Summerville Chalcedony, the sources of which may be equally distant, it is possible that the quartzite is from the Abajos. However, gray quartzite of any type is rather rare in the Salt Creek Pocket and Squaw Butte areas a short distance to the east (Tipps 1995:Table 8; Tipps and Hewitt 1989:86). This may indicate that (1) the material is from some other source or (2) travel routes and annual rounds of groups who used the quartzite in the Butler Flat Area were south of the Salt Creek Pocket and Squaw Butte areas.

White chalcedony appears on 8 percent of the Butler Flat Area sites, usually in small amounts, but in one instance as a co-primary material. This toolstone was not well described by the field crew. It may be Summerville Chalcedony.

Small amounts of obsidian are present on 8 percent of the sites. Three flakes from three different sites were sourced using X-ray fluorescence (see Appendix E). The geochemical data for a specimen from a multicomponent site with known Early Archaic and Pueblo III Anasazi components matches the Government Mountain/Sitgreaves Peak, Arizona, source. This source lies approximately 380 km southwest of the project area, near Flagstaff. Hydration bands on this flake have a mean of 2.0 microns (Appendix F).

Another flake from a site with Pueblo II-III Anasazi sherds matches the Cerro del Medio, New Mexico, source, which is on the eastern flank of the Valles Caldera in the Jemez Mountains (Baugh and Nelson 1987:Figure 5). This source is 420 km

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southeast of the project area, near Bandelier and many of the modern Pueblos. The average width of hydration bands on this flake is 4.6 microns.

The geochemical data for the final obsidian flake match the Wild Horse Canyon, Utah, source, which is 260 km west of the project area, near Beaver. This flake was found on a site of prehistoric age and unknown affiliation. It has an average hydration band width of 4.3 microns.

White chert is reported on only a few sites in the project area, but it occurs with Algalitic Chert in one of the lag deposits, and is, therefore, a local material. Cedar Mesa Limestone occurs as an infrequent chipped stone material on two sites. This toolstone is available on several of the lithic source area sites in the Butler Flat Area but is of low quality for flintknapping. Besides these named materials, the field crew reported small amounts of various other cherts, chalcedonies, quartzites, and agates. Most of these are probably nonlocal materials.

In summary, prehistoric flintknappers in the Butler Flat Area relied heavily on the local moderate to high-quality materials for the manufacture of stone tools. However, it is clear that at least some of these people had access to a wide variety of high-quality materials. Due to the short-term nature of the sites and long distances to the sources (circa 50 km), it is unlikely the nonlocal materials were obtained through logistic trips originating in Butler Flat. Except for obsidian and a few other rare materials, they are unlikely the products of trade, either, due to their abundance and bulk. The best explanation for the presence of most nonlocal materials is that they were obtained over the course of an annual round in areas visited prior to arriving in Butler Flat. The suspected locations of these sources suggests that at least some groups who used the Butler Flat Area were highly mobile and covered large areas that extended 50 km to the northeast and possibly to the southeast, as well as to the west.

Projectile Points

by Betsy L. Tipps

Thirty-nine projectile points were recorded during the inventory, 38 on sites and 1 as an isolated find (Table 7). Projectile points were discovered on 62 percent of the sites. Frequency ranges from one to three per site with points, but one is the modal category. While the number of points per site with points is comparable to other areas in the Needles District (Tipps 1995:46; Tipps and Hewitt 1989:87), the percentage of sites with projectile points is two to three times higher than other areas. This may be the result of less illegal surface collection because of the remote location of the Butler Flat Area or a higher frequency of activities involving projectile points.

Table 7. Projectile point data.

Property Number	Point Type	Artifact (PP) Number	Field Specimen Number ^a	Material	Measurements (cm)			Figure
					Length	Width	Thickness	
42SA18412	Sand Dune Side-notched	1	1	Cedar Mesa Chert	5.2 ^b	1.8	0.6	7a
42SA18387	Pinto Series	3	1	Cedar Mesa Chert	3.0 ^b	2.2	0.6	7b
42SA18365	Northern Side-notched	1	1	Black chert	3.1	2.8	0.6	7c
42SA18372	San Rafael Side-notched	1	-	White chert	-	-	-	7d
42SA18372	San Rafael Side-notched	3	6	Summerville Chalcedony	2.9 ^b	2.3 ^b	0.3	-
42SA18372	San Rafael Side-notched	4	2	Summerville Chalcedony	2.3 ^b	2.8	0.4	7e
42SA18373	San Rafael Side-notched	4	4	Cedar Mesa Chert	3.5 ^b	3.0	0.4	7f
IF 21	San Rafael Side-notched	-	-	Unknown	-	-	-	-
42SA18372	Elko Eared	2	5	Cedar Mesa Chalcedony	3.2	1.6	0.5	7g
42SA18372	Elko Eared	6	-	Light green chert	-	-	-	-
42SA18366	Elko Side-notched	2	2	Gray chert	3.2	1.9	0.6	8a
42SA18372	Elko Side-notched	5	3	Summerville Chalcedony	2.7 ^b	2.6	0.4	8b
42SA18405	Elko Side-notched	1	1	Summerville Chalcedony	3.6 ^b	2.0	0.5	8c
42SA18366	Elko Corner-notched	3	3	Cedar Mesa Chalcedony	2.6 ^b	3.3	0.7	8d
42SA18373	Elko Corner-notched	2	1	Gray-brown chert	1.3 ^b	2.0 ^b	0.5	8e
42SA18386	Elko Corner-notched	1	1	Dark gray chert	3.8 ^b	2.4	0.4	8f
42SA18395	Elko Corner-notched	2	1	Cedar Mesa Chert	3.1 ^b	2.7	0.5	8g
42SA18400	Elko Corner-notched	2	2	Gray chert	3.9	2.1	0.4	8h
42SA18409	Elko Corner-notched	1	1	Summerville Chalcedony	2.3 ^b	2.0 ^b	0.5	8i
42SA18373	Elko Corner-notched	3	2	Gray-off white chert	3.2	3.4	0.6	9a
42SA18376	Elko Corner-notched	1	1	Gray Dakota Quartzite	3.7 ^b	3.2	0.5	9b
42SA18400	Elko Corner-notched	1	1	Dark gray speckled chert	2.6 ^b	3.4	0.5	9c
42SA18407	Elko Corner-notched	1	1	Rose chert	3.5	2.3 ^b	0.5	9d
42SA18366	Rose Spring	6	-	Gray-brown chert	-	-	-	-
42SA18373	Rose Spring	1	3	Summerville Chalcedony	2.9 ^b	1.5 ^b	0.4	10a
42SA18395	Rose Spring	1	-	Summerville Chalcedony	-	-	-	-

Table 7. Projectile point data (continued).

Property Number	Point Type	Artifact (PP) Number	Field Specimen Number ^a	Material	Measurements (cm)			Figure
					Length	Width	Thickness	
42SA18366	Desert Side-notched	1	1	Cedar Mesa Chert	1.7 ^b	1.4	0.4	10b
42SA18387	Large side-notched	1	-	Algalitic Chert	-	-	-	-
42SA18387	Large side-notched	2	-	Milky white chalcedony	-	-	-	-
42SA18393	Large side-notched	1	-	Variiegated gray chert	-	-	-	-
42SA18410	Large corner-notched	1	1	Mottled beige chert	7.7	2.4	0.5	12a
42SA18385	Large stemmed	1	2	Algalitic Chert	4.0 ^b	3.9	0.7	12b
42SA18366	Large eared	4	4	Cedar Mesa Chert	5.6 ^b	3.3	0.6	12c
42SA18390	Medium side-notched	1	-	Gray Dakota Quartzite	-	-	-	-
42SA18375	Medium side-notched	1	2	Gray-brown chert	2.0 ^b	1.6	0.3	12d
42SA18366	Medium corner-notched	5	7	Gray Dakota Quartzite	3.1 ^b	1.8 ^b	0.4	12e
42SA18390	Medium corner-notched	2	-	White chert	-	-	-	-
42SA18400	Medium corner-notched	3	3	Cedar Mesa Chert	3.2 ^b	1.7	0.5	12f
42SA18380	Indeterminate side-notched	1	-	Variiegated chert	-	-	-	-

^aNumber provided if collected.

^bIncomplete measurement.

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The 39 points represent nine named types and seven indeterminate categories. All of the named types commonly occur in northern Colorado Plateau assemblages (cf. Holmer 1978; Schroedl 1976): Sand Dune Side-notched, Pinto Series, Northern Side-notched, San Rafael Side-notched, Elko Eared, Elko Corner-notched, Elko Side-notched, Rose Spring, and Desert Side-notched.

A probable Sand Dune Side-notched point (Geib and Ambler 1991; Tipps and Hewitt 1989) was found on a multicomponent lithic scatter with features. Made on a curved thinning flake of local, reddish brown Cedar Mesa Chert, this crudely flaked point is complete except for the tip (Figure 7a). The specimen was shaped by bifacially pressure flaking the margins of the original flake blank; the dorsal surface of the original flake is more heavily flaked than the ventral surface. This flaking was used to modify the overall outline of the flake blank but not to thin it. Portions of the flake's platform and an arris on the dorsal surface are still intact. The point has an elongate, slender, slightly asymmetrical blade; wide, shallow, irregular side notches; and a convex base.

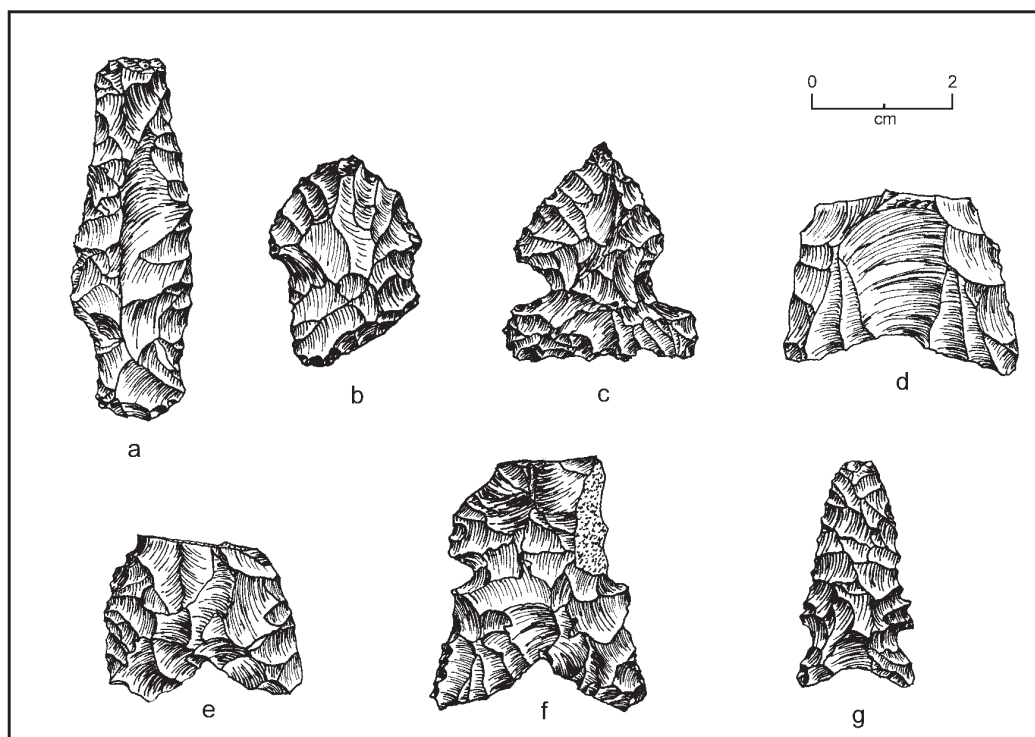


Figure 7. Selected dart points. a, Sand Dune Side-notched, site 42SA18412; b, Pinto, site 42SA18387; c, Northern Side-notched, site 42SA18365; d, San Rafael Side-notched, site 42SA18372; e, San Rafael Side-notched, site 42SA18372; f, San Rafael Side-notched, site 42SA18373; g, Elko Eared, site 42SA18372.

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Although this point is slightly wider and would have been slightly longer than other Sand Dune Side-notched points reported to date (Geib and Ambler 1991:Table 1), it matches all other characteristics of the type and is therefore believed to be a Sand Dune Side-notched specimen.

Tipps and Hewitt (1989:89-92) report on a similar, though shorter, point from Salt Pocket Shelter in the eastern Needles District. They designated the Sand Dune Side-notched type based on that point and three similar points from Sand Dune Cave in extreme southern Utah (Lindsay et al. 1968). Based on the stratigraphic positioning of the Sand Dune Cave specimens, Tipps and Hewitt (1989:92) propose that this point type dates to the Early Archaic. Geib and Ambler (1991:22) tentatively agree with this suggestion but call for more research. Additional unpublished investigations conducted as part of the Canyonlands Archeological Project indicate that the Early Archaic age is probably correct. Several Sand Dune Side-notched projectile points were discovered on open Archaic sites in the Upper Salt Creek drainage. These sites date in the 8000 B.P. range. Thus, the Sand Dune Side-notched specimen discovered in the Butler Flat Area may be the oldest point found during the inventory.

One reworked Pinto Series point (Amsden 1935; Harrington 1957) of local, reddish brown Cedar Mesa Chert was discovered on an open lithic scatter (Figure 7b). The reworked triangular blade is missing the tip; also, one tang is broken off. The point is classified as Pinto rather than Lake Mohave because the base is slightly indented. Pinto points date to the Early Archaic, between approximately 7500 and 5000 B.C., on the Colorado Plateau (Holmer 1978:66).

The Early Archaic is also represented by a Northern Side-notched point (Gruhn 1961) that has been extensively reworked (Figure 7c). Made from a nonlocal black chert, this side-notched point has a triangular blade that has been modified to approximately half of its probable original size. It has wide and deep side notches and a straight base. Northern Side-notched points date from approximately 5700 to 5200 B.C. on the northern Colorado Plateau (Holmer 1978:67).

Five Middle Archaic, San Rafael Side-notched points (Jennings et al. 1980) were discovered during the inventory, four on sites and one as an isolated find. Of the four points on sites, three occur on one lithic scatter; the other is on a lithic source area. The San Rafael specimens are all fragments consisting of a base, base and midsection, or a tang. These specimens have high side notches creating large tangs and proximally expanding bases. The base of one specimen (Figure 7d) is concave. The others have been flaked into a wide, inverted v-shape (Figure 7e-f). San Rafael Side-notched points date between approximately 3400 and 2400 B.C. on the northern Colorado Plateau (Holmer 1978:69, 1986:104). Holmer (1978:69) suggests that San Rafael points represent "a possible Plains association with the northern Colorado Plateau."

Two Elko Eared projectile points (cf. Heizer and Baumhoff 1961) were discovered, both on a multicomponent lithic scatter. One point is made from nonlocal light green chert, the other from Cedar Mesa Chalcedony that is probably local. The latter point is complete except for a small area of the tip (Figure 7g). It has a small, triangular, slightly serrated blade and wide corner notches. Elko Eared points date between 6000 and 2300 B.C. on the northern Colorado Plateau (Holmer 1978:Figure 22) and are considered diagnostic of the Archaic.

A total of three Elko Side-notched and ten Elko Corner-notched projectile points (cf. Heizer and Baumhoff 1961; Heizer et al. 1968) was recorded on ten different sites, most of which are lithic scatters. All have triangular blades; most are missing the tip and approximately one-third are missing a tang (Figures 8 and 9). The points vary considerably in size and at least two (e.g., see Figures 8a and 9a) are reworked. Three of the points are wider than average Elko points and have wide, almost stemmed bases (see Figure 9a-c). These and a smaller, similarly shaped point (see Figure 9d) may represent a distinct, as yet unnamed, point type. On the northern Colorado Plateau and in the extreme eastern Great Basin, Elko points date from 6000 to 3500 B.C., 3000 to 1000 B.C., and A.D. 1 to 1000 (Holmer 1986:101-102, Figure 12), but are most common during the earliest period.

Three projectile points were classified as Rose Spring (see Lanning 1963; Thomas 1981:19) by the field crew. One each occurs on a multicomponent lithic source area with sherds and features, a multicomponent lithic source area and sherd scatter, and a lithic scatter. Only one of these points was illustrated by the field crew. It has a slender, triangular blade with deep corner notches, downward-pointing tangs, and a proximally expanding, convex base (Figure 10a). This Summerville Chalcedony point is missing the tip and a portion of one tang. Based on work in the central Great Basin, Thomas (1981:19) suggests that Rose Spring Corner-notched be combined with the Eastgate Series (Heizer and Baumhoff 1961) to form a Rosegate Series because they grade into one another and are the same age. However, Eastgate points do not occur on the northern Colorado Plateau (Holmer and Weder 1980:Figure 8, 60), so the Rose Spring terminology is retained here.

Rose Spring points occur throughout the Intermountain West and seem "to be the point style associated with the initial spread of the bow-and-arrow" (Holmer 1986:107). The most recent dating evidence suggests that arrow points appeared on the northern Colorado Plateau by A.D. 100 (Geib and Bungart 1989; Tipps 1992). Holmer and Weder (1980:60) believe they persisted until A.D. 850-950.

Rose Spring points occur in very late Archaic and Fremont contexts (Holmer and Weder 1980), although certain Anasazi points also resemble Rose Spring (e.g., Brew 1946:Figure 172; Hayes and Lancaster 1975:Figure 178). This can make it difficult to

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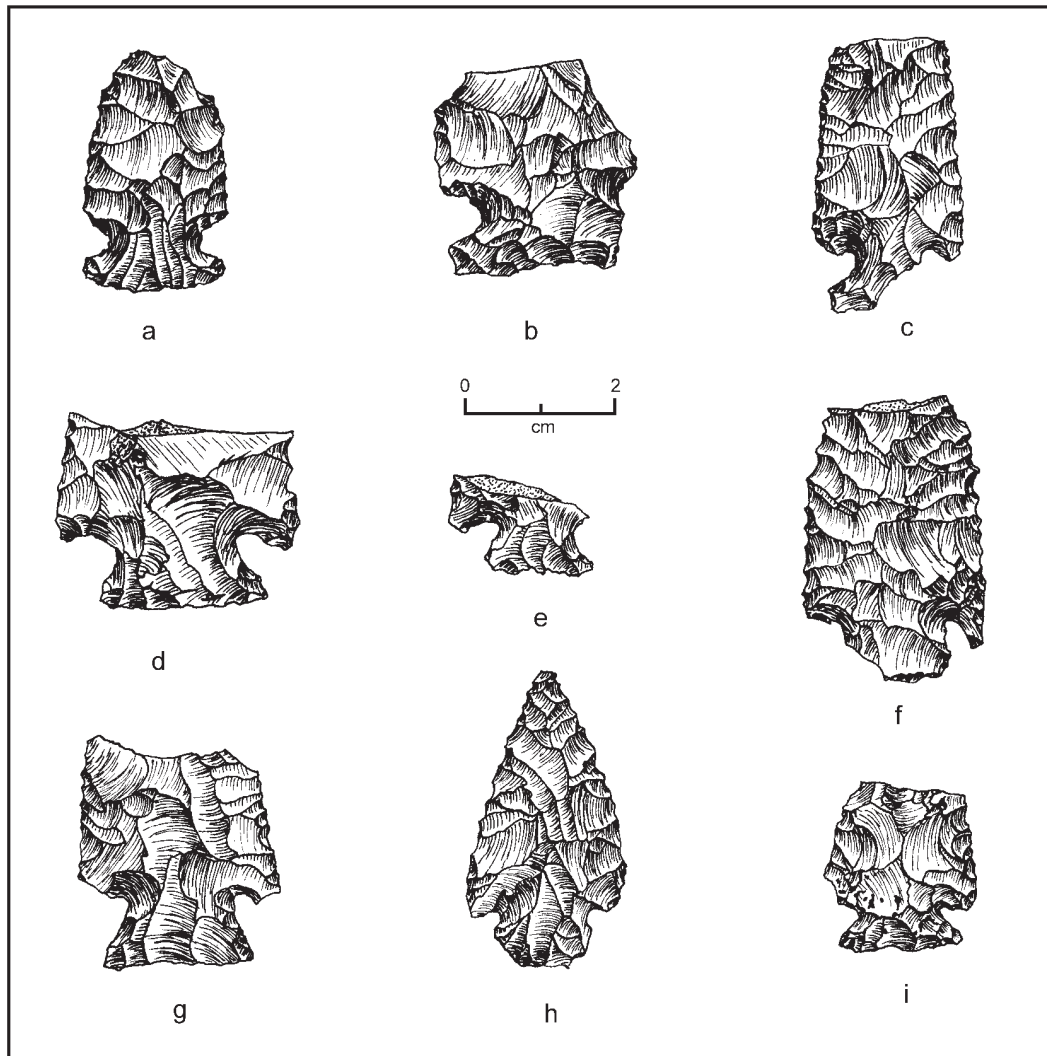


Figure 8. Selected Elko points. a, Elko Side-notched, site 42SA18366; b, Elko Side-notched, site 42SA18372; c, Elko Side-notched, site 42SA18405; d, Elko Corner-notched, site 42SA18366; e, Elko Corner-notched, site 42SA18373; f, Elko Corner-notched, site 42SA18386; g, Elko Corner-notched, site 42SA18395; h, Elko Corner-notched, site 42SA18400; i, Elko Corner-notched, site 42SA18409.

identify points as either Rose Spring or an Anasazi type when working away from core culture areas, especially in an area like the western Needles District of Canyonlands where Archaic, Anasazi, and potentially Fremont groups were present. Compounding the problem, since Thomas' (1981) suggestion that Rose Spring and Eastgate Series points be combined in a Rosegate Series, researchers seem to be including a wide

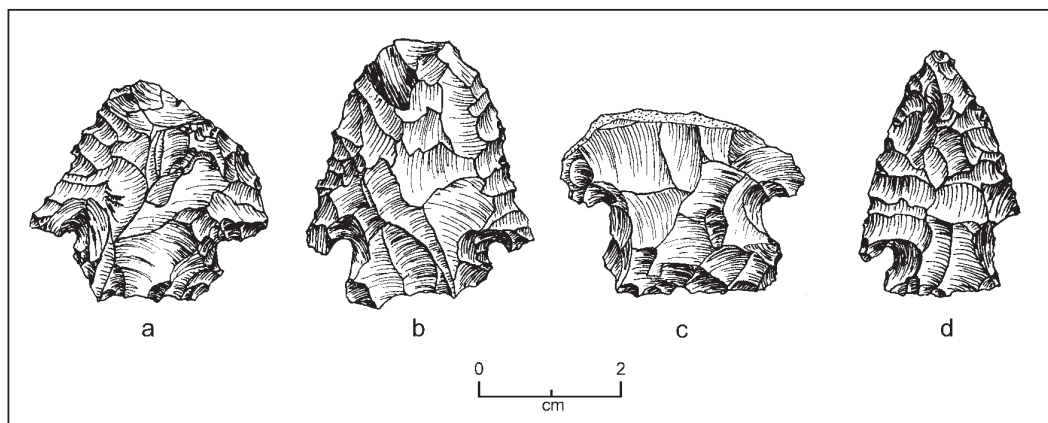


Figure 9. Selected Elko points with wide bases. a, Elko Corner-notched, site 42SA18373; b, Elko Corner-notched, site 42SA18376; c, Elko Corner-notched, site 42SA18400; d, Elko Corner-notched, site 42SA18407.

variety of points that possess neither Rose Spring, nor Eastgate, nor intermediate morphologies in this, the earliest of arrow point types.

It is likely that some of these morphologically distinct specimens are separate, as yet unidentified, types. Detailed consideration of this issue is well beyond the scope of

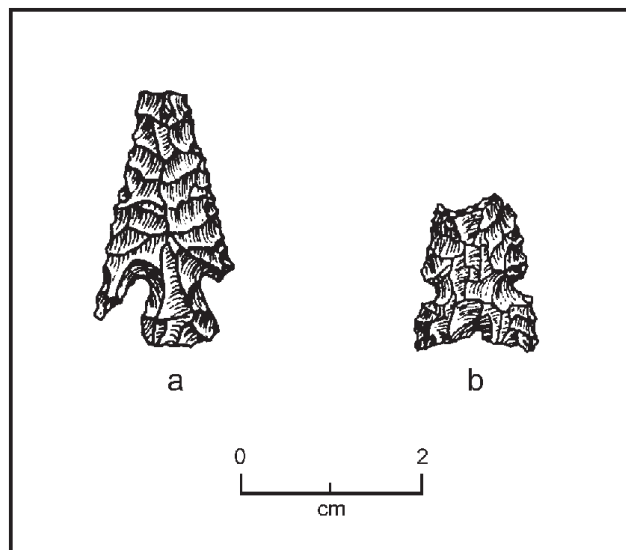


Figure 10. Selected arrow points. a, Rose Spring, site 42SA18373; b, Desert Side-notched, site 42SA18366.

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the current work. However, in the Needles midlands inventoried as part of the Canyonlands Archeological Project, there are at least two morphologically distinct styles of arrow points among those points that many researchers would consider Rosegate.

One "type" has small triangular blades, wide corner notches that give the points an almost stemmed/shouldered appearance, and rounded tangs that are more horizontal than downward pointing (Figure 11; see also Tipps and Hewitt 1989:Figure 14b-h). The bases or "stems" of these points are rather wide, long, and bulbous. Based on the wide corner notches, the horizontal positioning of the tangs, and the bulbous base, Tipps and Hewitt (1989:94) argue that these points do not represent the Rose Spring type. The original Rose Spring points defined by Lanning (1963) and the illustrated Rose Spring specimens from Gatecliff Shelter (Thomas 1981) have sharper, downward-pointing tangs and significantly less bulbous and rounded bases; in fact, the bases meet the corner notch at a rather sharp angle.

Instead, Tipps and Hewitt (1989:94) suggest that the specimens are Style B Anasazi points (cf. Hayes and Lancaster 1975:Figures 178 and 179). Although the Canyonlands points match some of the actual specimens illustrated by Hayes and Lancaster (1975) in Figure 179, the tangs are more horizontal than their idealized Style B specimen in Figure 178. It is possible the Canyonlands points are some other type than Style B, but they definitely appear to be Anasazi because more than half occur on Anasazi sites. Dating is imprecise, but in the Needles midlands, they occur with Anasazi materials that date from Pueblo I-III. Geib and Bungart (1989:37) report on two morphologically identical points from the Sunny Beaches site in central Glen Canyon, southwest of the project area. Because the points date to the first few centuries A.D., when the Anasazi were still using an atlatl and dart point technology, Geib and Bungart (1989:44) suggest that the points were made by "Terminal Archaic Protohistoric-Fremont populations." It is uncertain if the points Geib and Bungart (1989:37) found are

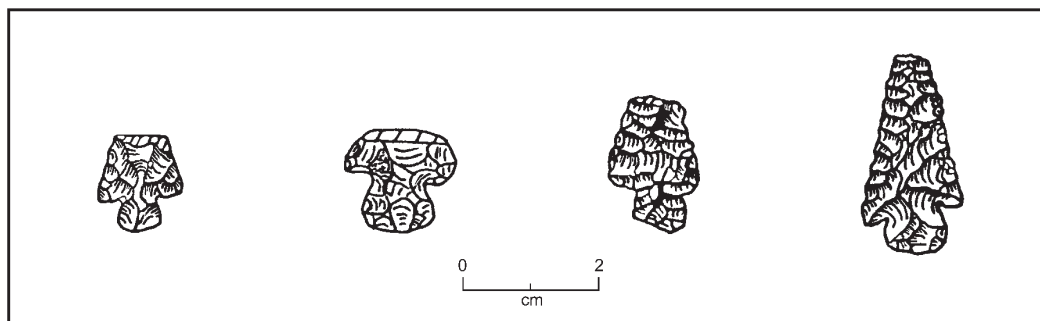


Figure 11. Selected arrow points from the Salt Creek Pocket and Devils Lane areas (after Tipps and Hewitt 1989:Figure 14).

technologically analogous to those in the Needles District and whether points of this type are diagnostic of a single cultural group or discrete time period.

The other distinctive arrow point "type" recorded in the Needles midlands is typified by the Butler Flat Area specimen discussed above (see Figure 10a). These points have triangular blades with long, downward-pointing tangs and deep corner notches that create proximally expanding bases, which are rounded. This type is similar to some of the tanged, Pueblo I points from Alkali Ridge (Brew 1946:Figure 172d-e), as well as a point identified as Rose Spring Corner-notched on the Interstate 70 testing project (Brown 1988:Figure 7.9g). It is also similar to, but smaller than, what Montgomery et al. (1982:Figure 2-10) refer to as Abajo Stemmed, an Anasazi type dating between A.D. 450 and 900. As with the preceding style, more research is needed to determine its potential age(s) and cultural affiliation(s).

The preceding paragraphs point out the need for more work on the Formative period arrow point typology, particularly how the Fremont types (Holmer and Weder 1980) relate to those of the Anasazi. Until this occurs, there will continue to be difficulties sorting out the ages and cultural affiliations of certain arrow points, including those in the Butler Flat Area classified as Rose Spring by the field crew. As such, the Butler Flat Area specimens were considered of Formative age, but unknown cultural affiliation.

The only other named point type discovered during the project is a Desert Side-notched specimen on a multicomponent lithic source area with features. This point has a triangular blade, high, shallow side notches, and a concave, slightly notched base (Figure 10b). Holmer (1978:107) suggests that Desert Side-notched points date between A.D. 1200 and 1700 on the northern Colorado Plateau. Reed (1994:191) believes they might occur as early as A.D. 1000. In the Canyonlands area, they are generally attributed to Late Prehistoric/Protohistoric, Numic speakers.

Twelve indeterminate points were recorded during the Butler Flat Area inventory. Six of these are large: three side-notched, one corner-notched (Figure 12a), one stemmed (Figure 12b), and one eared (Figure 12c). The large corner-notched and eared specimens may have been hafted knives. Five additional indeterminate points are of medium size. Two are side-notched (Figure 12d) and three are corner-notched (Figure 12e-f). The size of the remaining indeterminate point is unknown.

Prehistoric hunters are believed to have recovered serviceable hafts still containing broken projectile point bases, curated them until a convenient time for retooling, and then discarded the point bases at the retooling location (Keeley 1982; Odell 1980). Most of the Butler Flat Area projectile points are proximal fragments, many of which are definitively use-broken. Thus, many of the points were probably brought to the sites while still on a shaft and thrown away when the haft was refitted with a new tip. This suggests that one activity in the Butler Flat Area was retooling hunting implements.

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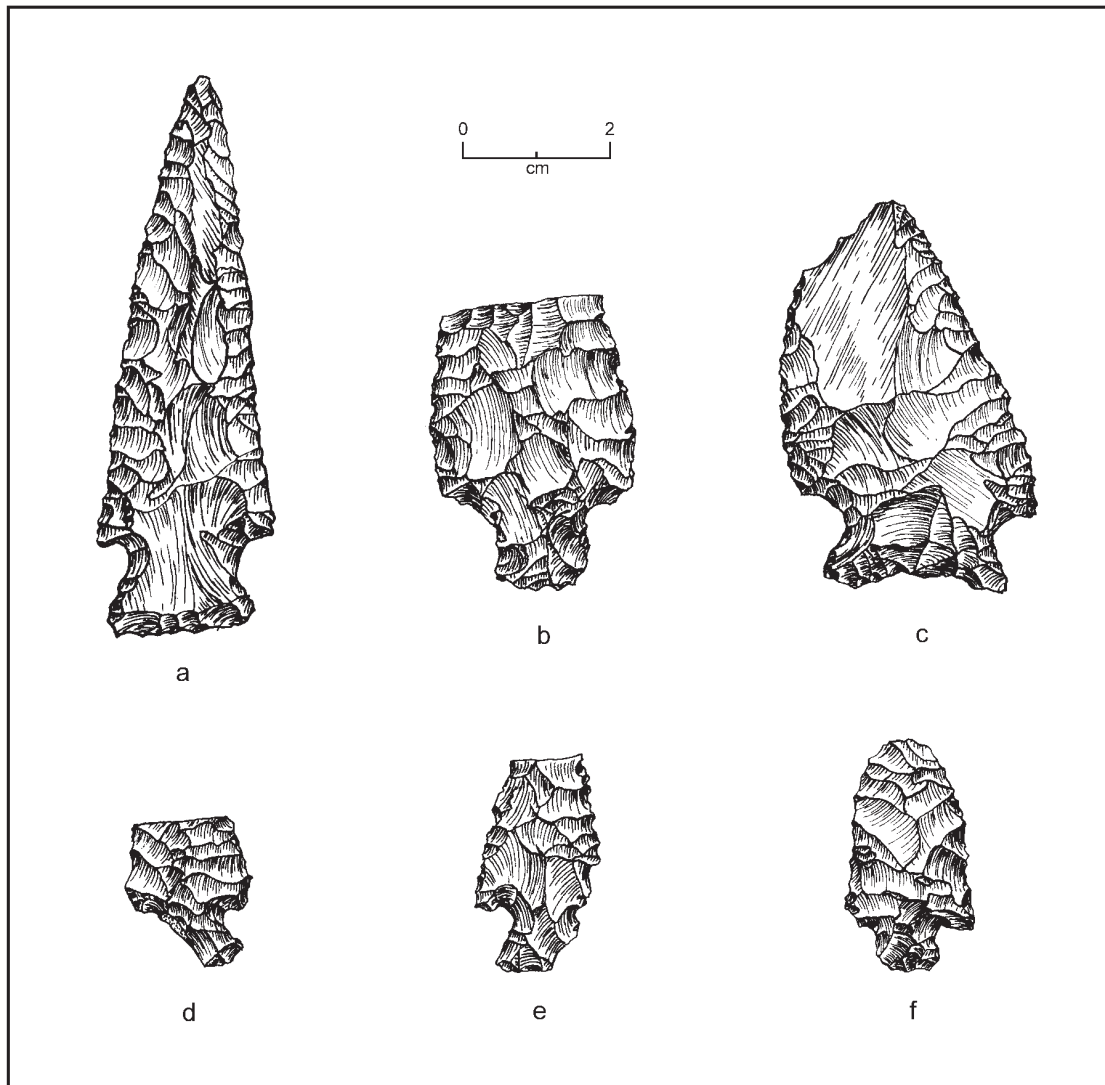


Figure 12. Selected indeterminate projectile points. a, large corner-notched, site 42SA18410; b, large stemmed, site 42SA18385; c, large eared, site 42SA18366; d, medium side-notched, site 42SA18375; e, medium corner-notched, site 42SA18366; f, medium corner-notched, site 42SA18400.

Bifaces

A total of 253 bifaces occurs on 35 sites (70 percent) in the Butler Flat Area. Thirteen other bifaces are isolated finds for a total of 266. Thus, bifaces are the most common tool type in the project area. Early-stage bifaces are the most common (n=140), followed by late-stage ones (n=86). The remainder are of unknown stage. Eighty tools

are complete. The average dimensions of 12 measured specimens are 4.2 cm long, 3.3 cm wide, and 1.3 cm thick.

The frequency of bifaces on sites with one identified prehistoric component is 135. Those on sites with multiple prehistoric components total 118. The sites date from Archaic to Protohistoric. Ten sites have 1 biface each and 25 sites have between 2 and 40, with an average of 7.2 per site. Approximately three-fourths of the sites with bifaces have six or less specimens.

The most common raw material type is Algalitic Chert (53 percent), followed by Cedar Mesa Chert (11 percent), brown chert (8 percent), gray-brown chert (6 percent), white chert (4 percent), and gray chert (3 percent). There are a few bifaces made of Summerville Chalcedony, white-pink chert, Dakota Quartzite, white chalcedony, petrified wood, pink chert, black chert, Morrison Chert, maroon chert, and other unknown types.

Some tools in this category may have been used for cutting. Other bifaces could have been used as cores, that is, reduced into smaller implements such as projectile points (Kelly 1988). Figure 13 shows several bifaces recorded in the project area.

Bifaces occur on a higher percentage of sites in the Butler Flat Area than in the Squaw Butte (Tipps 1995), Salt Creek Pocket, and Devils Lane areas (Tipps and Hewitt 1989). There is also a greater range, and higher average, of bifaces per site in the Butler Flat Area than in the other locales.

Knives

by Betsy L. Tipps

Although some of the bifaces and projectile points recorded during the inventory were probably used as knives, three bifacially flaked implements were coded as knives to emphasize that this appears to have been their primary function. Two are illustrated in Figure 14.

One finely shaped specimen is leaf shaped with straight to slightly concave margins and a slightly asymmetrical base (see Figure 14a). It is made from a large thinning flake of nonlocal white-pink chalcedony. The distal end of the specimen is thicker than the midsection and proximal end. In the northwestern Plains, artifacts of this type are referred to as Shoshonean knives and considered reliable indicators of late Shoshonean occupation (Frison 1991). Reed (1994) notes that they have been found with brown ware pottery and Desert Side-notched and Cottonwood Triangular projectile points in eastern Utah, suggesting they may represent Late Prehistoric/Protohistoric occupation, probably by Ute people or their ancestors.

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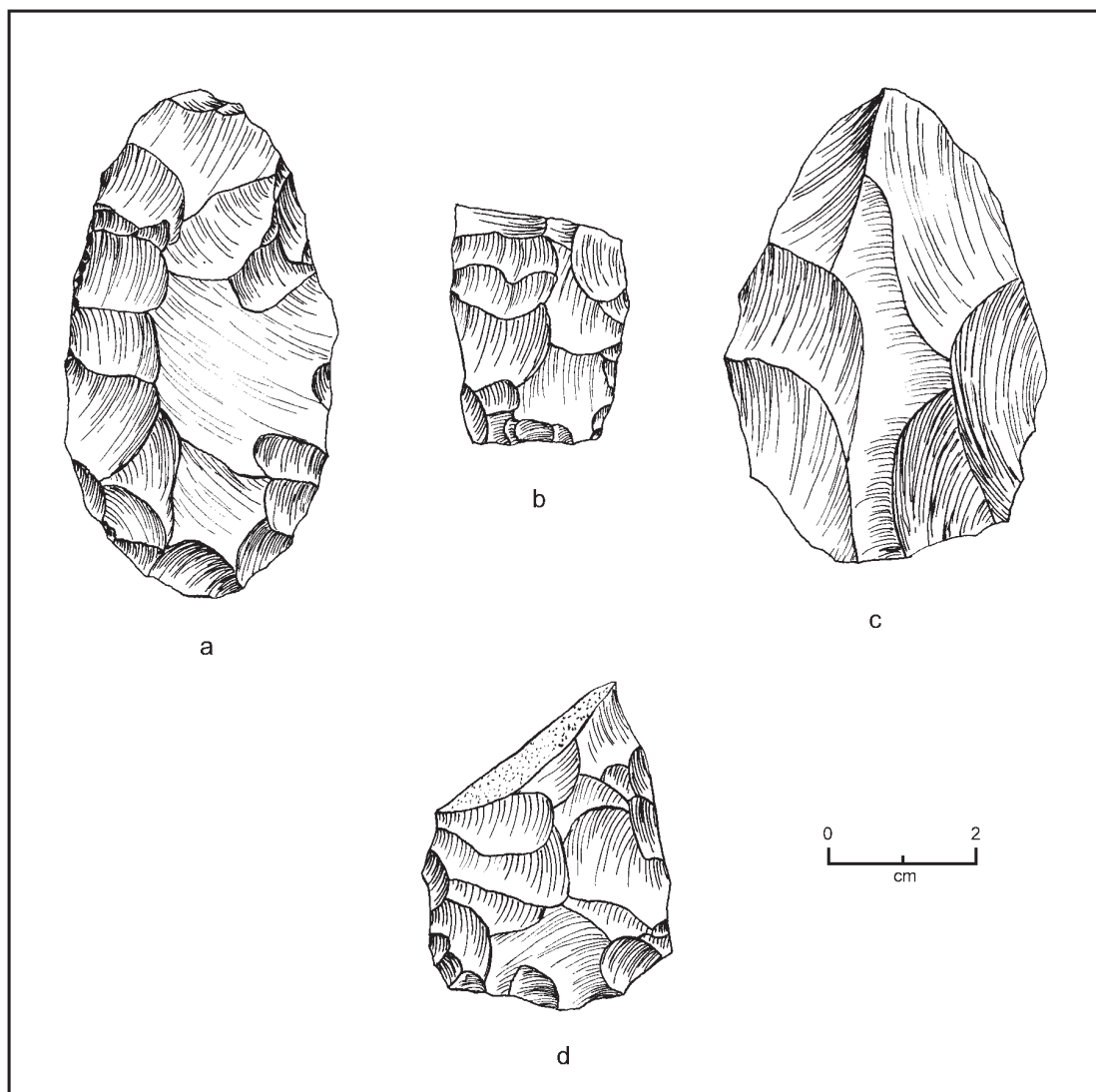


Figure 13. Selected bifaces. a, site 42SA18372; b, site 42SA18379; c, site 42SA18379; d, site 42SA18379.

Another specimen is the base of a large, deeply side-notched, hafted knife (see Figure 14b). This finely flaked specimen is made from dark purple quartzite of probable nonlocal origin. It was discovered on a multicomponent lithic source area with sherds and features. The third knife is a large, very thin, leaf-shaped specimen made of Dakota Quartzite. It was observed on a lithic scatter of unknown age and cultural affiliation.

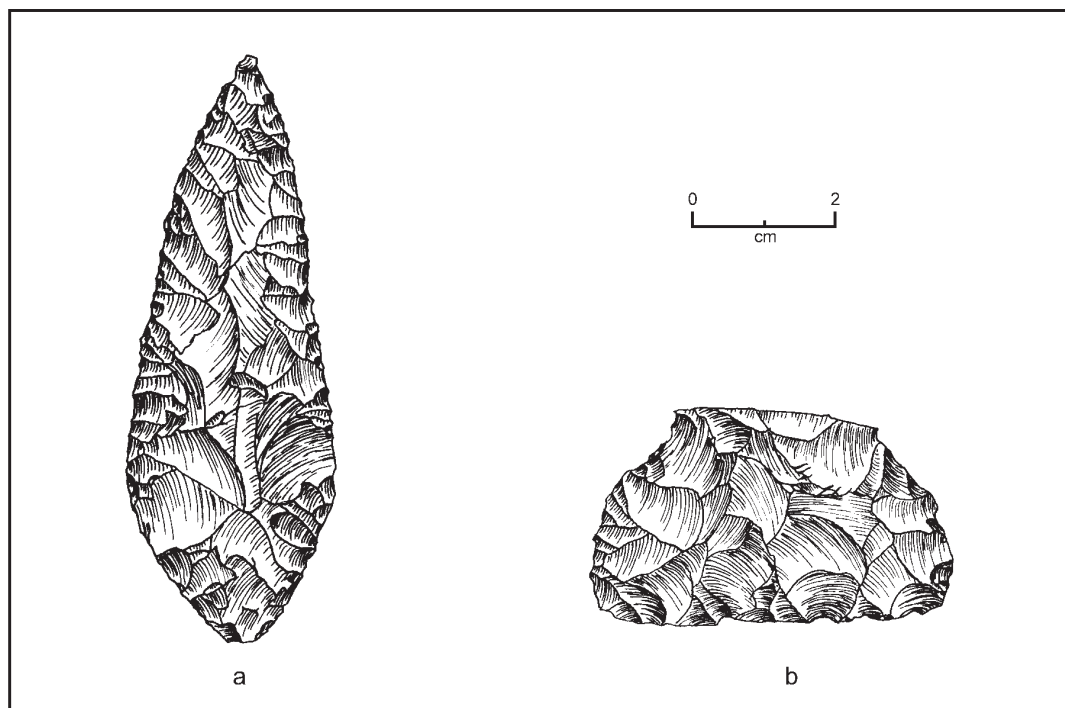


Figure 14. Selected knives. a, Shoshonean knife, site 42SA18375; b, side-notched knife end scraper, site 42SA18366.

Drills

Six drills are present in the assemblage, each on a different site (12 percent of the sites). One informal drill is from a Pueblo II-III site. Three formal and two informal drills are from sites of unknown prehistoric age and aboriginal affiliation. The formal drills were probably curated tools discarded after breakage. Curation is suggested by the presence of a formal drill of Summerville Chalcedony, a nonlocal material type. The informal drills were likely expedient tools that were discarded after use instead of after breakage. Figure 15 illustrates one of the formal drills.

Three tools are Cedar Mesa Chert, two are Summerville Chalcedony, and the sixth is of an unknown material type. Compared to the Salt Creek Pocket (Tipps and Hewitt 1989) and Squaw Butte areas (Tipps 1995), a slightly higher percentage of sites in the Butler Flat Area have drills, although the number per site is the same among all areas.

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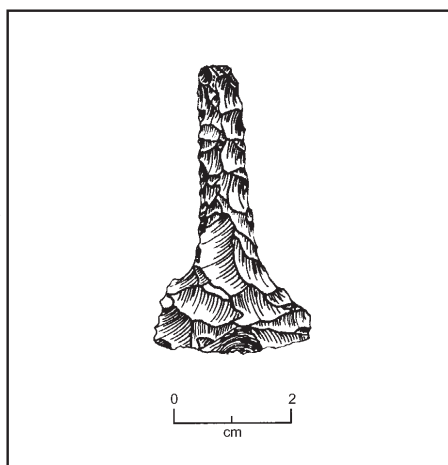


Figure 15. Drill from site 42SA18374.

Unifaces

Twenty-nine unifaces were observed on 15 sites (30 percent); 18 tools are from sites with 1 identified prehistoric component and 11 are from sites with multiple prehistoric components. The sites date from Early Archaic to Late Prehistoric/Protohistoric. Eight sites have one uniface each, whereas seven have between two and six unifaces.

Chert is the most common raw material; 16 unifaces are Algalitic Chert and 2 each are brown and gray cherts. One uniface is Dakota Quartzite—a nonlocal material type—and one is white chalcedony. Seven unifaces are of unknown raw material type. This tool category was used for scraping, graving, etc.

Compared with the Salt Creek Pocket, Devils Lane (Tipps and Hewitt 1989), and Squaw Butte (Tipps 1995) inventory areas, the sites in the Butler Flat Area have a much higher percentage of unifaces. The reason for this difference is uncertain. Except for the Devils Lane Area, where no unifaces were observed, the number of unifaces per site is approximately similar among all inventory parcels examined by the Canyonlands Archeological Project in the Needles District.

Scrapers

Thirty-two scrapers were documented on 14 sites (28 percent) in the Butler Flat Area, whereas 3 others are isolated finds. End scrapers are the most common type (n=17), followed by side (n=8), end/side (n=3), and convergent scrapers (n=1) (see Frison and Bradley 1980:Figure 40c and 40d). One specimen is a composite scraper/graver. Five are of unknown type. Figure 16 illustrates several end and end/side scrapers. Fifteen tools are from sites with one identified prehistoric component and

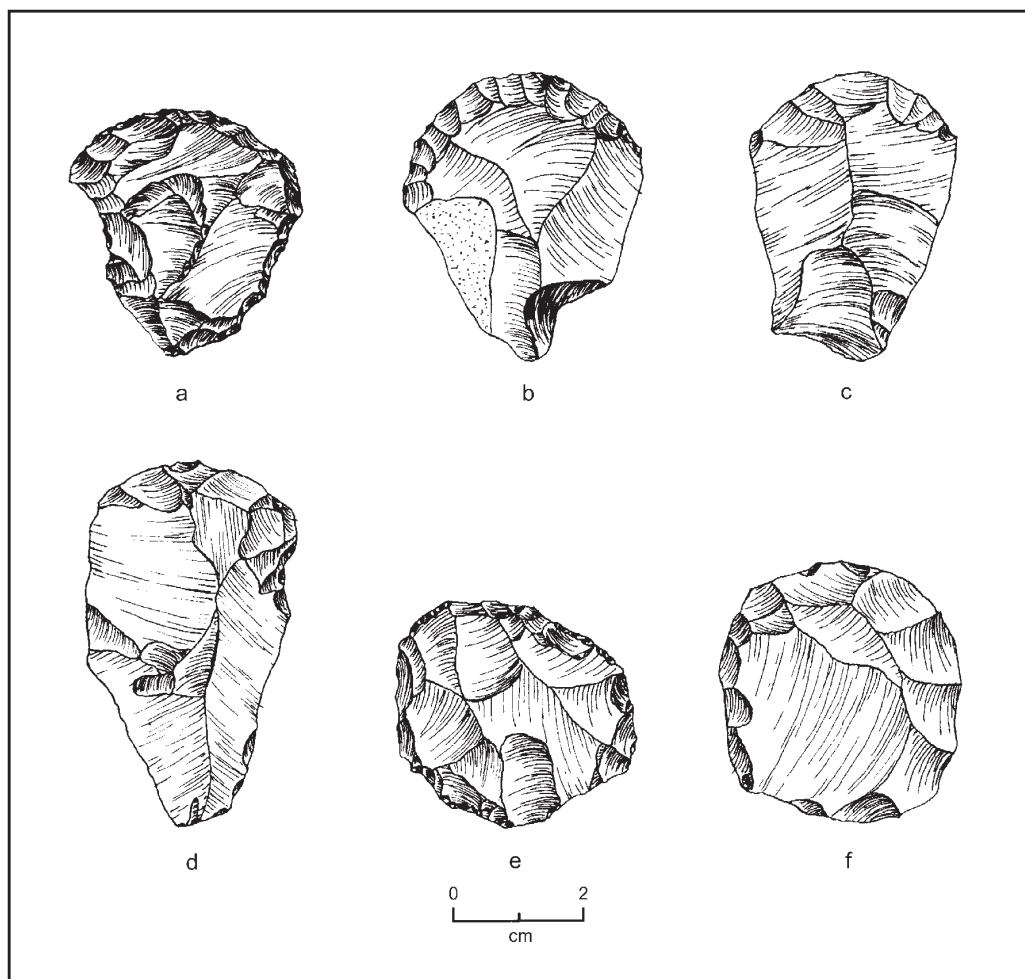


Figure 16. Selected scrapers. a, end scraper, site 42SA18385; b, end scraper, site 42SA18385; c, end scraper, site 42SA18385; d, end scraper, site 42SA18365; e, end/side scraper, site 42SA18365; f, end/side scraper, site 42SA18372.

17 are from sites with multiple prehistoric components. The sites date from Early Archaic to Late Prehistoric/Protohistoric. Six sites have one scraper each and eight have between two and five such tools.

Most (n=31) of the scrapers are chert, including Algalitic (n=18), Cedar Mesa (n=5), white (n=3), brown (n=2), gray (n=2), and white-pink (n=1). Two scrapers are nonlocal Dakota Quartzite, one is petrified wood, and one is of unknown material type. The eight measured end scrapers have mean dimensions of 5.3 cm long, 4.0 cm wide, and 1.0 cm thick. No measurements are available for the other scrapers.

One scraper has a denticulate or notch worked into one lateral margin, just below the working end (see Figure 16a). The scraper has a prominent spur formed by retouching

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a denticulate in the corner of the tool, contiguous with the scraping end, but the focus of use appears to have been the denticulate or notch rather than the spur. This scraper is made on an expanding secondary flake of brown Cedar Mesa Chert and has a steep scraping element on the distal end.

The sites in the Butler Flat Area have a higher percentage of scrapers relative to other inventoried areas within Canyonlands National Park (Tipps 1995; Tipps and Hewitt 1989). This, plus the presence of numerous projectile points in this area, suggests that more hunting and hide processing may have occurred here relative to other locales. The number of scrapers per site is roughly equivalent among all parcels inventoried in the Needles District as part of the Canyonlands Archeological Project.

Graver

Gravers are the least common tool type found in the project area. One graver was observed on an Anasazi site. It is composed of a white chert flake that was alternately retouched and sharpened into an expedient tool. As noted above, one of the scrapers was also used as a graver.

Modified Flakes

Thirty-seven modified flakes were discovered on 20 sites (40 percent). Two additional specimens occur as isolated finds. Twenty-three flakes are from sites with one identified prehistoric component and 14 are from sites with multiple prehistoric components. The sites date from Early Archaic to Late Prehistoric/Protohistoric. Frequency ranges from one to four per site, but one is the modal category.

Most of the modified flakes are chert (n=37), including Algalitic (n=23), Cedar Mesa (n=9), brown (n=3), gray (n=1), and semitranslucent (n=1). One is Dakota Quartzite and another is obsidian, both nonlocal raw material types.

Seven modified flakes are decortication flakes, eight are core reduction flakes, six are thinning flakes, and the remainder are other flake types or are unknown. Retouch occurs on one or more margins. Only five modified flakes exhibit definite usewear. This tool type was possibly used for scraping, planing, cutting, or shredding.

One modified flake made from local reddish brown chert is an expanding early-stage thinning flake with irregular bifacial retouch along the margins (Figure 17). A curved notch is flaked near the distal end of one lateral margin creating an irregular projection. There is no usewear on the projection. Instead, the focus of use appears to have been on the notch. Although the illustration resembles a spurred end scraper, it is doubtful this tool was used for this purpose. The distal end has an acute edge angle more suited to cutting than scraping and there is no evidence of wear on the spur.

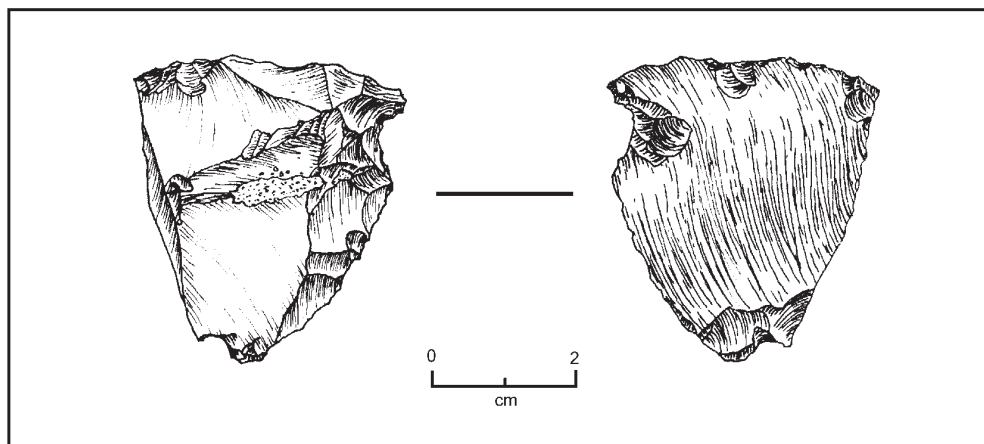


Figure 17. Modified flake from site 42SA18372.

The relatively high number of modified flakes on sites in the project area suggests that expedient tools were commonly used. Modified flakes were also relatively numerous in the Salt Creek Pocket, Devils Lane (Tipps and Hewitt 1989), and Squaw Butte areas (Tipps 1995), suggesting that expedient tools were an important part of the tool assemblage of the prehistoric inhabitants of Canyonlands. However, a higher percentage of sites in the Butler Flat Area have modified flakes compared to the other areas. It also appears that the number of modified flakes per site is somewhat greater in the Butler Flat Area than in other parcels.

Cores and Utilized Cores

Seventy-eight cores and utilized cores were recorded on 22 sites (44 percent) in the Butler Flat Area. Four additional specimens are isolated finds. Bidirectional cores are the most common (n=23). Also observed were multidirectional (n=18), unidirectional (n=12), and discoidal (n=7). The other cores are of unknown type. Thirty-seven cores were observed on sites with one identified prehistoric component. Forty-one cores are on sites with multiple prehistoric components. The sites range from Early Archaic to Late Prehistoric/Protohistoric. Eleven sites have 1 core each and 11 sites have between 2 and 14. The average number of cores per site is 3.5.

All cores, but four of unknown raw material type, are chert. The most common chert is Algalitic (n=61), followed by brown (n=7) and Cedar Mesa (n=5). Represented by one core each are gray, gray-brown, white, black, and white-pink cherts.

Twelve cores exhibit evidence of use subsequent to functioning as a core. Several have unspecified usewear, suggesting their employment as expedient tools. A few other cores are battered, probably from use as a hammerstone. A few cores in the Squaw

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Butte Area (Tipps 1995:58) show evidence of use in scraping and cutting. Twelve cores are exhausted, revealing their extensive use.

The Butler Flat Area has a greater percentage of sites with cores than other inventoried areas in the Needles District of Canyonlands (Tipps 1995; Tipps and Hewitt 1989). Additionally, it has a higher average of cores per site. This may suggest that more chipped stone tool manufacture was occurring, or that it was being done in a different fashion than elsewhere, possibly due to the nature of the local Algalitic Chert. The predominance of multidirectional cores in the Butler Flat Area mirrors other inventoried areas, although the Butler Flat Area appears to have more unidirectional cores than elsewhere. This suggests that different reduction strategies were used more frequently in the Butler Flat parcel.

Lithic Debitage

Debitage occurs on every site in the Butler Flat Area. Sites with 25-100 pieces ofdebitage are the most common (36 percent), followed by sites with 100-500 (32 percent) and those with 10-25 pieces (22 percent). Uncommon are sites with over 500 (6 percent) and those having 1-9 pieces ofdebitage (4 percent). More than 50 pieces ofdebitage were also recorded as isolated finds.

Following IMACS procedures, four ordinal-level categories (dominant, common, rare, and not present) were used to document the quantities of fourdebitage types: decortication, secondary, and tertiary flakes, and shatter. Tertiary flakes are the majority in the dominant category, whereas secondary flakes composed most of the common group. The rarestdebitage type is almost evenly split between decortication and shatter. However, a review of the site forms suggests that initial reductiondebitage, such as decortication flakes, may be more prevalent than this tally indicates. Chipped stone tool technologies used in Butler Flat include core and bifacial reduction.

Groundstone Artifacts

The groundstone assemblage consists of 17 manos and mano fragments, 32 metates and metate fragments, and 5 indeterminate groundstone artifacts. One-hand manos and basin metates are the most common.

Manos

Seventeen manos and mano fragments were discovered on 10 sites (20 percent) in the Butler Flat Area. All but one of these are on sites with one identified component. Most occur on sites of unknown age and affiliation or sites with Pueblo II-III Anasazi diagnostics, but some of the sites are suspected to be Archaic or have Archaic components. Seven sites have only one mano, two sites have two manos each, and one has six

manos. Thirteen tools are one-hand manos, one is a mano blank, and three are too fragmentary to ascertain their type.

Compared to other inventoried areas in the Needles District of Canyonlands (Tipps 1995; Tipps and Hewitt 1989), the Butler Flat Area has a similar percentage of sites with manos. The exception is perhaps the Devils Lane Area where the percentage of sites with manos is lower than elsewhere. All areas have an equivalent number of manos per site.

One-hand manos

The 13 complete and partial one-hand manos were recorded on 9 sites in the project area. One of the specimens is on a known multicomponent site and the remainder are on sites with one identified component. The specimens are approximately equally split between Pueblo II-III sites and sites of unknown prehistoric age, but as noted above, some of the sites are believed to have been used by Archaic peoples but lack Archaic diagnostics.

Six specimens are complete and seven are fragments. Three measured one-hand manos average 9.6 cm long, 6.8 cm wide, and 3.3 cm thick. These artifacts are sandstone (n=11), quartzite (n=1), and of metamorphic material (n=1). Three one-hand manos and four mano fragments are formally shaped by pecking and/or grinding.

Bifacial grinding facets appear on eight specimens. Four are unifacially ground. The remaining mano fragment has an unknown number of facets. Extent of wear is known for only four cases, three of which are well worn. The fourth is minimally worn. One unifacial, well-worn mano exhibits pecking on its use surface indicative of resharpening. The presence of extensive grinding and resharpening suggests the curation of three specimens.

Mano Blank

This complete artifact was observed on a site of unknown age. It consists of two conjoinable fragments of a sandstone slab that probably broke during manufacture. It measures 17.0 cm long, 9.0 cm wide, and 2.5 cm thick. This blank could have been intended for either a two- or one-hand mano.

Indeterminate Manos

These artifacts are too fragmentary to classify them as either one- or two-hand manos. Three indeterminate mano fragments were documented on two sites. Two of the indeterminate mano fragments are on a site with Anasazi diagnostics. The other is on a site of prehistoric age and unknown cultural affiliation.

Two indeterminate manos are sandstone and one is quartzite. One fragment lacks formal shaping whereas the presence of shaping is unspecified in two cases. One mano fragment has one grinding facet, one has two, and the other is unknown.

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Metates

Thirty-two metates and metate fragments were discovered during the inventory, 31 on 8 sites (16 percent) and 1 as an isolated find in the Butler Flat Area. Twenty-seven are on sites with one identified component. These sites are of Archaic, Anasazi, and unknown affiliation. Four metate fragments occur on a multicomponent site with known Archaic, Anasazi, and Late Prehistoric/Protohistoric components. Two sites have 1 metate each, whereas the remainder have between 2 and 11, but most have 3 or less. The assemblage includes 17 basin metates, 3 slab metates, and 12 of unknown type.

Compared to the Squaw Butte Area (Tipps 1995), the Butler Flat Area has a slightly higher percentage of sites with metates. Additionally, the average number of sites with metates in the Butler Flat Area is also higher than that computed for the Squaw Butte Area. This suggests that more grinding may have occurred in the Butler Flat Area, or perhaps there has been less illegal surface collection.

Basin Metates

Seventeen complete and partial basin metates were documented on five sites. All were observed on sites with one identified prehistoric component, either Archaic, Anasazi, or of unknown aboriginal affiliation.

Seven are complete specimens and 10 are fragments. The four measured basin metates average 53 cm long, 32 cm wide, and 4 cm thick. The 17 metates and metate fragments are made of sandstone. Two metates are formally shaped by spalling. Thirteen others exhibit no formal shaping and two cases are unknown.

Ten specimens are unifacially ground whereas seven others exhibit bifacial wear. Of the unifacially ground metates and metate fragments, four have minimal wear, one is moderately worn, two have extensive wear, and three are unknown. Six bifacially ground metates and metate fragments have an unknown degree of wear; one is extensively ground. Only three basin metates show evidence of resharpening.

Slab Metates

One slab metate and two slab metate fragments were observed on two sites in the project area. One is on a known multicomponent site with Pueblo III and Late Prehistoric/Protohistoric components. The other two are on a Pueblo II-III Anasazi site.

The slab metates are all unshaped sandstone tools. The complete specimen measures 45 cm long, 28 cm wide, and 16 cm thick.

The complete metate and both fragments have one grinding face each. The complete slab metate is extensively worn, one fragment has minimal wear, and the degree of wear on the second fragment is unknown. The complete specimen has pecking on its use surface indicative of resharpening.

Indeterminate Metates

Eleven indeterminate metate fragments were discovered on five sites. The twelfth fragment is an isolated find. Three fragments were observed on sites with known multiple components. One fragment is on a site of unknown prehistoric age. Seven pieces are on Anasazi sites.

All fragments are sandstone. Seven exhibit no formal shaping, five are unknown. Seven fragments have unifacial grinding, four are bifacially worn, and one is unknown. Of the seven uniaxially ground fragments, four are minimally worn. The remainder have an unknown degree of wear. The three bifacially ground fragments also have an unknown extent of grinding. Three fragments—two unifacial and one bifacial—were resharpened by pecking the use surface(s). One fragment is burned.

Indeterminate Groundstone

Five small groundstone fragments occur on two sites (4 percent) in the Butler Flat Area. One fragment is on a site of unknown prehistoric age, whereas four are on a site of Anasazi affiliation. All are unshaped, uniaxially ground sandstone pieces that are too small to determine groundstone type (i.e., mano, metate, etc.). One has minimal wear and the remainder have an unknown degree of grinding.

Discussion

In terms of formal shaping, the one-hand manos in the Butler Flat Area are comparable to those in other areas of the Needles midlands (Tipps 1995; Tipps and Hewitt 1989). Additionally, the dominance of bifacially ground manos is similar to other locales. Overall, this suggests that the manos in the Butler Flat Area were intensively used.

The lack of two-hand manos in the Butler Flat Area suggests that the inhabitants were not grinding large quantities of floral materials or large-grained goods such as corn. Two-hand manos are also poorly represented in the Salt Creek Pocket, Devils Lane, and Squaw Butte areas (Tipps 1995; Tipps and Hewitt 1989).

Similar to other inventoried areas in the Needles midlands (Tipps 1995; Tipps and Hewitt 1989), basin metates are the most numerous metate type in the Butler Flat Area. Comparable to the Salt Creek Pocket and Devils Lane inventories (Tipps and Hewitt 1989), very few of the Butler Flat Area basin metates are shaped, indicating a relatively expedient assemblage. Approximately half of the uniaxially basin metates exhibit slight grinding suggestive of low grinding intensity. Three other uniaxially worn metates are moderate and well-ground specimens that may have been used over longer periods or left on the sites as furniture and reused by successive inhabitants. Other evidence of extensive usage is the seven basin metates and metate fragments that are

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bifacially ground. The suggestion of heavy usage matches that of the one-hand manos in the groundstone assemblage.

The small assemblage of slab metates in the Butler Flat Area appears expedient, with few formally shaped implements, a result that is comparable to the Salt Creek Pocket and Devils Lane area assemblages (Tipps and Hewitt 1989:104).

Hammerstones

Eleven hammerstones were observed on nine sites (18 percent) and two additional specimens are isolated finds. Seven hammerstones are on sites with one identified prehistoric component whereas four are on sites with multiple prehistoric components. The sites date from Early Archaic to Late Prehistoric/Protohistoric. Seven sites have only one hammerstone, but two sites have two each.

The most common material type is gray limestone (n=6), followed by chert (n=4)—Algalitic (n=3) and brown (n=1)—and petrified wood (n=3). The hammerstones exhibit light to heavy use. One lightly used, limestone hammerstone was probably an expedient tool. This is suggested by the use of a local raw material and the extent of use. Some of the hammerstones with heavier battering may have been curated implements. An example is a heavily worn, chert hammerstone that was bifacially shaped by pecking.

Compared with the Devils Lane and Salt Creek Pocket areas (Tipps and Hewitt 1989), the Butler Flat Area has a comparable percentage of sites with hammerstones. The Squaw Butte Area (Tipps 1995) has a significantly lower percentage of sites with such tools than all other areas. However, the number of implements per site is comparable in all areas. In the Butler Flat Area, the majority of sites with hammerstones also have a large number of flakes and some also have quarrying debris, demonstrating that the inhabitants of this area were maintaining and manufacturing lithic tools, most often using local raw materials. On one site, hammerstones appear to have been used to manufacture or resharpen grinding tools.

Ceramic Artifacts

Twenty-nine sherds were observed on 10 sites (20 percent) in the Butler Flat Area. Five sites have one sherd each. Five sites have between two and nine sherds, few of which derive from the same vessel. All sherds were originally typed in the field. Ten of the 29 sherds were collected. These 10 sherds were subjected to a cursory analysis consisting of temper identification using a microscope and vessel form identification.

Most of the sherds (n=19) are gray wares, including plain (n=7) and corrugated (n=11) Mesa Verde Gray Ware and plain Tusayan Series Gray Ware (n=1). The 10 white

wares consist of McElmo Black-on-white (n=1), McElmo/Mesa Verde Black-on-white (n=5), and indeterminate Mesa Verde White Ware (n=4). Overall, the assemblage probably dates to Pueblo III or late Pueblo II-III. The plain gray ware could date between Basketmaker III and Pueblo III. However, the presence of one on a site with Pueblo III-age pottery suggests that it also dates to this period. Except for a single Kayenta sherd, the assemblage appears to represent occupation by Mesa Verde Anasazi.

Jar body sherds dominate the gray ware assemblage, with only two rim sherds observed. Two sherds are decorated by incision. Temper types recorded in the field include sherd (n=8), round rock (n=2), crushed rock (n=1), sand (n=1), and unknown (n=7). Laboratory analysis of eight of the sherds showed they have sherd and/or andesite/diorite porphyry temper.

The white ware assemblage consists of eight body sherds and two of unknown vessel portion. Five body sherds are from bowls and three are from jar sherds. Temper type is known for only five sherds; in the field, two were described as having sherd/crushed rock temper and one was described as having crushed rock temper. Upon laboratory analysis, two sherds recorded in the field as having unknown temper were determined to have andesite/diorite porphyry temper. Most of these sherds are heavily slipped on the interior and exterior. Four sherds are shaped by abrasion; two into ovoids measuring 3.8 by 6.0 cm and 1.8 by 5.0 cm and two into elongate ovals measuring 2.0 by 6.5 cm and 2.0 by 7.4 cm. Two of these shaped pieces are illustrated in Figure 18. They may be unfinished pendants. One sherd has a mend hole.

The small sherd assemblage from the Butler Flat Area resembles those recorded in other parcels inventoried in the Needles midlands (Tipps 1995; Tipps and Hewitt 1989). All of these assemblages are dominated by Pueblo II-III sherds that are predominantly affiliated with the Mesa Verde Anasazi. A small number of sherds in each assemblage appear to represent the Kayenta tradition. Compared to the Squaw Butte Area (Tipps 1995), a greater percentage of sites in the Butler Flat Area have sherds, although the average number of sherds per site is less in the latter area.

Summary

The predominance of chipped stone artifacts in the overall assemblage indicates that lithic reduction aimed at tool manufacture were important activities on sites in the project area. The entire production sequence was conducted on some sites, as evidenced by the presence of cores, early-stage reduction debris, and early-stage bifaces, along with later stage reduction flakes. There is evidence for both core and bifacial reduction. At other sites, the primary emphasis appears to have been later reduction stages as, for example, final thinning. Tools with evidence of resharpening suggest that rejuvenation also occurred.

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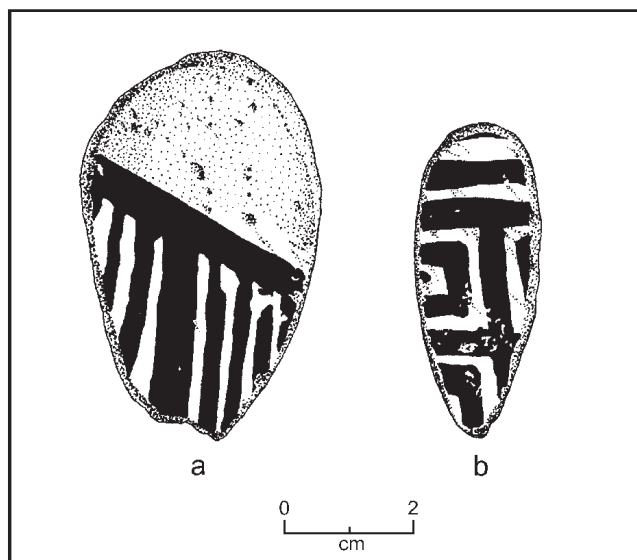


Figure 18. Worked sherds from site 42SA18366.

The majority of chipped stone artifacts are made from local materials. These materials either occur in the parcel or within a one-day walk of the Butler Flat Area. Cherts (e.g., Algalitic and Cedar Mesa) are the most common raw material types in the assemblage. A few artifacts are of nonlocal materials such as Dakota Quartzite and Summerville Chalcedony.

Although the majority of the tool assemblage is composed of bifaces, expedient chipped stone tools also appear to have been an important part of the assemblage. These artifacts were probably manufactured locally and discarded after use. A few tools appear to be curated specimens that may have been made locally or outside the Butler Flat Area. Tool discard occurred after breakage or exhaustion. A select number of tools and cores have evidence of secondary use. Chipped stone artifacts were probably employed in hunting and in the processing of faunal, floral, and other materials.

Groundstone tools are less common in the assemblage than chipped stone artifacts. Some of these tools are well worn and resharpened, indicating extensive use. Others have minimal wear. The shaping, extensive wear, and high portability of some manos imply curation. Formally shaped and extensively worn metates may have been site furniture. The lack of observed two-hand manos and trough metates, and the paucity of slab metates, may indicate that large-grained substances (i.e., corn) or large quantities of floral materials were not ground in the project area.

The ceramic assemblage indicates the occupation of the Butler Flat Area by the Mesa Verde Anasazi during the late Pueblo II to Pueblo III periods. A few plain gray

sherds could date as early as Basketmaker times but there is no corroborative evidence. Activities implied by the ceramic assemblage include serving, cooking, storage, and possibly personal adornment. As in the Squaw Butte Area (Tipps 1995:71), there is no evidence that ceramic manufacture occurred in the Butler Flat Area.

Caution is suggested regarding the comparisons between the Butler Flat Area and other inventoried areas in Canyonlands. On average, sites in the Butler Flat Area appear to have more finished tools and a larger variety of tools than those in other areas. However, this area has been more inaccessible than other locales, possibly making it subject to less illegal collection (Betsy L. Tipps, personal communication 1996).

Features

The Butler Flat inventory resulted in the discovery of 41 features. All the features are defined mainly on surface evidence. A few features were trowel probed, but no other form of testing occurred. For this reason, it is not possible to clearly determine the nature of some features, particularly those that are badly weathered or almost fully buried. Most of the features are in open settings, although a few features are in sheltered locations under overhangs.

Most of the features were involved in or are byproducts of some type of thermal (that is, burning or heating) event. These features include hearths; an oblong slab-lined feature; ash and charcoal stains; ash and rock concentrations; smoke blackening; and fire-cracked rock concentrations. The related activity of wood collection is indicated by two wood piles on two sites. The wood piles may be the remains of historic or recent activities. There is no evidence of sustained habitation on any site, although the presence of short-term habitation on some sites may be indicated by rock alignments, a surface structure, and middens. Other activities are suggested by a petroglyph panel, an enigmatic feature consisting of a crack filled with rock, and two weathered logs near the rock-filled crack.

Hearths

Of the thirteen hearths identified during the inventory, nine are unlined, two are slab-lined, and two are hearths with rock concentrations. Unlined hearths appear in plan view as circular to oval, charcoal and ash stains. Slab-lined hearths appear as upright slabs arranged in circular to rectangular patterns around charcoal and ash stains. Hearths with rock concentrations are ash stains with associated tabular sandstone. These features may be variants of the unlined or slab-lined hearths but cannot be put into one of these categories without excavation data.

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Unlined Hearths

Nine unlined hearths occur in the project area, eight on six open sites of unknown aboriginal affiliation and prehistoric age (one site has three), and one on an Early Archaic site. In plan view, these features appear as circular to oval ash stains measuring up to 2 m across. Some stains contain charcoal, whereas others have no visible charcoal. Oxidized sandstone is occasionally present (Figure 19). Erosion and deflation may have scattered the ash associated with some hearths, making them appear larger than they were originally. Some of the stains might also mark multiple hearths.

Slab-lined Hearths

One slab-lined hearth is on an open Archaic site and one is on a site of unknown prehistoric age and aboriginal affiliation. One of the features appears as a few partly buried, upright, sandstone slabs arranged in a square fashion, enclosing charcoal-stained sediment. It measures less than 100 cm across. The feature on the other site appears as an upright sandstone slab adjacent to a faint stain. Also associated are two smaller slab fragments. This feature is mostly buried and, thus, is difficult to evaluate without testing.



Figure 19. Photo of hearth at site 42SA18402.

Hearths with Rock Concentrations

The hearths with rock concentrations are circular to oval ash stains with flat-lying tabular sandstone pieces on or adjacent to their surface stains. One occurs on a site of unknown prehistoric age and aboriginal affiliation; the other is on an Anasazi site, both in open settings. Because the features were not excavated, the relationship of the sandstone clasts to the features is unclear. However, because sandstone is not good for stone boiling, some of these slabs may represent lining stones that are no longer in situ (cf. Tipps et al. 1996).

The feature on the site of unknown aboriginal affiliation is composed of one partially burned sandstone slab and some scattered pieces of oxidized sandstone associated with a roughly circular ash and charcoal stain. It measures 55 cm in diameter. The feature on the Anasazi site is an ash and charcoal concentration with associated pieces of oxidized sandstone. This hearth is less than 1 m in diameter, although its exact dimensions are unknown. It has been disturbed by illegal excavation.

Ash and Charcoal Stains

Ash and charcoal stains appear on the surface as concentrations of ash and often charcoal. They are generally larger than 1 m across and seem to have some depth. No artifacts are directly associated with them. Two ash and charcoal stains were found on a multicomponent site with known Pueblo III and Late Prehistoric/Protohistoric components.

One of the features consists of a 1.2- by 0.9-m ash stain eroding out of a slope. Fill from this feature is washing down an intermittent drainage. The other ash and charcoal stain is within an artifact concentration. It is eroded and diffuse and measures 1.4 by 1.8 m. A few small, sandstone slabs lying on the feature's surface may be directly associated with it.

These features may be hearths. Eolian activity may have scattered the ash and charcoal, making them appear larger than they were originally. Alternatively, some of these stains could be partially exposed architectural features such as burned pit structures.

Ash and Rock Concentrations

Ash and rock concentrations consist of ash stains and associated pieces of oxidized sandstone scattered in areas larger than 1 m². Charcoal is occasionally present. Two such features were recorded on open sites in the project area. One each occurs on two multicomponent sites.

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The ash and rock concentration on one site consists of oxidized sandstone fragments scattered in an area measuring 1.0 by 1.3 m. It has an associated, slight ash stain. This feature is within an artifact concentration containing a hammerstone and two pieces of groundstone. The feature on the other site is a 1.2- by 1.7-m concentration of oxidized sandstone with ash and charcoal. The ash and charcoal extend 2 m northwest of the burned sandstone clasts. Parts of this feature may have little or no depth, as evidenced by patches of exposed, oxidized bedrock within this area. This ash and rock concentration is spatially associated with four worked sherds and a heat-treated core tool. Fragments of burned, unidentified mammal bone are 2 m north of the feature.

These ash and rock concentrations may represent the remains of multiple hearths located in proximity. Natural processes may have caused the features to spread, obliterating their individual surface signatures. It is also possible that some of these features may be burned and buried nonarchitectural or architectural features. A midden function is not likely because these concentrations contain few artifacts.

Fire-cracked Rock Concentrations

Eight features on six separate sites consist of concentrations of fire-cracked rock lacking associated stains. One fire-cracked rock concentration occurs on each of two sites of unknown aboriginal affiliation and prehistoric age, whereas one other undated site has two such features. Three fire-cracked rock concentrations are on two Anasazi sites (one site has two of these features), and one other is on a multicomponent site.

The fire-cracked rock concentrations on the undated sites each consist of more than 25 pieces of burned tabular sandstone, although one concentration is composed of burned and cracked limestone cobbles. These oval features average 2.5 by 1.3 m. One of these concentrations is associated with unidentified burned bone. Most of these features are in the open, although one is partially under a shallow overhang.

A feature on one of the Anasazi sites is a 1.8- by 1.0-m collection of oxidized sandstone fragments. Metate fragments and two pieces of lithic debitage are also present. Two of the fire-cracked rock concentrations are on the same Anasazi site. One is a 3.0- by 1.2-m concentration of oxidized sandstone. The other is a 2.75- by 1.5-m oxidized sandstone concentration with no associated ash. The fire-cracked rock concentration on the multicomponent site consists of a concentration of oxidized pieces of sandstone approximately 1.5 m in diameter. One piece of groundstone is associated with this feature. The feature is completely eroded, and consequently has no depth.

The fire-cracked rock concentrations may be the remnants of deflated hearths. These concentrations do not resemble collapsed architectural features, as they lack depth and sufficient rock.

Oblong Slab-lined Feature

One oblong slab-lined feature was discovered on an open, multicomponent site that has known Anasazi and Late Prehistoric/Protohistoric components. This feature is a 4.3- by 1.0-m semicircle of partially exposed, upright sandstone slabs surrounding an ash stain that is eroding downslope. Numerous small pieces of fire-cracked rock occur east of the feature and may be associated with it. This feature may be a large roasting pit, a burned slab-lined bin, or a structure.

Smoke Blackening

One case of smoke blackening is at a site with a Formative period component of unknown cultural affiliation and an historic or modern component of probable Euroamerican affiliation. It occurs on the back and ceiling of an overhang above a prehistoric surface structure, which is discussed below.

Middens

Two middens were recorded in the Butler Flat Area. One is on an Archaic site and the other is on an Anasazi site. The former is a fairly extensive, oval, charcoal-stained deposit eroding out of the bottom of a gully. It measures approximately 4 by more than 1 m. Three metates and some chipped stone debitage are present on the surface of the stained deposit. Despite the midden, the site appears to have been used for only short-term occupation. The midden on the Anasazi site appears as a large, oval, dark ash stain with numerous flakes, some groundstone fragments, and one whole metate. It measures 5 by 4 m and has been potted at the northern end. Although this feature is on a site classified as Anasazi, it is in a locus lacking pottery and other Formative period diagnostics. Several characteristics of the lithic assemblage in this locus are of Archaic character.

Rock Alignments

Three sites, one of unknown aboriginal affiliation, one Anasazi, and one multi-component (Anasazi/Historic), have one rock alignment each. The rock alignment on the aboriginal site is a semicircular feature composed of small, eroded sandstone slabs. Part of this alignment is buried but at least two courses are present. The feature measures approximately 1 m long. The rock alignment on the open Anasazi site is composed of approximately 11-12 medium-sized sandstone slabs extending 2.5 m long by 1.4 m wide. The slabs are lying flat on the ground. Eight pieces of groundstone are near this feature. The function of this feature is unknown. The rock alignment on the Anasazi/Historic site consists of a low linear feature beneath a talus boulder that provides a low overhang, 1 m high. This linear alignment is almost perpendicular to the

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back wall of the overhang and may abut it. The alignment is 1.5 m long and is composed of 12 rocks piled to 30 cm high. This feature is considered prehistoric and may have been a temporary shelter.

Surface Structure

One surface structure is at a site with a Formative period component of unknown cultural affiliation and an historic or modern component of probable Euroamerican affiliation. This deteriorated, one-room structure is under an overhang and measures 3.5 by 3.0 m. Presently, it consists of only one clear wall remnant that abuts the back of the overhang. This remnant is composed of dry-laid, uncoursed sandstone slabs and measures 2.5 m long. The back wall is formed by the overhang. Another wall is potentially present as rubble along the eastern side. However, this rubble may be natural instead of construction materials. This feature presumably housed a short-term camp as evidenced by the presence of a slight scatter of prehistoric artifacts outside and in front of the overhang and smoke blackening on the alcove's back and ceiling. No charcoal or hearth is visible within the structure. A weathered pile of ax-cut juniper occurs in the northeastern corner of the overhang. These logs may be the result of recent activity. The lack of historic artifacts, the style of the architecture, and the presence of lithic artifacts suggest Formative period usage, possibly by the Anasazi.

Petroglyph Panel

One petroglyph panel is at an Anasazi site. The petroglyphs are on a varnished face of a rock outcrop. The panel measures 1.2 by 0.2 m and is approximately 1.0 m above present ground surface. Part of the feature consists of the stipple-pecked head of a bighorn sheep (Figure 20). Light, unidentifiable scratching and abrading are to the left of this figure. A lightly scratched historic or modern petroglyph occurs between the figure and the scratching/abrading. This petroglyph consists of initials within a vertical rectangle and may be the depiction of a livestock brand.

Charcoal Scatters

Two charcoal scatters occur on prehistoric sites but appear to represent minor historic or modern components. One charcoal scatter is a 2-m-diameter concentration of large charcoal fragments. There is no associated soil stain. The scatter has been impacted by natural processes. It is approximately 4 m from a pile of ax-cut juniper and may be related to it; this charcoal scatter may be the remnants of a slash burning pile associated with a wood-chopping area or the deflated remnants of a surface hearth. No details were recorded on the other charcoal scatter.



Figure 20. Photo shows Feature 1, petroglyph panel, site 42SA18394.

Wood Piles

One wood pile each is at two multicomponent sites. Both are historic or recent. The wood pile at one site is a weathered pile of ax-cut juniper in the northeastern corner of an overhang housing the above-mentioned surface structure. The wood pile on the other site consists of approximately 25 weathered pieces of ax-cut juniper. This feature is near one of the charcoal scatters mentioned previously.

Other

Three other features occur in the inventory area. One feature consists of a crack in a sandstone rock face that is stuffed tightly with small stones. This feature is near the base of a northwest-facing overhang. The stones within the crack are of a different color than the sandstone forming the overhang. The extremely eroded nature of this area makes further attribute description or functional interpretation difficult.

The other two features are on the same site and are historic or modern. They consist of two weathered logs lying to the north and south of the crack feature. These logs may have formed an historic livestock enclosure, although too little of this feature remains to accurately confirm this function.

Conclusions

An examination of the features in the Butler Flat Area suggests that limited or short-term activities have been conducted in this area since the Archaic period. However, because most of these features were defined on surface evidence alone, there are few interpretive data on some of these phenomena. Excavation data may contribute greatly to the functional and chronological interpretation of both features and sites.

The presence of limited or short-term events is suggested by the scant number of features, the small size of some features, and the apparent lack of investment in durable or substantial features. Examples consist of the small, unlined hearths and the dry-laid surface structure. Most of the features were involved in or are byproducts of thermal events conducted in open settings. Unlined and slab-lined hearths and hearths with rock concentrations—that may be variants of the former two types—were presumably constructed for the provision of heat for warmth and cooking purposes. Other thermal features may be represented by ash and charcoal stains, ash and rock concentrations, an oblong slab-lined feature, and perhaps even fire-cracked rock concentrations. However, it is also possible that some of these features are remnants of burned and buried nonarchitectural and architectural features. The presence of relatively high investment features such as pit structures would suggest longer term habitation in the area. Currently the only evidence of habitation (middens, rock alignments, a surface structure, and smoke blackening) indicates short-term residence. The presence of a petroglyph panel, an enigmatic feature consisting of a crack filled with rock, and two weathered logs that may represent an historic enclosure (e.g., a corral) suggest nondomestic activities.

Chapter 5

SUMMARY AND CONCLUSIONS

by Betsy L. Tipps

This report documents the results of an intensive cultural resources inventory undertaken in 1987 in Canyonlands National Park, Utah. The inventory was in the Butler Flat Area of the western Needles District and covered 1080 acres. This work was undertaken as part of the multiyear Canyonlands Archeological Project conducted for the National Park Service, Rocky Mountain Regional Office, by P-III Associates, Inc. Cultural resource inventory and assessment was the focus of this multi-year effort. The main purpose of the project was to collect data that could be used to revise and upgrade the park's interpretive program. Other project goals were collecting data to guide management actions and address scientific research questions.

While most areas slated for inventory were chosen by the National Park Service, the contract allowed P-III Associates to select some of the inventory areas based on research interests. The Butler Flat Area, one of two such areas selected by P-III Associates during the multiyear project, was chosen because of its potential to yield information on the Archaic period. Archaic occupation of the area was completely overlooked during Sharrock's (1966) baseline inventory in the Needles District and only minimally known from more recent projects (e.g., Griffin 1984; Hartley 1980; Osborn et al. 1986; Tipps and Hewitt 1989). The lack of information on the Archaic created a major gap in knowledge regarding a long period of human prehistory in the park, a gap that carried over into the park's interpretive program. As such, P-III Associates believed that the most critical research need was continued work on issues relating to the Archaic occupation, including such basic topics as determining the nature and extent of occupation and identifying the time periods of use. Based on the previous inventory in the nearby Devils Lane Area (Tipps and Hewitt 1989), it was suspected that the Butler Flat Area had a substantial Archaic occupation. The Butler Flat Area was also chosen because of its potential to provide data relevant to the Anasazi-Fremont issue, that is,

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whether the Anasazi, Fremont, or both cultural groups used the area during the Formative period.

Fifty sites and 32 isolated finds were discovered and documented during the inventory. All 50 sites have prehistoric remains; three also contain minor modern or historic components. These 50 sites have 59 recognizable components, though additional components that could not be definitively identified from surface evidence are probably present. The 59 components date to the Archaic, Formative, Late Prehistoric/Protohistoric, and Historic/Modern periods. Diagnostic artifacts on the Archaic sites are types that commonly occur on the northern Colorado Plateau. The most common Archaic projectile point type in the project area, the Middle Archaic San Rafael Side-notched, is a northern Colorado Plateau type, but may also suggest influence by or association with the Plains (Holmer 1978:69). All Formative-period sites that can be ascribed to a particular cultural group are Anasazi; there was no definitive evidence of Fremont occupation. The Late Prehistoric/Protohistoric sites were probably occupied by Ute people or their ancestors. The historic/modern components are likely Euroamerican.

Both individually and as a group, the sites are characteristic of short-term occupation. Most sites are lithic scatters or lithic source areas, some of which have a few sherds and/or simple features such as hearths, ash and charcoal concentrations, fire-cracked rock scatters, or rock alignments. One site is composed of a crude masonry structure with a small artifact assemblage. Several sites are in shallow natural overhangs or have a small overhang within their boundaries, but the vast majority are in the open, usually in eolian or colluvial depositional settings. The sites appear to be primarily, if not exclusively, limited-activity loci and short-term camps or residential bases. The former were used to procure and process local Algalitic Chert and manufacture chipped stone tools, including, but not limited to, mobile, hunting-related toolkits. The latter were used for more intensive chipped stone and groundstone tool manufacture and maintenance, as well as domestic activities such as camping, cooking, grinding native plants, and processing animals. There is no evidence of long-term habitations or agricultural sites.

Nineteen sites have a total of 41 visible surface features. Most of these features were used for cooking, heating, and lighting, or resulted from some type of thermal event (e.g., hearths, smoke blackening). Hearths, both unlined and slab-lined, account for more than one-third of the features. Ash and charcoal stains, ash and rock concentrations, and fire-cracked rock scatters, which may be hearths, or related features compose another one-third of the assemblage. The remaining features include two small middens, a petroglyph panel, several rock alignments, a crude masonry structure, and an oblong slab-lined feature that might be a roasting pit, a burned slab-lined bin, or possibly a small pitstructure. The historic or modern features consist of woodpiles, charcoal

scatters that represent campfires, and poles or beams that may have been used to make a small livestock enclosure. With the possible exception of the oblong slab-lined feature, the features took a minimal amount of time and effort to produce. None exhibit any evidence of long-term use or maintenance.

Like other areas inventoried during the Canyonlands Archeological Project, the Butler Flat Area artifactual assemblage is composed primarily of debitage, with an estimated 12,000 pieces observed. A total of 418 chipped stone tools, 54 groundstone implements, 13 hammerstones, 82 cores and utilized cores, and 29 pieces of pottery was also documented on the sites and as isolated finds. The frequency of finished tools is substantially higher than in other areas of the park inventoried during the Canyonlands Archeological Project. This may be because the Butler Flat Area is more remote and, therefore, has been subject to less illegal surface collection. The sites that extend into modern campgrounds have noticeably fewer finished tools than sites away from the campgrounds.

Bifaces are the most common chipped stone tool type, accounting for approximately 64 percent of the assemblage. Projectile points, modified flakes, scrapers, and unifaces compose 7-9 percent of the assemblage, each. There are a few drills, knives, and a graver. In the groundstone assemblage, metates outnumber manos by almost two to one. Basin metates and one-hand manos, technology usually associated with grinding wild seed plants, predominate. Two-hand manos are entirely lacking, although there are a few slab metates that might have been used with two-hand manos. The ceramic assemblage includes both gray wares and white wares, although the former are twice as common as the latter. Few sherds are identifiable to a specific named type, but all are of Anasazi origin, and all but one were produced using a western Mesa Verde Anasazi ceramic technology. The single non-Mesa Verde Anasazi specimen is a Kayenta gray ware sherd. Small percentages of Kayenta pottery have been reported by previous researchers in the Needles District (Bond 1994; Tipps 1995:67; Tipps and Hewitt 1989:104-105).

The vast majority of the stone artifacts are manufactured from raw materials available in the Butler Flat Area such as Algalitic Chert and sandstone. Toolstones available within a day's walk or less of the Butler Flat Area, such as Cedar Mesa Chert and gray chert, are also present in the artifact assemblage, but occur on fewer sites and are usually, but not always, in lower frequencies than Algalitic Chert. There is a minor to moderate presence of raw materials that were obtained at sources circa 50 km from the project area. These are Summerville Chalcedony, the closest known source of which is near La Sal Junction, and Dakota Quartzite, which outcrops in the Abajo Mountains. Other, more rare toolstone was probably procured from even greater distances. Obsidian from the project area has been identified to three different sources: one in eastern Utah,

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one in northern Arizona, and one in northern New Mexico; these sources are 260-420 km from the Butler Flat Area. The ceramic artifacts are also nonlocal in the sense that they do not appear to have been manufactured in the project area. The technological attributes of dark paste and sherd-andesite/diorite temper suggest they were manufactured in the greater Elk Ridge Plateau region, a short distance to the south and southeast.

Most of the sites are in good condition, although all have been affected by erosion and livestock trampling to some degree. A few sites have also been impacted by National Park Service campgrounds, minor pothunting, and prepark seismic exploration. However, as a group, the sites have considerable potential to yield additional important information on park prehistory. At the conclusion of the inventory in 1987, they had large and diverse artifact assemblages. Data obtained from detailed studies of these assemblages could be used to address research questions concerning lithic procurement and tool manufacturing strategies, chipped stone tool technology, settlement and mobility strategies, subsistence practices, sizes and potential directions of annual territories covered by site inhabitants, and trade networks, for example. In addition, many sites have intact features that can provide both chronological and subsistence information with minimal expense and disturbance to the sites. Acquisition and analysis of such information is highly recommended, as it can be used to refine and verify the local culture historical sequence and better define adaptational strategies.

The remainder of this chapter reviews the project results relative to the research design presented in Chapter 1. Due to the nature and age of the sites, some of the questions can only be addressed in a cursory manner. However, they are still important and were incorporated into research plans for later years of work on the Canyonlands Archeological Project.

Chronology and Cultural Affiliation

The first issue in the Chronology and Cultural Affiliation domain was ascertaining the ages and cultural affiliations of the sites, with a particular focus on identifying the periods and cultures overlooked by Sharrock (1966), that is, pre- and post-Pueblo II and groups other than the Anasazi. Our prefield expectations regarding the ages and cultural affiliations of the sites were met (see Chapter 1) with the exception that no early Pueblo sites were located.

No definite Paleoindian sites or artifacts were discovered in the Butler Flat Area, but one artifact is possibly Paleoindian. A scraper from a site with known Archaic and Anasazi components (see Figure 16a) comfortably fits into a class of artifacts that Fairley and Geib (1986:224, 226) identify as spurred end scrapers, which may be of Paleoindian origin. Neither the Butler Flat Area scraper nor the scrapers illustrated by Fairley and Geib (1986:Figure 5.28) appear to be analogous to what Frison (1991:Figure

2.81) and Frison and Stanford (1982:Figure 2.19b, e, k, 2.20b, and 2.21w, x) call spurred end scrapers, in that the spurs are not pointed beaks, but rounded projections, which, in the case of at least the Butler Flat Area specimen, appears to have been created fortuitously by notching the lateral margin. However, several of the end scrapers in Frison and Stanford's (1982:2.19d, i) Paleoindian collection have notches "placed just below one corner of the working edge," suggesting the scraper from the Butler Flat Area could be a Paleoindian artifact. It should be noted, however, that such scrapers were also used during later time periods and sometimes occur on Navajo sites (Timothy Kearns, personal communication 1995).

Even if the scraper is Paleoindian, this does not necessarily indicate Paleoindian use of the site because the artifact could have been scavenged and brought to the site by later peoples. Based on geomorphologic and other grounds, Tipps (1995:95-101) argues that several Paleoindian artifacts discovered in the Squaw Butte Area of the eastern Needles District are scavenged rather than in situ specimens. Evidence for Paleoindian presence in the Needles District is still sketchy, but will probably grow with additional inventory and investigations. It should also be noted that a maintenance worker found two fragmentary Eden points in or near the Needles District (Owen Severance, personal communication 1990). Eden points are diagnostic of the latter part of the Paleoindian period.

Based on inventory in the nearby Devils Lane Area (Tipps and Hewitt 1989), it was suspected that the Butler Flat Area would exhibit evidence of Archaic occupation, and indeed, this is the case. Six sites were determined to have Archaic components based on diagnostic projectile points; many additional sites have what are usually considered Archaic attributes (e.g., numerous one-hand manos, basin metates, finely crafted bifaces manufactured using a bifacial reduction technology, and nonlocal materials acquired from great distances [50 km]), suggesting they may also be Archaic or have Archaic components.

Three of the six known Archaic sites and components date to the Early Archaic, two to the Middle Archaic, and one to the generalized Archaic period. In addition, a Middle Archaic projectile point was discovered as an isolated find. Evidence for Late and Terminal Archaic occupation is lacking despite being represented in other areas of the park inventoried during the course of the project (Tipps 1995; Tipps et al. 1996), including a site on Butler Flat that was discovered during the Devils Lane Area inventory and later tested (Tipps and Hewitt 1989). The lack of identifiable Terminal Archaic sites in the Butler Flat Area is problematical because there are no known artifacts exclusively diagnostic of the Terminal Archaic period; the only way to conclusively identify such sites at present appears to be via radiocarbon dating, and no testing was undertaken in conjunction with the Butler Flat Area inventory. It is suspected that at least some of

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the sites with unlined and slab-lined hearths date to the Terminal Archaic, as this is most common time period represented among the 31 sites radiocarbon dated over the course of the Canyonlands Archeological Project.

Archaic projectile points on the sites are typical of those found in northern Colorado Plateau assemblages, although some occur over much wider areas than just the northern Colorado Plateau (e.g., Pinto, Northern Side-notched, Elko Eared). The few Sand Dune Side-notched points identified to date occur in the canyon country of southeastern Utah (Geib and Ambler 1991; Tipps and Hewitt 1989), suggesting that groups who used this point type primarily inhabited this area of the northern Colorado Plateau. San Rafael Side-notched points are common in the San Rafael Swell area of central Utah, northwest of the project area, but are similar to Mallory points, which may indicate association with or influence from the Plains (Holmer 1978:69). None of the points represent Oshara types (e.g., Bajada, San Jose, etc.) or any definite connection to the southern Colorado Plateau.

Definitive evidence for Preformative and Early Formative occupation was also lacking in the project area. Like the preceding periods, the Preformative and Early Formative periods are represented in other inventoried areas of the park (Tipps 1995; Tipps et al. 1996), but were primarily identified through radiocarbon dating, although a few sites, mainly in the Devils Lane Area, were identified as Early Formative based on Chapin Gray pottery (Tipps and Hewitt 1989). These periods may be represented in the Butler Flat Area among the undated sites.

Ten sites are attributable to the Anasazi. Based on ceramic types and styles, four date to Pueblo III, five to Pueblo II-III, and one to an unknown period. These sites represent occupation by western Mesa Verde Anasazi peoples, although there is one trade ware, a Kayenta gray ware. The ceramic technology in the small sherd assemblage—dark paste and sherd or sherd and andesite/diorite porphyry temper—exemplifies that found in the greater Elk Ridge Plateau area of southeastern Utah, a short distance south and southeast of the Butler Flat Area. Because ceramic manufacture in the Butler Flat Area seems extremely unlikely due to the short-term, transient nature of the occupation, Anasazi who used the Butler Flat Area sites probably came from the greater Elk Ridge Plateau area.

Settlement Patterns

The first topics of concern in this domain were identification of site types, intensity and duration of occupation, season of occupation, and whether the sites were used on multiple occasions. Another research issue was whether inhabitants of the Butler Flat Area used a logistical or forager adaptive strategy. Finally, prehistoric mobility patterns and the potential size and direction of each cultural group's annual territory were considered.

Sites in the project area are primarily lithic scatters and lithic source areas, some with a few sherds, features, or both. Features are numerous but most are expedient phenomena that were created quickly and used for short periods: hearths are the most common feature type, followed by fire-cracked rock concentrations and other thermal features such as ash and charcoal stains and ash and rock concentrations. Constructed features are limited to a few rock alignments; a crude, low-wall, masonry structure in an overhang; and an oblong slab-lined feature that could be a roasting pit, large slab-lined bin, or small pitstructure. These, the most substantial of the features, also took little effort to prepare and have no evidence of maintenance or long-term use. Two small middens, one on an Archaic site and one on an undated artifact concentration that may be Archaic, probably developed over longer periods of time, but appear to result from repeated rather than extended use. Some sites are large, have numerous tools, and up to four features, but are also believed to be the result of multiple rather than long-term or extended visits. Overall, the nature of the sites suggests that occupation was short term and transitory during all periods of prehistory, no more than a few weeks at most, and probably less in most cases.

Because no testing was conducted during this project, good evidence of site seasonality is lacking. There are no perennial water sources in the Butler Flat Area, although there are three known springs within 5 km (see Chapter 2). If the lack of immediately available perennial water or distance to these springs posed a problem, occupation may have been timed to coincide with the rainy season when water periodically flowed in the drainages and collected in natural depressions in the sandstone bedrock. Today, most precipitation occurs between July and December (see Chapter 2). Alternatively, if water was not a strict limitation on the season of occupation, people may have used the Butler Flat Area much like the Archaic people are believed to have used the nearby Squaw Butte Area (Tipps 1995:178), that is, during the spring/early summer, when winter stores were depleted and early greens and seeds were available, and again in the fall when highly nutritious goosefoot seeds were ready for harvest. Whatever the season of occupation, it seems unlikely that there was much occupation during the winter. Overhangs were used, but not intensively, and substantial constructed shelters are entirely lacking.

For most of prehistory, foraging is believed to be the primary mode of adaptation because the Butler Flat Area lacks the types of resources that would warrant logistical use, with the possible exception of Algalitic Chert. Similar- or better quality Cedar Mesa Chert is readily available throughout much of the Needles District and across the Colorado River in the Maze District (Horn 1990; Tipps 1995; Tipps and Hewitt 1989), making logistical trips to procure Algalitic Chert unnecessary in most cases. The Anasazi who inhabited the project area may have at times employed a foraging strategy either during lean times when winter stores were exhausted and spring greens were not yet

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available near their high-elevation pueblos or seasonally, while traveling through the project area to farmsteads along the Colorado River or plots of arable land in other parts of the Needles District. If natural sources of suitable-quality toolstone are lacking in the area of their long-term residences (i.e., the greater Elk Ridge Plateau highlands), it is conceivable that they occasionally sent logistical parties to the Butler Flat Area to procure specific resources such as Algalitic Chert.

As expected in a forager-type adaptation, most sites appear to be camps/residential bases or limited-activity loci. These sites were used for collecting and processing Algalitic Chert and performing other domestic activities such as cooking, eating, sleeping, and repairing toolkits. The abundance of one-hand manos and basin metates suggests that wild seed plant processing was an important activity. The presence of use-broken projectile points and scrapers reveals that animal resources were also hunted and processed. Camp activities such as cutting, scraping, shredding, planing, and incising are reflected by the large assemblage of unifaces, scrapers, knives, drills, and expedient flake tools. Another major activity appears to have been repairing and replacing broken tools and restocking mobile toolkits with raw material (primarily in the form of bifaces) and various finished tools.

Bifacial tool technology has been convincingly associated with high-mobility settlement patterns because it conserves toolstone and provides flexibility to overcome toolstone shortages encountered during the course of a group's annual round (Bamforth 1986; Kelly 1988; Parry and Kelly 1987). Bifaces are convenient to transport and can serve as both multipurpose tools and as cores for flake blanks that can be manufactured into tools (Kelly 1988). Bifacial tool technology may also have been used by less mobile populations who lived in or ventured into toolstone-poor areas because it allows efficient use of a scarce resource (Andrefsky 1994; Kelly 1988). However, the focus on bifacial tool technology in the Butler Flat Area is probably the result of high mobility rather than raw material shortages because natural sources of toolstone are abundant; both the Needles midlands and portions of the Maze have ubiquitous chert sources. The overwhelming emphasis on bifacial tool technology suggests that most project-area inhabitants were practicing a highly mobile settlement strategy at the time of occupation.

The presence of certain nonlocal toolstones in the chipped stone assemblage reveals that at least some site inhabitants covered large distances during their annual round. Summerville Chalcedony and Dakota Quartzite account for small, but significant, portions of the toolstone found on the Butler Flat Area sites. The closest known sources of these materials are 50 km northeast and 50 km southeast, respectively. Annual ranges for several desert-dwelling hunter-gatherer groups range from approximately 2,000 km to well over 11,000 km², with a modal value in the low 3,000 range (Kelly 1995:Table 4-1, 157-158; Lee 1968; Thomas 1983). Although the sizes of annual ranges vary

tremendously between cultural groups due to local factors (e.g., environmental conditions, population density, etc.), for illustrative purposes, a circular 3000-km² area would have a maximum dimension of 62 km. Given these figures, it is realistic to believe that mobile hunter-gatherers who used the Butler Flat Area visited the Summerville Chalcedony and Dakota Quartzite raw material sources during the course of their annual round.

Several pieces of obsidian come from more distant sources still: the Government Mountain/Sitgreaves Peak source near Flagstaff, Arizona, 380 km to the southwest; the Cerro del Medio source in the Jemez Mountains near Bandelier, New Mexico, 420 km to the southeast; and the Wild Horse Canyon source, near Beaver, Utah, 260 km to the west. While these sources may have sometimes been within a direct procurement range, the obsidian flakes are more likely the result of a trade network.

Environmental Adaptation

Research in this domain focused on identifying the natural resources available in the project area, whether any of these resources were a major reason for occupation, and if the environmental setting provided any constraints on occupation, for example, a lack of water or arable land.

The natural environment of the Butler Flat Area is similar to that found throughout most of the Needles midlands. As noted in Chapter 1, the Needles midlands consist of the arid country above the lowland canyons of the Colorado River and below the highlands of Ruin Park, Beef Basin, the Elk Ridge Plateau, and the high-elevation, well-watered canyons of Upper Salt and Horse creeks. They comprise a vast open plateau of broad open pockets and plains, locally interrupted by horsts, grabens, hoodoos, buttes, and towers, and occasionally incised by washes, most of which flow only after precipitation events. The Needles midlands have large areas of exposed bedrock or bedrock with shallow eolian cover. Perennial water sources are rare, except for a select few locales. Low, desert scrub vegetation predominates, with a sparse pinyon-juniper woodland in higher or wetter areas. Elevations are generally between 1470 and 1645 m.

One of the primary resources of interest to prehistoric people in the Butler Flat Area was probably the lag deposits of chert toolstone. Algalitic Chert is the primary material in the lag deposits, but there is also some white chert in one source area. Algalitic Chert debitage occurs on every site, is the only material on 10 percent of the sites, the dominant material on 62 percent of the sites, and one of two primary materials on 22 percent of the sites. It is infrequent on just 4 percent of the sites. The reason for this ubiquity is probably because of its abundance in the project area and the ease with which it could be procured—simply picking up clasts from the ground surface. No quarrying was necessary.

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A major prehistoric activity in the project area was the primary manufacture of early-stage bifaces from the local material using a bifacial reduction strategy. These artifacts may have been intended and used as both tools and cores. Late-stage bifaces were also manufactured and refined, either for immediate use on local campsites or for transport in a mobile toolkit. The abundance of cores indicates that a flake-core reduction strategy was also used to reduce the local Algalitic Chert. Using this strategy, prehistoric flintknappers probably produced flakes suitable for use as flake tools and as flake blanks that could be reduced using a bifacial technology into formal implements such as projectile points and knives. There are multiple core morphologies in the Butler Flat Area assemblage—bidirectional, multidirectional (random), unidirectional, and discoidal—but all are rather expedient. The presence of multiple expedient core morphologies may reflect an attempt to accomplish reduction in the most efficient manner possible given the quality and morphology of the toolstone clasts.

Various seed plants constitute another resource that may have been attractive to prehistoric peoples. Groundstone suitable for grinding the seeds of wild plants is common in the project area, numbering 54 pieces. In addition, the range site data, which predict which taxa will grow under natural, pregrazing conditions, suggest that several economically useful plants were abundant on some project area soils (Lammers 1991). Two soils, Mido Loamy Fine Sand and Rock Outcrop-Ustic Torripsamments Complex, have relatively high Indian ricegrass productivity under natural conditions, 120 lb/acre during an average year. They would also provide four-wing saltbush (60 lb/acre), needle-and-thread grass (60 lb/acre), and dropseed (30 lb/acre). These soils cover approximately 48 percent of the project area, but contain 58 percent of the sites. Soils categorized as Rock Outcrop-Rizno Complex have a low annual vegetative productivity. They account for 40 percent of project-area soils, but contain only 29 percent of the sites. These trends suggest that prehistoric peoples were aware of economically useful plants and positioned the sites to take advantage of them. A wide variety of economically useful perennial and annual herbs and trees not included in the range site data were also identified in the project area during the inventory (see Table 2).

Range site data rate wildlife habitat on all project-area soils as very poor to poor for openland, woodland, and wetland animal species (Lammers 1991:Table 6, 97). The rating for rangeland species is very poor to poor on all but one soil, Ignacio-Leanto, which covers a tiny piece of the project area. Rangeland species include deer, antelope, sage grouse, and coyote. Hunting was probably less important than seed gathering in the prehistoric economy but, despite the poor wildlife habitat, tools in the project area suggest that animals were hunted and processed, at least on occasion.

Another "resource" that might have attracted people to the area is the nearby trail to the Colorado River crossing at Spanish Bottom. Throughout most of prehistory,

people were highly mobile and the presence of a major river crossing may have been an important consideration to people coming from or going to what is now the Maze District. The Butler Flat Area would have been a logical place for parties to camp while on their way to or from Spanish Bottom.

The major constraint on occupation during the Formative period is the lack of arable land and sufficient water for agriculture. The project area lies well below the elevation where dry-farming could be successful in an average year, and locations where flood-water farming could have been successfully practiced are lacking. Depending on the season of occupation, the lack of permanent water may have also been a hindrance throughout prehistory.

The final research issue in this domain was determining whether the source(s) of Algalitic Chert are in or near Butler Flat or the surrounding area, and whether Algalitic Chert derives from the Cedar Mesa Formation. Based on the declining frequencies of Algalitic Chert flakes and trends toward later stages of flakes from the nearby Devils Lane to the more distant Squaw Butte and Salt Creek Pocket areas, we predicted that the source(s) of the material would be in the western Needles District, possibly the Grabens or Butler Flat Area (Tipps 1995; Tipps and Hewitt 1989). Supporting this hypothesis were several clasts of unflaked Algalitic Chert discovered on a talus slope in the Devils Lane Graben and nodules of what appeared to be the same material embedded in a nearby Cedar Mesa Formation cliff (Tipps and Hewitt 1989).

The prediction that Algalitic Chert occurs naturally in the western Needles District proved to be correct. Five sites in the Butler Flat Area have lag deposits of Algalitic Chert. As noted previously, these deposits appear to have been used extensively throughout prehistory. The field notes do not specify whether the lag deposits derive from the Cedar Mesa Formation, although it is the only geologic formation exposed in the area (Huntoon et al. 1982). While it is possible that the lag deposits are from a younger geologic formation that has completely weathered away, it is suspected they originated in the Cedar Mesa Formation.

Cultural Interaction

Research in this domain was directed at evaluating Lucius' (Hewitt et al. 1989:142-143) hypotheses regarding Formative-period occupation in the arid, unwatered portions of the Needles midlands: (1) that both the Anasazi and Fremont used the area, (2) that both Anasazi and Fremont occupation was short term and nonintensive, (3) that Fremont use was mainly limited to hunting and toolstone procurement, and (4) that Fremont sites would have few cultural markers due to the short-term nature of occupation and the types of activities performed.

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The results of the Butler Flat Area inventory support the hypothesis that Anasazi occupation was short term and nonintensive, but like other inventories conducted during the Canyonlands Archeological Project, produced no definitive evidence of Fremont occupation, ephemeral or otherwise. The lack of Fremont diagnostics does not necessarily refute Lucius' hypothesis that Fremont people sporadically used the area because he believes that Fremont sites may lack cultural markers. This, however, is not really a testable hypothesis, because if the sites lack distinctive cultural markers, there is no way to identify the sites as Fremont.

What can be said is that in the 8813 acres inventoried by P-III Associates during the Canyonlands Archeological Project, no Fremont sites were discovered. Fremont diagnostics were severely limited. A single, possible Fremont rock art element was noted on a multicomponent site in the Devils Lane Area and a few Fremont gray ware sherds were identified in Anasazi cliff dwellings in Upper Salt Creek. Unless there are Fremont diagnostic artifacts that have not yet been recognized and identified (e.g., certain arrow point types), it seems likely that Fremont people did not use the area with any regularity, if at all. If they did, distinctly Fremont sites should have been identified, not simply a few scattered artifacts or features on sites of other cultural affiliations.

The suggestion that Fremont people came to the Needles midlands to procure toolstone is unsupported. There are numerous sources of toolstone along the Colorado River and in the Doll House area of the Maze, almost directly across the Colorado River from the Butler Flat Area (Losee and Lucius 1975; Tipps and Hewitt 1989). These materials are of similar quality to those in the Needles midlands; it seems unlikely that Fremont people would have traveled to the Needles midlands to procure toolstone when they could obtain similar stone closer to home.

Based on available evidence, we still cannot rule out the possibility that Fremont hunting parties sporadically used the area. The Formative period projectile point typology is poorly defined, and as such, many types of small corner-notched arrow points cannot be reliably identified as Fremont or Anasazi. Whether projectile points are viable cultural markers for cultural affiliation in the Formative period is an open question. Certain small projectile points are found among various Anasazi (Mesa Verde, Chuska, etc.) as well as Fremont groups (Holmer and Weder 1980; Phagan 1988; Reher 1977). If, in the future, certain manifestations of these points can be clearly associated with just the Anasazi or Fremont, we will be in a better position to evaluate the hunting party hypothesis. It is possible that some of the Rose Spring points identified by the Canyonlands Archeological Project and by the Midwest Archeological Center (Dominguez 1988) in the Squaw Butte area signify sporadic use of the area by Fremont hunters, but they may also relate to the Anasazi occupation.

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Appendix A

LEGAL LOCATIONS OF THE INVENTORY AREA

by Daniel K. Newsome

Distribution Limited To:

National Park Service
Canyonlands National Park
Moab, Utah

National Park Service
Midwest Archeological Center
Lincoln, Nebraska

Appendix B

CORRELATION OF TEMPORARY FIELD NUMBERS AND PERMANENT SMITHSONIAN SITE NUMBERS

CORRELATION OF SITE NUMBERS

Table B-1. Correlation of temporary field numbers and permanent Smithsonian site numbers.

Temporary Number	Permanent Smithsonian Number	Temporary Number	Permanent Smithsonian Number
1	42SA18409	26	42SA18372
2	42SA18408	27	42SA18405
3	42SA18380	28	42SA18404
4	42SA18379	29	42SA18403
5	42SA18407	30	42SA18399
6	42SA18384	31	42SA18386
7	42SA18406	32	42SA18370
8	42SA18385	33	42SA18402
9	42SA18387	34	42SA18398
10	42SA18383	35	42SA18391
11	42SA18374	36	42SA18388
12	42SA18376	37	42SA13389
13	42SA18375	38	42SA18390
14	42SA18377	39	42SA18394
15	42SA18378	40	42SA18381
16	42SA18410	41	42SA18382
17	42SA18367	42	42SA18373
18	42SA18366	43	42SA18392
19	42SA18363	44	42SA18393
20	42SA18365	45	42SA18395
21	42SA18364	46	42SA18396
22	42SA18368	47	42SA18397
23	42SA18412	48	42SA18400
24	42SA18371	49	42SA18401
25	42SA18369	50	42SA18411

Appendix C

TABULAR SITE DATA

Table C-1. Location of each site by inventory area and geographic location.

Site Number	Inventory Area	Geographic Location
42SA18363	Butler Flat Area	Butler Flat
42SA18364	Butler Flat Area	Butler Flat
42SA18365	Butler Flat Area	Butler Flat
42SA18366	Butler Flat Area	Butler Flat
42SA18367	Butler Flat Area	Butler Flat
42SA18368	Butler Flat Area	Butler Flat
42SA18369	Butler Flat Area	Butler Flat
42SA18370	Butler Flat Area	Butler Flat
42SA18371	Butler Flat Area	Butler Flat
42SA18372	Butler Flat Area	Butler Flat
42SA18373	Butler Flat Area	Butler Flat
42SA18374	Butler Flat Area	Butler Flat
42SA18375	Butler Flat Area	Butler Flat
42SA18376	Butler Flat Area	Butler Flat
42SA18377	Butler Flat Area	Butler Flat
42SA18378	Butler Flat Area	Butler Flat
42SA18379	Butler Flat Area	Butler Flat
42SA18380	Butler Flat Area	Butler Flat
42SA18381	Butler Flat Area	Butler Flat
42SA18382	Butler Flat Area	Butler Flat
42SA18383	Butler Flat Area	Butler Flat
42SA18384	Butler Flat Area	Butler Flat
42SA18385	Butler Flat Area	Butler Flat
42SA18386	Butler Flat Area	Butler Flat
42SA18387	Butler Flat Area	Butler Flat
42SA18388	Butler Flat Area	Butler Flat
42SA18389	Butler Flat Area	Butler Flat
42SA18390	Butler Flat Area	Butler Flat
42SA18391	Butler Flat Area	Butler Flat
42SA18392	Butler Flat Area	Butler Flat
42SA18393	Butler Flat Area	Butler Flat
42SA18394	Butler Flat Area	Butler Flat
42SA18395	Butler Flat Area	Butler Flat
42SA18396	Butler Flat Area	Butler Flat
42SA18397	Butler Flat Area	Butler Flat
42SA18398	Butler Flat Area	Butler Flat
42SA18399	Butler Flat Area	Butler Flat
42SA18400	Butler Flat Area	Butler Flat
42SA18401	Butler Flat Area	Butler Flat
42SA18402	Butler Flat Area	Butler Flat
42SA18403	Butler Flat Area	Butler Flat

TABULAR SITE DATA

Table C-1. Location of each site by inventory area and geographic location (continued).

Site Number	Inventory Area	Geographic Location
42SA18404	Butler Flat Area	Butler Flat
42SA18405	Butler Flat Area	Butler Flat
42SA18406	Butler Flat Area	Butler Flat
42SA18407	Butler Flat Area	Butler Flat
42SA18408	Butler Flat Area	Butler Flat
42SA18409	Butler Flat Area	Butler Flat
42SA18410	Butler Flat Area	Butler Flat
42SA18411	Butler Flat Area	Butler Flat
42SA18412	Butler Flat Area	Butler Flat

Table C-2. List of sites and their cultural affiliation and age.

Site Number	Number of Identifiable Occupation	Cultural Affiliation	Age
42SA18363	1	Anasazi	Formative
42SA18364	1	Aboriginal	Prehistoric
42SA18365	1	Archaic	Early Archaic
42SA18365	2	Anasazi	Pueblo III
42SA18366	1	Anasazi	Pueblo III
42SA18366	2	Numic	Late Prehistoric/Protohistoric
42SA18367	1	Anasazi	Pueblo II-III
42SA18367	2	Euroamerican	Historic/Modern
42SA18368	1	Aboriginal	Prehistoric
42SA18369	1	Aboriginal	Prehistoric
42SA18370	1	Aboriginal	Prehistoric
42SA18370	2	Euroamerican	Historic/Modern
42SA18371	1	Aboriginal	Prehistoric
42SA18372	1	Archaic	Middle Archaic
42SA18372	2	Anasazi	Pueblo III
42SA18373	1	Archaic	Middle Archaic
42SA18373	2	Aboriginal	Formative
42SA18373	3	Anasazi	Pueblo III
42SA18374	1	Aboriginal	Prehistoric
42SA18375	1	Numic	Late Prehistoric/Protohistoric
42SA18376	1	Aboriginal	Prehistoric
42SA18377	1	Aboriginal	Prehistoric
42SA18378	1	Anasazi	Pueblo II-III
42SA18379	1	Aboriginal	Prehistoric
42SA18380	1	Aboriginal	Prehistoric
42SA18381	1	Aboriginal	Prehistoric
42SA18382	1	Aboriginal	Prehistoric
42SA18383	1	Aboriginal	Prehistoric
42SA18384	1	Aboriginal	Prehistoric
42SA18385	1	Archaic	Archaic
42SA18385	2	Anasazi	Pueblo II-III
42SA18386	1	Aboriginal	Prehistoric
42SA18387	1	Archaic	Early Archaic
42SA18388	1	Aboriginal	Prehistoric
42SA18389	1	Aboriginal	Prehistoric
42SA18390	1	Aboriginal	Prehistoric
42SA18391	1	Aboriginal	Prehistoric
42SA18392	1	Aboriginal	Prehistoric
42SA18393	1	Aboriginal	Prehistoric

TABULAR SITE DATA

Table C-2. List of sites and their cultural affiliation and age (continued).

Site Number	Number of Identifiable Occupation	Cultural Affiliation	Age
42SA18394	1	Anasazi	Pueblo II-III
42SA18395	1	Aboriginal	Formative
42SA18396	1	Aboriginal	Prehistoric
42SA18397	1	Anasazi	Pueblo III
42SA18398	1	Aboriginal	Prehistoric
42SA18399	1	Aboriginal	Prehistoric
42SA18400	1	Aboriginal	Prehistoric
42SA18401	1	Aboriginal	Prehistoric
42SA18402	1	Aboriginal	Prehistoric
42SA18403	1	Aboriginal	Prehistoric
42SA18404	1	Aboriginal	Prehistoric
42SA18405	1	Aboriginal	Prehistoric
42SA18406	1	Aboriginal	Prehistoric
42SA18407	1	Aboriginal	Prehistoric
42SA18408	1	Aboriginal	Prehistoric
42SA18409	1	Aboriginal	Prehistoric
42SA18410	1	Aboriginal	Prehistoric
42SA18411	1	Aboriginal	Formative
42SA18412	1	Archaic	Early Archaic

Table C-3. List of sites and their descriptive site types.

Site Number	Component Number	Site Setting	Descriptive Site Type
42SA18363	1	Open	Lithic source area and sherd scatter with features
42SA18364	1	Open	Lithic source area
42SA18365	1	Open	Lithic source area with feature
42SA18365	2	Open	Lithic source area and sherd scatter with feature
42SA18366	1	Open	Lithic source area and sherd scatter with features
42SA18366	2	Open	Lithic source area with features
42SA18367	1	Open	Sherd and lithic scatter with features
42SA18367	2	Open	Historic/modern site
42SA18368	1	Open	Lithic scatter with features
42SA18369	1	Open	Lithic scatter with features
42SA18370	1	Open	Lithic scatter
42SA18370	2	Open	Historic/modern site
42SA18371	1	Shelter	Lithic scatter
42SA18372	1	Open	Lithic scatter
42SA18372	2	Open	Sherd and lithic scatter
42SA18373	1	Open	Lithic source area
42SA18373	2	Open	Lithic source area
42SA18373	3	Open	Lithic source area and sherd scatter
42SA18374	1	Open	Lithic scatter with features
42SA18375	1	Open	Lithic scatter
42SA18376	1	Open	Lithic scatter
42SA18377	1	Open	Lithic scatter
42SA18378	1	Open	Sherd and lithic scatter
42SA18379	1	Open	Lithic scatter
42SA18380	1	Open	Lithic scatter with feature
42SA18381	1	Open	Lithic scatter
42SA18382	1	Open	Lithic scatter
42SA18383	1	Open	Lithic scatter
42SA18384	1	Open	Lithic scatter
42SA18385	1	Open	Lithic scatter
42SA18385	2	Open	Sherd and lithic scatter
42SA18386	1	Open	Lithic scatter
42SA18387	1	Shelter	Lithic scatter
42SA18388	1	Shelter	Lithic scatter
42SA18389	1	Open	Lithic scatter
42SA18390	1	Shelter	Lithic scatter with features
42SA18391	1	Open	Lithic scatter
42SA18392	1	Open	Lithic scatter
42SA18393	1	Open	Lithic scatter with features
42SA18394	1	Open	Sherd and lithic scatter with features

TABULAR SITE DATA

Table C-3. List of sites and their descriptive site types (continued).

Site Number	Component Number	Site Setting	Descriptive Site Type
42SA18395	1	Open	Lithic scatter
42SA18396	1	Open	Lithic scatter
42SA18397	1	Open	Sherd and lithic scatter with features
42SA18398	1	Open	Lithic scatter
42SA18399	1	Open	Lithic scatter
42SA18400	1	Open	Lithic scatter
42SA18401	1	Open	Lithic scatter with feature
42SA18402	1	Open	Lithic scatter with feature
42SA18403	1	Open	Lithic scatter
42SA18404	1	Open	Lithic scatter with feature
42SA18405	1	Open	Lithic scatter with features
42SA18406	1	Open	Lithic scatter
42SA18407	1	Open	Lithic scatter
42SA18408	1	Open	Lithic scatter
42SA18409	1	Open	Lithic scatter
42SA18410	1	Open	Lithic scatter
42SA18411	1	Open	Masonry architecture site
42SA18412	1	Shelter	Lithic scatter with features

NOTE: Some sites listed as having an open setting have small overhangs but are characterized as open because the majority of the site is open rather than sheltered.

Table C-4. Number and type of artifacts on prehistoric sites and components.

Site Number	Projectile Points	Bifaces	Shoshonean				Unifaces	Scrapers	Graver	Scraper/ graver
			Knives	Knife	Drills					
42SA18363	-	3	-	-	-	2	4	-	-	
42SA18365	1	19	-	-	-	2	3	-	-	
42SA18366	6	40	1	-	-	1	-	-	1	
42SA18367	-	-	-	-	-	1	2	-	-	
42SA18368	-	-	-	-	-	-	-	-	-	
42SA18369	-	-	-	-	-	-	-	-	-	
42SA18370	-	5	1	-	-	-	-	-	-	
42SA18372	6	33	-	-	-	2	5	-	-	
42SA18373	4	17	-	-	-	-	4	-	-	
42SA18374	-	2	-	-	1	1	2	-	-	
42SA18375	1	3	-	1	-	-	-	-	-	
42SA18376	1	4	-	-	-	1	2	-	-	
42SA18377	-	6	-	-	-	-	1	-	-	
42SA18378	-	6	-	-	1	2	-	-	-	
42SA18379	-	32	-	-	1	4	-	-	-	
42SA18380	1	17	-	-	1	-	-	-	-	
42SA18381	-	2	-	-	-	-	-	-	-	
42SA18382	-	1	-	-	-	-	-	-	-	
42SA18383	-	-	-	-	-	-	-	-	-	
42SA18384	-	1	-	-	-	-	-	-	-	
42SA18385	1	9	-	-	-	6	4	-	-	
42SA18386	1	1	-	-	-	-	-	-	-	
42SA18387	3	4	-	-	-	3	1	-	-	
42SA18388	-	1	-	-	-	-	-	-	-	
42SA18389	-	1	-	-	-	-	-	-	-	
42SA18390	2	6	-	-	-	-	-	-	-	
42SA18391	-	-	-	-	-	-	-	-	-	
42SA18393	1	-	-	-	-	-	-	-	-	
42SA18394	-	5	-	-	-	1	-	1	-	
42SA18395	2	11	-	-	-	-	1	-	-	

Table C-4. Number and type of artifacts on prehistoric sites and components (continued).

Site Number	Projectile	Bifaces	Knives	Shoshonean			Unifaces	Scrapers	Graver	Scraper/ graver
	Points			Knife	Drills					
42SA18396	-	1	-	-	-	-	-	-	-	-
42SA18397	-	-	-	-	-	1	-	-	-	-
42SA18398	-	5	-	-	1	-	-	-	-	-
42SA18399	-	1	-	-	-	1	-	-	-	-
42SA18400	3	3	-	-	-	-	1	-	-	-
42SA18401	-	2	-	-	-	-	-	-	-	-
42SA18402	-	-	-	-	-	-	-	-	-	-
42SA18405	1	2	-	-	-	-	-	-	-	-
42SA18406	-	1	-	-	-	1	-	-	-	-
42SA18407	1	-	-	-	-	-	-	-	-	-
42SA18408	-	-	-	-	1	-	-	-	-	-
42SA18409	1	1	-	-	-	-	-	-	-	-
42SA18410	1	5	-	-	-	-	-	-	-	-
42SA18411	-	2	-	-	-	-	1	-	-	-
42SA18412	1	1	-	-	-	-	-	-	-	-
Total	38	253	2	1	6	29	31	1	1	

Table C-4. Number and type of artifacts on prehistoric sites and components (continued).

Site Number	Modified Flakes	Cores	Utilized Cores	Hammer- stones	Manos	Mano Blank	Metates	Indeterminate Groundstone	Sherds	Total
42SA18363	1	8	-	-	-	-	-	-	1	19
42SA18365	3	6	-	1	-	-	2	-	1	38
42SA18366	3	14	-	1	1	-	2	-	4	74
42SA18367	3	-	-	-	-	-	-	-	1	7
42SA18368	1	-	-	-	1	-	1	-	-	3
42SA18369	-	1	-	-	-	-	-	-	-	1
42SA18370	-	2	-	-	-	-	-	-	-	8
42SA18372	1	7	3	2	2	-	-	-	6	67
42SA18373	3	10	-	1	-	-	-	-	1	40
42SA18374	2	2	-	-	-	-	-	-	-	10
42SA18375	2	-	-	-	-	-	-	-	-	7
42SA18376	4	-	-	1	-	-	-	-	-	13
42SA18377	-	-	-	-	-	-	-	-	-	7
42SA18378	1	1	2	-	-	-	-	-	2	15
42SA18379	-	5	-	-	-	-	-	-	-	42
42SA18380	-	-	-	-	-	-	-	-	-	19
42SA18381	-	4	-	-	-	-	-	-	-	6
42SA18382	-	-	-	-	-	-	-	-	-	1
42SA18383	1	-	-	-	-	-	-	-	-	1
42SA18384	-	-	-	-	-	-	-	-	-	1
42SA18385	1	1	-	-	-	-	-	-	9	31
42SA18386	-	-	-	1	1	-	-	-	-	4
42SA18387	2	1	-	-	-	-	-	-	-	14
42SA18388	-	-	1	2	1	1	-	-	-	6
42SA18389	-	-	-	-	-	-	-	-	-	1
42SA18390	1	1	2	-	1	-	-	1	-	14
42SA18391	-	1	-	-	-	-	-	-	-	1
42SA18393	-	-	-	-	-	-	-	-	-	1
42SA18394	-	-	1	1	6	-	9	-	3	27
42SA18395	-	-	-	-	-	-	-	-	-	14

Table C-4. Number and type of artifacts on prehistoric sites and components (continued).

Site Number	Modified Flakes	Cores	Utilized Cores	Hammer-stones	Manos	Mano Blank	Metates	Indeterminate Groundstone	Sherds	Total
42SA18396	1	-	-	-	-	-	-	-	-	2
42SA18397	-	-	-	1	1	-	11	4	1	19
42SA18398	-	-	-	-	-	-	-	-	-	6
42SA18399	-	-	-	-	-	-	-	-	-	2
42SA18400	-	-	1	-	1	-	-	-	-	9
42SA18401	1	1	-	-	-	-	-	-	-	4
42SA18402	-	-	-	-	1	-	2	-	-	3
42SA18405	-	-	-	-	-	-	1	-	-	4
42SA18406	-	-	-	-	-	-	-	-	-	2
42SA18407	1	-	-	-	-	-	-	-	-	2
42SA18408	2	1	-	-	-	-	-	-	-	4
42SA18409	3	-	-	-	-	-	-	-	-	5
42SA18410	-	-	-	-	-	-	-	-	-	6
42SA18411	-	1	-	-	-	-	-	-	-	4
42SA18412	-	-	1	-	-	-	3	-	-	6
Total	37	67	11	11	16	1	31	5	29	570

Table C-5. Number and type of features on the sites.

Site Number	Hearths	Ash and Charcoal Stains	Ash and Rock Concentrations	Fire-cracked Rock Concentrations	Oblong Slab-lined Feature	Occurrences of Smoke Blackening	Middens
42SA18363	-	-	-	-	-	-	-
42SA18365	-	-	1	-	-	-	-
42SA18366	-	2	1	1	1	-	-
42SA18367	-	-	-	-	-	-	-
42SA18368	-	-	-	2	-	-	-
42SA18369	1	-	-	1	-	-	-
42SA18370	-	-	-	-	-	-	-
42SA18374	1	-	-	-	-	-	-
42SA18380	-	-	-	-	-	-	-
42SA18390	1	-	-	1	-	-	-
42SA18393	1	-	-	-	-	-	-
42SA18394	1	-	-	2	-	-	-
42SA18397	-	-	-	1	-	-	1
42SA18401	1	-	-	-	-	-	-
42SA18402	1	-	-	-	-	-	-
42SA18404	1	-	-	-	-	-	-
42SA18405	3	-	-	-	-	-	-
42SA18411	-	-	-	-	-	1	-
42SA18412	2	-	-	-	-	-	1
Total	13	2	2	8	1	1	2

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Table C-5. Number and type of features on the sites (continued).

Site Number	Rock Alignments	Surface Structure	Petroglyph Panel	Charcoal Scatters	Wood Piles	Poles/ Beams	Other	Total
42SA18363	-	-	-	-	-	2	1	3
42SA18365	-	-	-	-	-	-	-	1
42SA18366	-	-	-	-	-	-	-	5
42SA18367	1	-	-	1	1	-	-	3
42SA18368	-	-	-	-	-	-	-	2
42SA18369	-	-	-	-	-	-	-	2
42SA18370	-	-	-	1	-	-	-	1
42SA18374	-	-	-	-	-	-	-	1
42SA18380	1	-	-	-	-	-	-	1
42SA18390	-	-	-	-	-	-	-	2
42SA18393	-	-	-	-	-	-	-	1
42SA18394	1	-	1	-	-	-	-	5
42SA18397	-	-	-	-	-	-	-	2
42SA18401	-	-	-	-	-	-	-	1
42SA18402	-	-	-	-	-	-	-	1
42SA18404	-	-	-	-	-	-	-	1
42SA18405	-	-	-	-	-	-	-	3
42SA18411	-	1	-	-	1	-	-	3
42SA18412	-	-	-	-	-	-	-	3
Total	3	1	1	2	2	2	1	41

Appendix D

CATALOG OF ISOLATED FINDS

Table D-1. Catalog of isolated finds (IFs) in the Butler Flat Area.

IF Number	Description
1	Post-World War II camp—includes weathered firewood/scattered charcoal/wire/several clear glass masonry jars/rusted tin cans/two crimped-hinge tobacco tins
2	1 serrated end scraper made on a secondary flake of variegated orange Cedar Mesa Chert
3	1 decortication flake of Algalitic Chert 3 core reduction flakes of Algalitic Chert
4	1 large, crude biface fragment of Algalitic Chert 1 multidirectional core of Algalitic Chert
5	1 side scraper made on a large, thick decortication flake of Algalitic Chert 1 decortication flake of Algalitic Chert 1 core reduction flake of Algalitic Chert
6	1 hammerstone of brown chert
7	1 bifacially modified decortication flake denticulate of semitranslucent, gray chert
8	1 large, crude biface fragment of white chalcedony
9	1 medium-sized, subtriangular biface of brown chert; tip is missing 1 secondary flake of gray chert
10	1 biface fragment of Algalitic Chert 1 secondary flake of Algalitic Chert Associated with an outcrop of chert
11	1 large, thick modified flake (denticulate) of variegated gray and red Cedar Mesa Chert 1 piece of shatter of gray and red Cedar Mesa Chert
12	1 convex end scraper of milky white chert 2 secondary flakes of brown chert 3 secondary flakes of Algalitic Chert 1 secondary flake of gray-brown chert Artifacts are widely scattered and probably not associated
13	1 medium-sized, ovoid, late-stage biface base of milky white chert 1 whole, large, thick, ovoid biface of Algalitic Chert 1 large, lanceolate, late-stage biface base of Algalitic Chert 1 medium-sized, subrectangular, late-stage biface of Algalitic Chert
14	1 medium biface midsection of reddish brown Cedar Mesa Chert 6-8 flakes over an area measuring 100 m in diameter
15	1 large, early-stage biface base of maroon chert
16	1 large, thick, ovoid, early-stage biface of reddish brown chert 1 secondary flake of gray-brown chert 38 m east of the biface

CATALOG OF ISOLATED FINDS

Table D-1. Catalog of Isolated Finds (IF) in the Butler Flat Area (continued).

IF Number	Description
17	1 hammerstone of gray limestone 1 secondary flake of white chalcedony
18	1 medium-sized, subtriangular, late-stage biface of white chalcedony
19	1 bidirectional core of brown chert
20	A diffuse scatter of debitage between sites 42SA18393 and 42SA18394 Single flakes are generally more than 15 m apart with no clustering
21	1 large, possible San Rafael Side-notched projectile point base fragment 1 core of reddish brown Cedar Mesa Chert located 50 m west of the projectile point 1 indeterminate flake of Algalitic Chert located 50 m west of the projectile point
22	1 small indeterminate metate fragment of tan sandstone 3 flakes of chert
23	6 secondary flakes of Cedar Mesa Chert 2 secondary flakes of gray-brown chert
24	4 secondary flakes of gray-brown chert
25	1 large, uniaxially flaked core tool of Algalitic Chert 1 secondary flake of gray chert
26	6 secondary flakes of Algalitic Chert
27	1960s base camp and an overhang adjacent to the road—includes 2 slab-lined hearths/woodpile of milled lumber and natural wood/scattered charcoal/a clear glass jar stuffed into a rusted tin can with eggshells at the bottom. The lid on the jar is embossed with the plain "LIBBY" trademark.
28	Post-World War II, simple pole structure in a small overhang. Two poles are propped against the back of the overhang and two logs are lying flat on the ground. Heavily deteriorated yellow plastic flagging tape occurs nearby and 8-10 rock cairns mark a passage through the associated rock formation.
29	1 secondary flake of reddish brown Cedar Mesa Chert 1 secondary flake of white chalcedony
30	1 core reduction flake of Algalitic Chert, possibly utilized
31	1 large, ovate biface fragment of Algalitic Chert 3 core reduction flakes of milky white chert 1 core reduction flake of reddish brown Cedar Mesa Chert
32	2 decortication flakes of Algalitic Chert

Appendix E

SOURCING OF FOUR OBSIDIAN ARTIFACTS FROM SITES IN THE BUTLER FLAT AND UPPER SALT CREEK AREAS, CANYONLANDS NATIONAL PARK, SOUTHEASTERN UTAH

by Richard E. Hughes

Appendix E

SOURCING OF FOUR OBSIDIAN ARTIFACTS FROM SITES IN THE BUTLER FLAT AND UPPER SALT CREEK AREAS, CANYONLANDS NATIONAL PARK, SOUTHEASTERN UTAH

by Richard E. Hughes

Page E-5 of this report contains a table presenting x-ray fluorescence (xrf) data generated from the analysis of four obsidian artifacts from four archaeological sites (42SA18365, 42SA18367, 42SA18381, and 42SA21083) in the Needles District of Canyonlands National Park, southeastern Utah. The research reported here was conducted pursuant to a letter request from P-III Associates, Inc., on November 15, 1991.

Laboratory investigations were performed on a Spectrace™ 5000 (Tractor X-ray) energy dispersive x-ray fluorescence spectrometer equipped with a Rh x-ray tube, a 50-kV x-ray generator, with microprocessor controlled pulse processor (amplifier) and bias/protection module, a 100-mHz analog to digital converter (ADC) with automated energy calibration, and a Si(Li) solid-state detector with 150-eV resolution (FWHM) at 5.9 keV in a 30 mm² area. The x-ray tube was operated at 35.0 kV, .28mA, using a .127-mm RH primary beam filter in an air path at 300 seconds livetime to generate x-ray intensity data for the trace elements zinc (Zn K α), gallium (Ga K α), rubidium (Rb K α), strontium (Sr K α), yttrium (Y K α), zirconium (Zr K α), and niobium (Nb K α). Barium (BA K α) intensities were generated by operating the x-ray tube at 50.0 kV, .35 mA, with a .63-mm copper (Cu) filter at 300 seconds livetime. Data processing for all analytical subroutines is executed by a Hewlett Packard Vectra™ microcomputer with operating software and analytical results stored on a Hewlett Packard 20-megabyte fixed disk. Trace element intensities were converted to concentration estimates by employing a least-squares calibration line established for each element from analysis of up to 26 international rock standards certified by the U.S. Geological Survey, the U.S. National Institute of Standards and Technology (formerly National Bureau of Standards), the

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Geological Survey of Japan, and the Centre de Recherches Petrographiques et Geochimiques (France). Further details pertaining to x-ray tube operating conditions and calibration appear in Hughes (1988a).

Trace element measurements on the xrf data table are expressed in quantitative units (i.e., parts per million [ppm] by weight), and matches between unknowns and known obsidian chemical groups were made on the basis of correspondences (at the 2-sigma level) in diagnostic trace element concentration values (in this case, ppm values for Rb, Sr, Y, Zr, Nb, and Ba) that appear in Anderson et al. (1986), Baugh and Nelson (1987), Hughes (1986, 1988b), Hughes and Nelson (1987), Nelson (1984), and unpublished data in my possession on Colorado obsidian (Hughes 1991). Artifact-to-obsidian source (geochemical type) matches were considered reliable if diagnostic mean measurements for artifacts fall within two standard deviations of mean values for source standards. The term "diagnostic" is used here to specify those trace elements that are well-measured by x-ray fluorescence, and whose concentrations show low variability *within* a source and marked variability *across* sources. Diagnostic elements, then, are those whose concentration values allow one to draw the clearest geochemical distinctions between sources (see Hughes 1990; Hughes and Lees 1991). Although Zn, Ga, and Nb ppm concentrations also were measured and reported for each specimen, they are not considered "diagnostic" because they do not usually vary significantly across obsidian sources (see Hughes 1982, 1984). This is particularly true of Ga, which occurs in concentrations between 10-30 ppm in nearly all parent obsidians in the study area. Zn ppm values are infrequently diagnostic; they are always high in Zr-rich, Sr-poor peralkaline volcanic glasses, but otherwise, they do not vary significantly between sources in the study area. Likewise, Nb occurs in low concentrations in most volcanic glasses in the study area.

The trace element composition measurements presented herein are reported to the nearest ppm to reflect the resolution capabilities of non-destructive energy dispersive x-ray fluorescence spectrometry. The resolution limits of the present x-ray fluorescence instrument for the determination of Zn is about 3 ppm, Ga about 2 ppm, for Rb about 4 ppm, for Sr about 3 ppm, Y about 2 ppm, Zr about 5 ppm, Nb about 3 ppm, and Ba about 10 ppm. When counting and fitting error uncertainty estimates (the " \pm " value in the table) for a sample are greater than calibration-imposed limits of resolution, the larger number is preferred as a more conservative, robust reflection of elemental composition and measurement error due to variations in sample size, surface and x-ray reflection geometry (see Hughes 1988a).

The trace element data in Table E-1 indicate that all four samples were fashioned from obsidian of a different geochemical type: one each from Government Mountain/Sitgreaves Peak, Arizona (Jack 1971); Cerro del Medio and No Agua Peaks, New

Mexico (Baugh and Nelson 1987:Table 1); and Wild Horse Canyon, Utah (Nelson 1984:Table 5, source 2; Hughes 1986:Table 4). Although Government Mountain, Cerro del Medio, and Wild Horse Canyon obsidians have been identified at other sites in the area, this is the first time I have recognized No Agua Peaks obsidian in an archeological context.

Table E-1. Geochemical data for obsidian samples.

Site Number	Field Specimen Number	Trace Element Concentrations								Obsidian Source
		Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba	
42SA18365	2	65 ±5	15 ±3	110 ±4	75 ±3	21 ±2	81 ±5	51 ±3	318 ±14	Government Mtn./ Sitgreaves Peak, AZ
42SA18367	1	75 ±5	19 ±3	158 ±4	5 ±3	47 ±2	164 ±5	51 ±3	1 ±13	Cerro del Medio, NM
42SA18381	1	47 ±5	20 ±3	210 ±4	40 ±3	25 ±2	118 ±5	25 ±3	182 ±14	Wild Horse Canyon, UT
42SA21083	1	70 ±5	23 ±3	299 ±5	4 ±3	54 ±2	83 ±5	87 ±3	6 ±13	No Agua Peaks, NM

NOTE: All trace element values in parts per million (ppm); ± = pooled expression (in ppm) of x-ray counting uncertainty and regression fitting error at 300 seconds livetime.

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Appendix F

HYDRATION BAND ANALYSIS OF FOUR OBSIDIAN ARTIFACTS FROM SITES IN THE BUTLER FLAT AND UPPER SALT CREEK AREAS, CANYONLANDS NATIONAL PARK, SOUTHEASTERN UTAH

by Thomas M. Origer

Appendix F

HYDRATION BAND ANALYSIS OF FOUR OBSIDIAN ARTIFACTS FROM SITES IN THE BUTLER FLAT AND UPPER SALT CREEK AREAS, CANYONLANDS NATIONAL PARK, SOUTHEASTERN UTAH

by Thomas M. Origer

This document reports hydration band analysis of four obsidian specimens from four sites: 42SA18365, 42SA18367, 42SA18381, and 42SA21083. The analysis was completed at the Sonoma State University Obsidian Hydration Laboratory, an adjunct of the Anthropological Studies Center, Department of Anthropology. Procedures used by our hydration laboratory for thin-section preparation and hydration band measurement are described below.

Each specimen was examined to find two or more surfaces that would yield edges which would be perpendicular to the microslide when preparation of the thin section was completed. Two small, parallel cuts were made at an appropriate location along the edge of each specimen with a 4-inch-diameter, circular saw blade mounted on a lapidary trimsaw. The cuts resulted in the isolation of a small sample with a thickness of approximately one millimeter. Each sample was removed from its specimen and mounted with Lakeside Cement onto a permanently etched petrographic microslide.

The thickness of the samples was reduced by manual grinding with a slurry of #500 silicon carbide abrasive on a glass plate. The grinding was completed in two steps. The first grinding was terminated when the sample's thickness was reduced by approximately one-half, thus eliminating any micro-chips created by the saw blade during the cutting process. The slides were then reheated, which liquefied the Lakeside Cement, and the samples inverted. The newly exposed surfaces were then ground until the proper thickness was attained.

HYDRATION BAND ANALYSIS

The correct thin-section thickness was determined by the "touch" technique. A finger was rubbed across the slide onto the sample and the difference (sample thickness) was "felt." The second technique employed for arriving at proper thin-section thickness is termed the "transparency" test. The microslide was held up to a strong source of light and the translucency of the thin section was observed. The sample was sufficiently reduced in thickness when the thin section readily allowed the passage of light.

A protective coverslip was affixed over the thin sections when all grinding was completed. The completed microslides are curated at our hydration laboratory under File No. 92-H1094.

The hydration bands were measured with a stainfree, 40-power objective and a Bausch and Lomb 12.5-power filar micrometer eyepiece on a Nikon petrographic microscope. Six measurements were taken at several locations along the edge of the thin section. The mean of the measurements was calculated and is listed on Table F-1 with other information. These hydration measurements have a range of ± 0.2 due to normal limitations of the equipment.

Table F-1. Obsidian hydration results.

Site Number	Field Specimen Number	Laboratory Accession Number	Laboratory Number	Description	Remarks	Measurements ^a						Mean	Source
						M1	M2	M3	M4	M5	M6		
42SA18365	2	92-H1094	1	Debitage	Weathered	1.9	1.9	2.0	2.0	2.0	2.1	2.0	Government Mtn./ Sitgreaves Peak, AZ
42SA18367	1	92-H1094	2	Modified flake	None	4.4	4.5	4.5	4.7	4.8	4.8	4.6	Cerro del Medio, NM
42SA18381	1	92-H1094	3	Debitage	None	4.2	4.3	4.3	4.3	4.4	4.5	4.3	Wild Horse Canyon, UT
42SA21083	1	92-H1094	4	Debitage	None	0.8	0.8	0.8	1.0	1.1	1.1	0.9	No Agua Peaks, NM

^aM1-M6 are individual band measurements.