LAND OF THE RELENTLESS SUN

An Examination of Prehistoric Site Structure along the Lower South Seven Rivers Drainage, Eddy County, New Mexico

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Museum of New Mexico
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Land of the Relentless Sun: An Examination of Prehistoric Site Structure along the Lower South Seven Rivers Drainage, Eddy County, New Mexico

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Administrative Summary

In the spring of 1996 the New Mexico State Highway and Transportation Department (now the New Mexico Department of Transportation, or NMDOT) authorized the Office of Archaeological Studies (OAS) to undertake data recovery at LA 8053, LA 38264, and LA 112349. These sites lay partly within NMDOT right-of-way in Eddy County, southeastern New Mexico. The NMDOT planned to improve the bridge over the South Seven Rivers drainage as part of improvements to US 285. The land is owned by NMDOT and private owners.

The three sites included prehistoric and historic Native American components and nineteenth- and twentieth-century Euroamerican components. All three sites had been previously recorded. The Native American components include two camps (LA 8053); a small baking facility (LA 112349); and a very large camp associated, at least in part, with an annular thermal feature, or "ring midden" (LA 38264). LA 8053 and LA 38264 have multiple components, including one at LA 38264 dating to the early historic period.

A fourth site, LA 112630, of Native American derivation, was originally part of the data recovery project, but the final bridge design excluded it, making data recovery operations unnecessary.

NMDOT Project WIPP-285-1(27)50 (CN 2097).
MNM Project 41.614 (Seven Rivers).
Joint Powers Agreement No. J00122.
CPRC State Permit SE-114 (June 1996).

For Susana R. Katz,

esteemed colleague and dear friend

[Southeastern New Mexico] is not an easily accessible land, not a land immediately assimilated into human emotions. It overwhelms; it is subtle, vast, even savage in its stark forms and endless horizons. Its very largeness can conceal forever the intricate beauties of the small-scale natural phenomena found within it. It presents the individual with a continual choice between watching its larger outlines or pausing to absorb the valley places, canyon places, mesa or desert places within it. It will not be tamed. It will be windswept, self-determining, dynamic under a sun that seems to hold the land as laboratory to test its own powers of intensity. The air itself takes on visible shimmerings under the sun's relentless penetration.

It is a landscape one either grasps and feels imprinted on one's soul or else finds vaguely unsettling, taunting, even repugnant and antithetical to the civilizing ways of people. There are on the wide stretches of the plateau plain no deep green grass carpets, no lush forests, no shaded tumbling streams, no craggy peaks over misted valleys. There are, in short, no places to hide, to be caressed by nature, no places to believe in abstract beauty; there is no surcease from reality, no real smallness within which to shield oneself from the largeness, no aids from nature encouraging belief in one's uniqueness or protected status. And yet, ultimately, there is something in the landscape that enfolds, uplifts, strengthens, and places people firmly in a tapestry being woven into geological, anthropological, cultural history.

—Carole Larson, *Forgotten Frontier*

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—Regge N. Wiseman, Project Director

Introduction

In the spring of 1996 the New Mexico State Highway and Transportation Department (now the New Mexico Department of Transportation, or NMDOT) authorized the Office of Archaeological Studies (OAS) to undertake data recovery at LA 8053, LA 38264, and LA 112349 (Fig. 1 and Appendix 10). These sites lay partly within NMDOT right-of-way in Eddy County, southeastern New Mexico (Levine 1996; Wiseman 1996a). The NMDOT planned to improve the bridge over the South Seven Rivers drainage as part of improvements to US 285, Project WIPP-285-1(27)50. The land is owned by NMDOT and private owners (Appendix 10).

All three sites had been previously recorded: LA 8053 by Kenneth Honea of the Museum of New Mexico for the Highway Cultural Inventory project during the early 1960s, and LA 38264 (SMU 45) and LA 112349 (SMU 44) by Southern Methodist University for the Brantley Reservoir project in the late 1970s and early 1980s.

The present report details the results of investigations of the prehistoric and early historic Native American components at these sites. The results obtained during the investigation of the Euroamerican components were published separately (Wiseman 2001a).

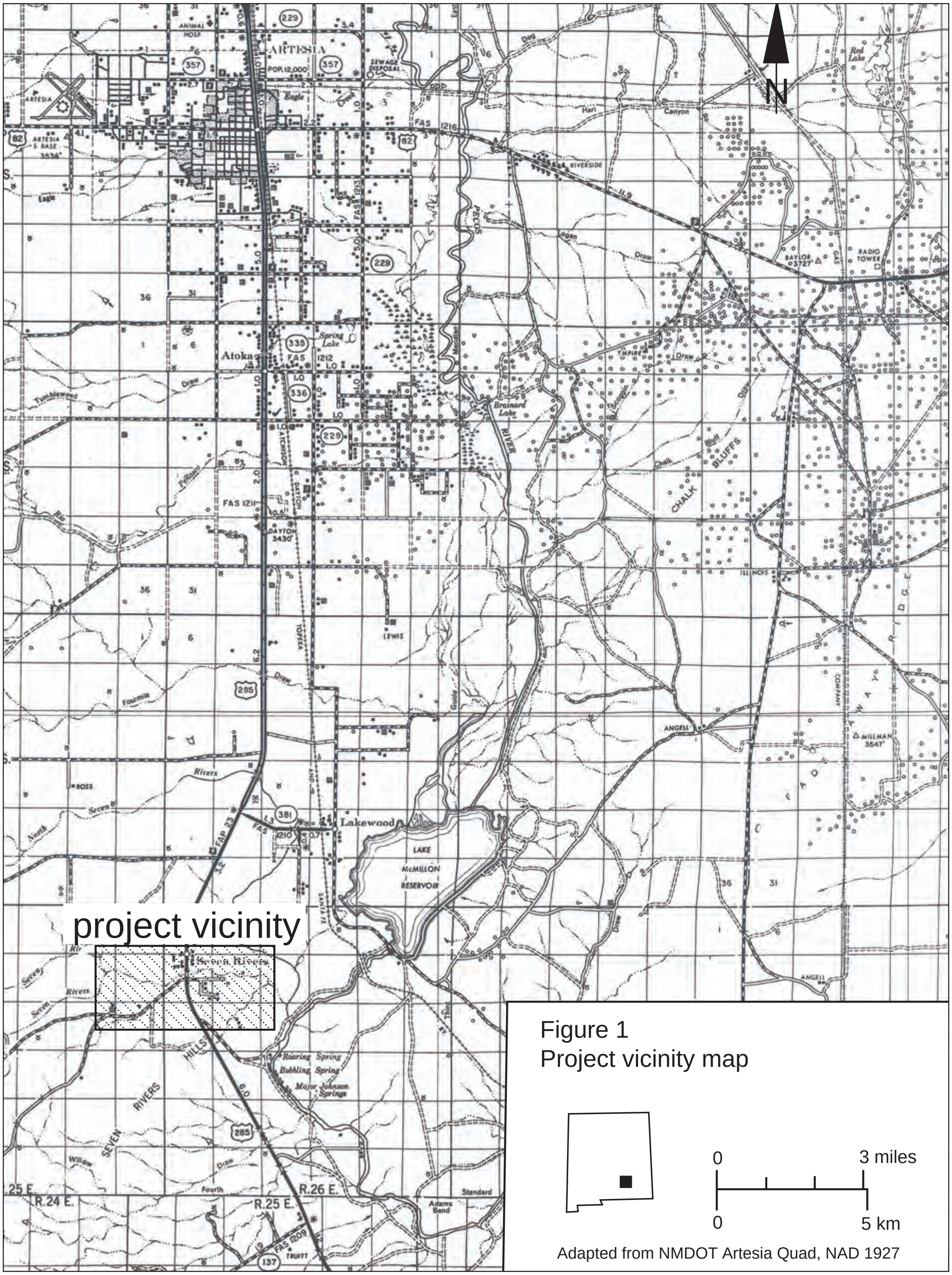


Figure 1
Project vicinity map

1. Natural Environment

In some ways, the physical appearance of the Pecos Valley, excluding modern towns and farms, has not changed much over the past 100 years. It was, and still is, a plains-like environment with broad expanses of grass and scrubland, and trees that are limited to water courses. But to the naturalist and the ecologist, the changes have been profound. As attested by the reports of pioneers (Shinkle 1966), the biotic wealth of the land prior to AD 1900 was remarkable.

The project sites are situated along the channel of the South Seven Rivers, 4 to 5 km west of where that stream enters the Pecos River. The sites sit on the first terrace at an elevation of 1,005 m above mean sea level.

The surface geology of the project area consists of mixed alluvial sediments deposited by the ancient Pecos River. Outcrops of the geologically older Seven Rivers and Queens sedimentary formations (Permian) occur southwest, west, and northwest of the sites (Dane and Bachman 1965).

Soils in the project area belong to the Calciustolls–Rock Land association. These thermic soils are shallow and rocky and occur on "strongly sloping and rolling to very steep uplands underlain mainly by limestone bedrock" (Maker et al. 1974). Very limited acreages of soils belonging to the Pachic Calciustolls, Pachic Haplustolls, or Cumulic Haplustolls occur along the course of the South Seven Rivers, but these tracts are too small for any but garden farming. Annual precipitation of 11–13 inches in the Artesia-Carlsbad region is generally insufficient for dryland farming. Thus, growing crops without irrigation in the vicinity of the project sites would be impossible except perhaps during exceedingly wet periods and then only on a small scale along the course of the South Seven Rivers below the sites.

The South Seven Rivers today is an intermittent stream with its headwaters in the east-central foothills of the Guadalupe Mountains. Contrary to statements made in Wiseman (1996a:4), this drainage was not fed by artesian springs, nor do we currently have water data that indicates the presence or former presence of springs along its channel anywhere near the project sites (White and Kues 1992; USGS 1954, 1957; Tom Morrison, pers. comm., June 2006). Thus, we can only conclude that water was not readily available to the occupants at or near the project sites unless they were there during a period of runoff from local storms.

According to pioneer accounts (Shinkle 1966), the Pecos Valley at the time of Euroamerican settlement was a grama-dominated grassland. Trees were common only along certain watercourses such as the Rio Hondo. Kuchler (1964) posits that the potential natural vegetation of the project area was the creosote bush–tarbush association, consisting of "fairly dense to very open vegetation of shrubs, dwarf shrubs and grass." In Dick-Peddie's (1993) classification, the association is Chihuahuan desert scrub.

The variety and abundance of wildlife in the Pecos Valley were two of its attractions. While not as abundant today as in the recent past, antelope, cottontails, jackrabbits, and other species used by prehistoric peoples are still fairly common. Until the late 1800s, the Pecos River formed the western boundary of the main range of the southern Great Plains bison herd, though small herds and individuals frequently crossed the river. The Pecos River is a flyway for ducks, geese, and many other migratory species.

The climate of the project area today is characterized by mild winters and hot summers. The mean January temperature is 5.1 degrees C, the July mean is 26.3 degrees C, and the yearly mean is 15.9 degrees C (Gabin and Lesperance 1977). The average frost-free season exceeds 200 days (Tuan et al. 1973).

Precipitation is currently summer-dominant. The normalized annual mean is 305 mm, of which 203 mm falls from April through September and 102 mm from October through March (USDC 1965).

2. Cultural Setting

The following culture history of southeastern New Mexico is distilled from a number of sources. Sources for the prehistoric period include Stuart and Gauthier (1981, a general study of New Mexico archaeology), Sebastian and Larralde (1989, an overview of east-central and southeastern New Mexico), Jelinek (1967, the Pecos River north of Roswell), Katz and Katz (1985a, the Pecos River south of Roswell), and Leslie (1979, the region east of the Pecos River and especially the southeastern corner of New Mexico). The primary references used for the historic period are Katz and Katz (1985b) and Shinkle (1966).

Human occupation of southeastern New Mexico began with the Llano complex ("Clovis Man") of the Paleoindian period, which dates to at least 13,000 years ago. These people and their successors of the Folsom period hunted large mammals such as mammoths and extinct forms of bison and maintained a nomadic or seminomadic lifestyle. Although most accounts of Paleoindians refer to them as big-game hunters, it is a virtual certainty that the people collected and consumed wild vegetal foods and small animals as well as large animals.

The retreat of the Pleistocene glaciers and the resulting warming of the more southerly latitudes resulted in a shift in human adaptation to what archaeologists call the Archaic period. This hunting and gathering adaptation was evidently more eclectic than the Paleoindian period and focused on smaller animals such as deer and rabbits. The appearance of grinding tools and specialized burned-rock features suggests a greater reliance on plant foods.

In the project area, an Archaic sequence (including hunter-gatherers dating to the pottery period) developed by Katz and Katz (1985a), starts with the Middle Archaic, rather than the Early Archaic. This suggests that an occupational hiatus occurred between the Paleoindian period and the Avalon phase (3000–1000 BC).

Little is known about the peoples of the Avalon phase except that they inhabited the floodplain near the river channel during at least part of the year, camped and constructed hearths in the open, and consumed one or more species of freshwater shellfish. The subsistence orientation at these sites was clearly riverine. Projectile points are currently unknown for this phase.

Late Archaic peoples of the succeeding McMillan phase (1000 BC to AD 1) are better known in that more sites with more artifacts have been documented. Sites contain relatively small hearths (1 m diameter clusters of small rocks) and burned-rock rings (also called midden circles, mescal pits, annular middens, etc.). Previously named projectile point styles associated with the McMillan include the Darl and Palmillas types. Subsistence involved exploiting both riverine and upland plant and animal species in an annual subsistence round.

The Terminal Archaic Brantley phase (AD 1–750) continued the previous patterns and included a greater use of burned-rock rings. Although this suggests that certain upland resources such as agave and sotol were becoming more important in the diet, the ratio of riverine to upland sites remained the same, with the emphasis still on floodplain living. Projectile point types commonly associated with the Brantley phase include the previously known San Pedro style; a newly described provisional type, the Pecos point (Katz and Katz 1985a); and several less standardized, but nevertheless familiar, styles of points commonly found in this and surrounding regions.

In the Carlsbad locale, occupation of the floodplain environment reached its zenith during the Globe phase (AD 750–1150). At this time, four major changes occur: the appearance of pottery, the bow and arrow, rock habitation structures (the piled-rock structure or "stone enclosure"), and a shift in the primary subsistence focus from the rivers to the uplands. Projectile point styles are dominated by the corner-notched arrow tips called Scallorn. In many ways, the Globe phase appears to have been transitional between earlier and later adaptive patterns.

During the Oriental phase (AD 1150–1450), occupation along the river in the Carlsbad area continued to diminish. The people who remained in the area used painted pottery such as Chupadero Black-on-white, Three Rivers Red-on-terracotta, and El Paso Polychrome, imported from he west and northwest. Otherwise, the people retained their essentially Archaic, hunter-gatherer lifestyle. Why the people of the Carlsbad and Guadalupe Mountains region did not develop a more sedentary life-style employing farming, as occurred to the north and west, remains to be determined.

The Phenix phase (AD 1450–1540) and the Seven Rivers phase (AD post-1540) are predicated on projectile point styles only (Garza-like and Toyah-like in the former and metal points in the latter), but Katz and Katz (1985a) admit that distinguishing between the two may be dubious in practice. They were able to assign only one site to each phase, indicating that Native American use of the riverine habitat in the Carlsbad area was minimal, mostly oriented towards hunting and perhaps succulent-plant exploitation, and focused mainly (?) on Rocky Arroyo.

Where many of the people went, assuming that fewer sites and cultural remains indicate at least partial abandonment of the area, also remains to be determined. The period represented by the Phenix and Seven Rivers phases (the latter including the early Spanish explorations in the late 1500s) is unknown archaeologically. Abandoned *rancherías* described by early Spanish explorers for the Seven Rivers region certainly indicate the presence of hunter-gatherers during the protohistoric and early historic periods (Schroeder and Matson 1965), but the inhabitants (possibly Jumanos; Hickerson 1994) effectively disappeared as an identifiable people before detailed accounts, relationships, and descriptions could be recorded.

From Spanish contact until after the American Civil War, roaming Apaches, Comanches, Kiowas, and other Plains tribes kept Euroamerican settlement of southeastern New Mexico in abeyance. Following the Civil War, westward mass movement of Euroamericans and eastward drifting of small groups of New Mexico Hispanics led to settlement of the region. Cattle ranching was the first economic activity, but a major drought during the mid-1880s came close to shutting it down.

The village of Seven Rivers was founded about 1885 just east of the project area and rapidly became a haven for outlaws escaping justice in Texas. The turn towards law and order was completed when artesian water was discovered at Roswell in 1891, and its development throughout the valley promoted a rapid influx of people and widespread irrigation. The railroad reached Carlsbad in 1891, irretrievably setting the course of urban development in the area. At the turn of the century, the regional economy became firmly based on agriculture and stockraising, and in the mid-twentieth century, the production of oil, gas, and potash. Tourism also took hold with the opening of Carlsbad Caverns National Park in the Guadalupe Mountains, southwest of Carlsbad.

3. Previous Archaeological Work in the Project Area

Except for small-scale contract archaeological projects associated with oil and gas exploration, archaeological investigations in the project area have been few. The list below includes some of the more significant investigations. Except where noted, the sites are prehistoric.

Applegarth (1976). Excavation of several caves and shelters in the Guadalupe Mountains.

Ferdon (1946). Excavation of Hermit's Cave in Last Chance Canyon of the Guadalupe Mountains.

Gibbs (2005). Summary of surveys and test excavations of sites in Brantley area exchange lands.

Henderson (1976). Survey of Brantley Reservoir on the Pecos River.

E. B. Howard (1930, 1932, 1935). Excavations at several caves in the Guadalupe Mountains.

Gallagher and Bearden (1980). Excavations by Southern Methodist University at open sites in the Brantley Reservoir between Carlsbad and Artesia.

Paul Katz (1978). Survey and assessment of sites in Guadalupe Mountains National Park.

Katz and Katz (1985a, 1985b). Excavations and cultural synthesis of prehistoric and historic resources in the Brantley Reservoir.

Jones (in prep.) and Jones et al. (in prep.). Excavation of several dozen sites along a cable route from Lamesa to El Paso, Texas, for Western Cultural Resource Management. Archaic and Late Prehistoric habitation sites, camps, and ring middens.

Lord and Reynolds (1985). Excavation of three open sites in the Waste Isolation Pilot Project area in eastern Eddy County.

Mallouf (1985). Cultural synthesis of the Trans-Pecos region, including the Guadalupe Mountains.

Mera (1938). Survey and excavations in caves and open sites in the Guadalupe Mountains and the open country east of the Pecos River, all in New Mexico.

Phippen et al. (2000). Excavation of 13 Archaic and Late Prehistoric sites along a pipeline from the Pecos River to Cornucopia Draw, 15 miles west of the Guadalupe Mountains.

Riches (1970). Survey of caves, shelters, and open sites in the Guadalupe Mountains.

Roney (1995). Excavations at Hooper Canyon Cave in the Guadalupe Mountains and survey along upper Rocky Arroyo.

Sebastian and Larralde (1989). Cultural overview, assessment, and synthesis of the prehistory and history of the Roswell District, Bureau of Land Management.

Staley (1996). Excavation of 11 Archaic through protohistoric sites along a transmission line between Artesia and Lovington.

Wiseman (2003). Investigation and excavation of a camp site, a mortar site, and a site of unknown function (primarily a cemetery?) representing the Archaic through protohistoric periods along US 285 from Carlsbad north to Rocky Arroyo.

Zamora (2000). Excavation of a lithic-quarry site and a site with burned, Late Prehistoric wickiups near Carlsbad.

4. Research Perspective and Data Recovery Questions

This section is borrowed in most of its particulars from the data recovery plan (Wiseman 1996a). Some references (e.g., Kemrer 1998 and Phippen et al. 2000) have been added in place of personal communications with other archaeologists.

Archaeological Taxonomy

Katz and Katz (1985a) provide an excellent outline of prehistoric cultural developments in the Guadalupe Mountains–Brantley region (Table 4.1). But they would be the first to admit that this sequence, which covers Paleoindian through early historic Native American periods, requires verification and elaboration. The last two periods—Globe (AD 750–1150) and Oriental (AD 1150–1450)—are not as well known as earlier ones, largely because aboriginal use of the Brantley project area had decreased markedly in favor of the Guadalupe Mountains and their foothills west of the Pecos River. It is perhaps fortunate that two of our project sites represent the Globe and Oriental phases and lie between Brantley and the foothills of the Guadalupes. This position provides an excellent opportunity to begin the process of fleshing out the details of these phases and of verifying and modifying the shift in subsistence emphasis posited by Katz and Katz.

Table 4.1. Culture-historical sequence for the Brantley locality

Period	Phase	Dates
Ethnohistoric	Seven Rivers	AD 1450–1860*
Late Late Prehistoric	Phenix	AD 1450–1540
Middle Late Prehistoric	Oriental	AD 1150–1450
Early Late Prehistoric	Globe	AD 750–1150
Terminal Archaic	Brantley	AD 1–750
Late Archaic	McMillan	1000 BC–AD 1
Middle Archaic	Avalon	3000–1000 BC
Early Archaic	-	5000–3000 BC
Paleoindian	-	8000–5000 BC

Source: Katz and Katz (1985a: Fig. 5-1 [pp. 64-65] and p. 420)

* This end date should probably be extended into the twentieth century to include later Mescalero components such as the one documented at LA 44565 in the Seven Rivers area (Wiseman 2003), or else another phase should be added to the sequence.

As discussed in more detail below, horticulture evidently was not practiced prehistorically in the Guadalupe-Brantley region. This fact, plus other characteristics such as the ubiquitous annular thermal features or "ring middens," have led Robert Mallouf (1985) to suggest that the prehistoric remains of the southern Guadalupe Mountains are more closely associated with the Trans-Pecos culture area of West Texas than with the Jornada-Mogollon to the west and north. We concur with Mallouf. Drawing on Katz's work at Brantley, we suggest that the same applies to Brantley, including the sites discussed in this report. A formal line of demarcation between the Trans-Pecos (including the Guadalupe-Brantley region) and the Jornada-Mogollon remains to be defined, but this is only incidental to our present purposes.

The implications of the taxonomic assignment of the Guadalupe-Brantley region to the Trans-Pecos are several. First, as far as can be ascertained at present, the peoples inhabiting the Trans-Pecos—with the exception of those at La Junta de los Rios on the Rio Grande at present day Presido, Texas—lived an Archaic-like hunter-gatherer lifestyle throughout the prehistoric and historic periods. Many Late Prehistoric sites in the Trans-Pecos produce small amounts of pottery, but all of it was probably traded in from nearby regions. Most or all of the pottery at Guadalupe-Brantley sites came from the Sierra Blanca and El Paso regions, to the northwest and west, respectively.

Theoretical Perspective on Hunter-Gatherer Subsistence Systems

Past research in the Guadalupe-Brantley region, as in the Trans-Pecos in general, indicates that baked succulents such as lechuguilla and sotol were a fundamental aspect of pottery-period (Late Prehistoric) subsistence (Greer 1965, 1967, 1968; Roney 1995; Katz and Katz

1985a). Archaeological remains of communal baking ovens usually take the form of midden rings (now called annular thermal features by Texas archaeologists) or circles of burned rock surrounding central pits, though burned-rock mounds of other shapes are also known (Phippen et al. 2000). Midden circles date as early as the Middle Archaic period in Texas but are more common in later time periods. Most ovens in the eastern Trans-Pecos, including the Guadalupe Mountains, are believed to date to post–AD 500 on the basis of associated surface pottery (Roney 1995). Since these succulents provide a reliable, year-round source of carbohydrates, they were understandably important to prehistoric and historic diets and probably obviated the value of, or need for, many other carbohydrates including corn (Sebastian and Larralde 1989; Roney 1995).

W. H. Wills (1988:54-55) states that succulents are usually scattered across the landscape rather than clumped, which probably affected humans in yet another way. (Through personal observation, I do not entirely agree with this assessment of succulent availability.) Wills posits that the scattered nature and year-round availability of these resources in the Trans-Pecos led to the retention of a more nomadic, "forager" pattern, rather than a less nomadic, logistically organized pattern (Binford 1980). In simplest terms, foragers move the people to the food, and collectors move the food to the people. Collectors do this by means of task groups that are sent out to obtain specific resources and return them to the group, a behavior warranted by resources that occur in clumped or patchlike distributions. The primary differences between collector and forager lifestyles are the degrees to which and ways in which people plan, organize, and conduct their food quest in response to resource distribution and season of availability.

In theory, forager and collector sites should have fairly distinct attributes, as follows.

Forager sites, because people are moved to the resources, are inhabited for shorter periods and have smaller accumulations of trash and similar ranges of artifact types, all because the same general activities are carried out at each. Because they are occupied for only days or a few weeks, relatively few items (manufacture debris, broken artifacts, etc.) should be left behind. One site should look pretty much like another, and their archaeological visibility should be subtle, perhaps even inconspicuous.

Collectors, on the other hand, send out work parties to set up temporary special-activity sites, collect the target resource(s), and take the food back to long-term base camps. The characteristics of these two basic site types should be as follows: Special-activity sites are created during collecting expeditions, might be used only once, and are almost invisible archaeologically because they are used for only short periods, have little or no accumulation of nonperishable debris and broken artifacts, and have limited artifact inventories that reflect comparatively few activities. Base camps, on the other hand, are generally quite visible archaeologically because they are used for a wide range of daily activities, resulting in the accumulation of a wide range of artifact types, activity areas, and refuse deposits. Some form of structure, whether ephemeral or more substantial in construction, is usually present, as are pits for storing food and other items. Base camps are generally used over long periods of time (several months) each year for several years, sometimes in sequential years and sometimes in staggered years or sets of years. A logistically organized group generally has only one or two base camps that it uses during a given year.

While I generally agree with Wills's proposition, I, like Sebastian and Larralde (1989) and Collins (1991:8), emphasize that these strategies—forager and collector—are two ends of a continuum, not a dichotomy. In a given year or over a series of years, some groups may actually employ both strategies because of factors relating to season, climatic regime, economic success, demography, competition, and other factors (see Boyd et al. 1993). Sebastian and Larralde (1989:55-56) present an example of a "mixed" forager/collector strategy in the concept of "serial foraging." Using the Archaic peoples of southeastern New Mexico as an example, they define serial foraging as follows:

> A strategy of serial foraging involves a small residential group that moves into the general vicinity of an abundant resource and camps there, uses the target resource and other hunted and gathered resources encountered in the general area until the target resource is gone, or until another desired resource is

> known to be available, and then moves on to the next scheduled procurement area. Such a strategy could be expected to create a great deal of redundancy in the archaeological record, an endless series of small, residential camps from which daily hunting-and-gathering parties move out over the surrounding terrain, returning to process and consume the acquired foods each evening. If the resources were randomly distributed, all the sites would look generally the same. But since many of the resources appear in the same place year after year or in some other cyclical pattern, some sites tend to be reoccupied.

Reoccupied sites, then, would be a clustering of small, single-event, serial-foraging sites. But Sebastian and Larralde envisage a complicating factor:

> The only exception to the rule of basically redundant but sometimes overlapping small campsites would be the winter camps. Given the relatively brief winters of the Roswell District, many of the sites would, on the surface, be no different in appearance from reoccupied short-term camps. Excavation of such sites might recover resources indicating a winter seasonal occupation or features indicative of storage, however. If we were able to differentiate single, large-group occupations from multiple, small-group occupations, we might find that winter sites differ from warm season camps in that they were occupied by larger groups. (Sebastian and Larralde 1989:56)

In the above scenario, the settlement types of serial foragers should then start taking on the appearance of collectors' sites. While this introduces some difficulty in archaeological studies, it probably approximates reality to a greater degree and certainly seems to make better sense with respect to the archaeological record of southeastern New Mexico.

In addition to feature and artifact content of sites, Collins (1991:7–8) suggests biological correlates of forager and collector sites, particularly those involving burned-rock middens. He suggests that the difference between the two might be signaled by whether the target plant species are r- or K-selected. Collectors would focus on r-selected species that are available in large numbers or amounts during short periods of time, requiring some form of preparation and storage for long-term benefit to humans. Foragers, on the other hand, would rely mostly on plant species that are available throughout the year, precluding the need for storage but usually requiring greater mobility because their distribution across the landscape is general, not patchy. He suggests that animal species might also be conducive to this type of analysis, but because animals are mobile, many favored species (deer, antelope, jackrabbits, etc.) are not particularly useful in this regard.

Before leaving the subject of subsistence strategies, it is appropriate to touch on the subjects of gardening/farming and food storage. The evidence of prehistoric horticulture in the Guadalupe-Brantley region is minimal at present. Roney (1995) stated that corn was recovered from only three sites, all of them caves in the Guadalupes, but in each case, few remains were found. At the Pratt cave (Schroeder 1983:67), one or more kernels were recovered from the vicinity of a hearth. Since two chile seeds were recovered from a lower level in the same test at Pratt cave, it seems likely that the corn was introduced during the historic period by Apaches, rather than during Archaic times, as suggested by Roney. According to Roney, the proveniences and temporal associations of the other two reports of corn are also uncertain. More recently, Kemrer (1998) reported that minimal evidence of corn was recovered at a complex domestic site in Indian Basin several kilometers southwest of our project area. All of this leads us to conclude that horticulture either was not practiced by the prehistoric inhabitants of the Guadalupes or was practiced on only a very limited scale. Clarification of this point is needed.

Storage, usually in the form of pits, is believed to be a key indication of the existence and identification of base camps and habitation sites. The storage of quantities of foodstuffs is a characteristic of logistically organized subsistence systems. Generally speaking, storage implies a location that is easily protected or otherwise secure from theft. Sebastian and Larralde (1989:86) advance the interesting hypothesis that because some resource patches are spread over the landscape and create a logistical problem for exploitation, some people may actually have cached foods in the collection areas and then moved their families from cache to cache as needed throughout the winter season. This constitutes yet another variation on the serial-forager theme. But while it may actually reflect the situation in southeastern New Mexico, it also has the strong potential for confusing the interpretation of archaeological remains.

Data Recovery Questions

The investigations were directed towards answering basic questions about settlement and subsistence behavior in the north end of the Trans-Pecos culture area. The main thrust was documenting and validating part of the culture sequence formulated and outlined by Katz and Katz (1985a), expressed as follows.

All three sites have prehistoric components. Judging by surface manifestations, some are Archaic and others Late Prehistoric in age. Feature types tentatively identified included hearths, baking features, burned-rock mounds, burned-rock scatters, and artifact scatters. The data recovery project described here dealt with about 30 of these features. Part of the effort focused on finding and excavating any pits or other features currently masked by the extensive burned-rock concentrations. Every effort was made to recover or record information pertinent to the following issues.

1. Evaluate (verify or modify) our perception of the cultural content of the McMillan, Brantley, Globe, and Oriental phases, and where possible, augment the criteria by which the phases can be distinguished. These phases span the Late Archaic through the Late Prehistoric periods in the Brantley sequence (Katz and Katz 1985a).

2. Evaluate (substantiate, refute, or modify) the subsistence trend outlined by Katz and Katz (1985a) for the Brantley area. Katz and Katz believe that a major subsistence shift took place during the prehistoric sequence. Riverine resources such as mussels were important foods during the Avalon, McMillan, and Brantley phases (Middle Archaic through Terminal Archaic), and nonriverine resources were largely supplemental. But starting in the Brantley phase and continuing throughout the Globe, Oriental, and Phenix phases (the entire Late Prehistoric period), upland resources became more important and riverine resources less important. While this is better conceived as a change in emphasis, rather than a sharp change from one set of resources to another, it led to a markedly reduced human presence along the Pecos River.

3. Determine whether the inhabitants of the Guadalupe-Brantley region farmed and, if so, determine to what degree cultigens figured in the diet relative to wild foods. Given their proximity to horticultural peoples of the Southwest, it might seem that prehistoric peoples in the Guadalupe-Brantley region did not farm. But before this impression can be confirmed, we must use modern techniques to investigate the matter. If they did not farm, we then need to determine whether the reasons are cultural, demographic, climatic, or some combination of these. Could it be that the introduction/perfection of a new food processing technology (succulent baking) precluded the need for or usefulness of the adoption of farming, as has been suggested?

To investigate these ideas, the following questions are advanced.

1. What types of features and artifact assemblages are present at the project sites? What types of tools and manufacture debris are present? What are the relative abundances of the various types? On the basis of the features and artifacts, what types of activities were performed at the sites? How do these assemblages compare with those from other sites in the region?

The types of artifacts at a site help define the kinds of activities that took place at each specific location (component) within the site. Manos and metates imply grinding plant foods, projectile points imply hunting, and scrapers imply hide dressing (as may manos [Adams 1988]). Multipurpose tools such as hammerstones, awls, and drills, and manufacture debris such as chipped stone debris, shell fragments, and some types of fragmentary artifacts imply a host of generalized activities involving the manufacture or maintenance of items associated with day-to-day living. A wide range of artifact and debris types imply a base camp/habitation situation, and fewer artifact and debris types imply special-activity sites. The percentages of each category provide a *very rough* index to the relative frequency of occurrence of each activity at the site.

Caution is required in interpreting the data in this manner because of the effects of tool use-life on artifact assemblage composition (Schlanger 1990), because this line of interpretation makes several assumptions about the data and the activities they represent, and because the technique greatly simplifies a number of complex variables and conditions.

With these details worked out, we could then compare the project sites with other sites in the Guadalupe-Brantley region. Sites to be used in this comparison include cave, shelter, and open sites investigated by Katz and Katz (1985a) and Southern Methodist University (Henderson 1976; Gallagher and Bearden 1980; Roney 1995; Applegarth 1976).

2. What plants and animals were being processed or consumed at the project sites? What biotic communities were being exploited? Were the inhabitants of the sites exploiting all available biotic communities or only selected ones? Were cultigens being grown and/or consumed? What season or seasons were the sites occupied?

Plant and animal remains recovered at archaeological sites provide first-line evidence for reconstructing various aspects of the human food quest. Animal bones and the pollen and charred remnants of plants were studied to identify the species present and the biotic zones exploited, characterize the diet and food-preparation techniques, and provide insights into the effects of taphonomic processes on the archaeological record. Floral and faunal data also have the potential of providing data on the season of the year that they were collected or hunted.

Although only certain plant and animal remains provide seasonal data, they are very useful in helping define the time of the year the sites were occupied. Since it is unlikely that the data from the project sites constitute a total view of the diet throughout the year or through time, it will be necessary to compare these results with those of other projects in the region to gain a better understanding of the total subsistence system.

It was imperative that we establish whether or not domestic plants were grown in the Guadalupe-Brantley region. Leslie's (1979) assessment of the structural sites in the vicinity of Hobbs in far southeastern New Mexico, though without benefit of flotation and pollen recovery techniques, suggests that corn was not being grown east of the Pecos River within New Mexico. The WIPP Project (Lord and Reynolds 1985), located between Leslie's sites and the Pecos River, excavated three nonstructural sites but failed to find evidence of cultigens in flotation and pollen samples. On the other hand, corn was clearly being grown further north within the Pecos Valley at Roswell (Kelley 1984: Appendix 6; Rocek and Speth 1986; Wiseman 1985) and probably near Fort Sumner as well (Jelinek 1967). Relatively large numbers of domestic remains indicate that the people were farmers. Small amounts of cultigens indicate hunter-gatherers who engaged in some gardening or obtained the cultigens by trading with, or raiding, farmers.

3. What exotic materials or items at the sites indicate exchange or mobility? If present, what do such materials tell us about the directions and cultures potentially involved?

Materials and artifacts not naturally available in a region indicate exchange relationships with other people or a mobility pattern that permits a group to acquire these items during their yearly round. Judging which situation is applicable to the project sites required comparison with data from the Roswell region. We planned to determine if the site occupants acquired the goods through trade or by direct access to gain perspective on the territory they used and therefore on the identity of the people themselves.

The absence of exotic materials is another matter entirely. In small sites and sites of short occupation, the absence of exotics can be misleading simply because such items may not have had time to find their way into the archaeological record. Or, conversely, the site occupants may not have acquired exotic materials. Either way, we may never know at any specific site. This is precisely where comparisons with other assemblages in the region and the long-term accumulation of excavation data from numerous sites and projects, both large and small and of all types, is necessary for acquiring perspective and, eventually, resolving the problem.

4. What are the dates of occupation at the project sites?

Since it is likely that all three sites were occupied on two or more occasions during the prehistoric period, dating individual features and components was crucial. At the individual feature level, we needed to determine which are contemporaneous (or approximately so) and which were not. Defining and dating features and groups of features would permit documentation of site and region use through time and allow us to determine whether or not these uses changed through time, and if they did, the directions, intensity, and reasons for those changes. Dating information also permitted us to relate our components to the Brantley sequence and thereby evaluate that chronology, the phase sequence, and postulated cultural changes for the Guadalupe-Brantley region.

The dating situation is critical in southeastern New Mexico, where dendrochronology, the most accurate and preferred dating technique, works poorly or not at all (W. Robinson, pers. comm., 1975). Few absolute dates derived by other techniques are currently available (Sebastian and Larralde 1989). Recent advances in radiocarbon dating make it the most viable technique for southeastern New Mexico. Thermoluminescence and obsidian hydration techniques have been tried in the region, but because they are fraught with problems and are not generally reliable, they will not be used in this study.

During excavation, we planned to recover charcoal from as many features and cultural situations as possible. Because of the importance of dating the project sites, we planned to submit very small samples (for accelerator mass spectrometry analysis) and bulk samples (carbon-stained sands) for dating if necessary.

5. Are the prehistoric components of the project sites base camps/habitation sites, special-activity sites, or some combination of the two?

Are structures, storage pits, other types of pits, and thermal features (hearths, cooking pits, etc.) present? It is virtually guaranteed that all three sites were occupied more than once during the prehistoric period. Assuming so, we needed to discover not only what kinds of features are present, but also which ones were contemporaneous and which were not. Were the activities or site function during each component the same or different?

Before the excavation phases of the project, we had few observational data and facts by which to judge the answers to these questions. The minimal data available suggested that two or more components were present at all sites and probably represented two or more phases in the Katz and Katz sequence. The validity of this expectation required confirmation. To do this, we needed to discover, isolate, and study features and artifacts belonging to separate occupations (components).

Once individual components were defined, we could document the activities that took place at each. The cultural features (storage pits, other types of pits, hearths, baking pits, etc.), associated artifactual materials, and the patterning of these remains were critical in defining site types through an analysis of the activities represented. Important subsidiary studies that assisted in determining site type, as well as overall subsistence patterns, included floral, faunal, and artifactual data.

Artifact Terminology

The following descriptions and discussions have three fundamental, interrelated tenets or presumptions. First, during the planning and production of a tool or artifact, the individual had one of two general ideas in mind: a specific tool for a specific function, or a more generalized tool for multiple functions. These considerations are manifested in tool shapes and other characteristics. This is not to say that, once available, special-use tools did not serve more than one function. Most probably did. However, it was the *anticipated* function that led to the design and labor investment in the finished product.

An example of a common special tool is the projectile point. For reasons of aerodynamics and anticipated mode of use, their characteristics (size, shape, weight, and hafting) had to meet certain specifications. They were hafted onto arrows or atlatl darts and used to kill animals or human enemies. This did not necessarily preclude the occasional use of a hafted point for limited cutting or scraping chores as long as those tasks did not present serious risk of breaking the projectile point. People generally do not risk breaking or damaging tools that represent an investment of time and labor in their production.

Secondary use after the projectile point was broken is another matter. Broken points might, for example, have been used for impromptu cutting or scraping in the same way that many flakes became informal tools when they were picked up, used for scraping or cutting, and discarded. Importantly, such uses may or may not be distinguishable from secondary-use characteristics engendered while the artifact was hafted and still constituted a viable projectile point tip.

General-purpose tools were made with the intention of serving two or more functions. Two examples of such tools are the awl and the hammerstone. The awl might be used for hide-working and basket-weaving. Hammerstones could be used to manufacture chipped stone and ground stone artifacts and also to renew or resharpen the grinding surfaces of manos and metates.

The second tenet is that, having identified tools and artifacts according to the principles just discussed, their descriptions are ordered in a fashion that facilitates discussions of activity types, site function, and settlement and subsistence practices. Thus, we use groupings such as "plant processing–related artifacts." This approach, taking its inspiration from Kelley (1984), provides the reader with an idea about artifact diversity and activity range at a glance.

The third tenet concerns many categories of bifaces and other artifacts that I believe represent stages of manufacture, rather than finished tools. For reasons that are not always clear to the modern investigator, the items broke, were discarded, or were lost, or otherwise became part of the archaeological record before being completed. Thus, they are part of the debris created during manufacture and are described as "manufacture debris" along with the descriptions of lithic knapping debitage (flakes, cores, etc.).

All collections, records, and photographs were submitted to the Museum of New Mexico's Archaeological Research Collection for curation and storage. No human remains were recovered during this project.

Field Procedures

Grids, based on 1 by 1 m squares, were established at each site (and for the east and west sides of the highway at LA 38264) for counting surficial burned rocks, collecting surface artifacts, and controlling excavations. The grids were oriented according to magnetic north.

Counts of surficial burned rocks and possible burned rocks and collection of artifacts were conducted simultaneously. The basic provenience unit for these activities was the 2 by 2 m square. These counts were used to make artifact and burned-rock density maps for each site, revealing site structure and helping us make excavation decisions.

Recent OAS excavations in southeastern New Mexico are proving the efficacy of broad-scale excavations in sites of the region. Prior to the early 1990s, excavation in the region all too often consisted of digging a number of small units (mainly 1 by 1 and 2 by 2 m squares) and backhoe trenches scattered throughout the project areas. Since these excavations rarely encompassed more than 5 percent of the areas within the projects, they never amounted to more than testing by standards employed elsewhere in the world. Not surprisingly, these excavation methods resulted in information of minimal value, precluded assessments of associations among artifacts and features, and did not give archaeologists a reasonable view of site content or structure.

Accordingly, work at the current project sites focused on opening up large, contiguous areas of hundreds of square meters. In the eastern sector of LA 38264, it would have been preferable to double or even triple the excavated area, making a total excavated area of 1,500 to 2,000 sq m. However, we had to settle for 783 sq m of excavated space in this rather large site.

Broad-scale excavations like those conducted here can be done quickly and efficiently. The work has two facets. First, the crew members function as a team. One or two workers dig, one or two haul buckets of fill to the screeners, others screen the fill, and others bag artifacts and maintain the field record. Team members can be rotated among these tasks.

Although the screens were set up as far as 40–50 m from the starting points of the excavations, excavation generally progressed towards the screens, making the bucket haul a shorter and shorter trip. Most importantly, we never had to move backdirt or contend with excavating a site surface obscured by sediment that we had moved in the first place.

Second, since most sites in southeastern New Mexico are characterized by shallow deposits of sediment, with nodes of features, artifacts, and burned rocks spaced across fairly large areas, the spaces between nodes can be rapidly excavated by shovel-scraping in 1 m squares. Artifacts are bagged by square. Features encountered during the stripping, whether seen from the surface beforehand or discovered during stripping, can be skirted and returned to later or be excavated in detail by a second team. In this manner, my team of five people routinely excavated 40 sq m in 5.5 hours in site sediments ranging from 5 to 20 cm deep. In this way, the excavated area grows rapidly.

At LA 8053 and LA 38264 we contended with occasional small, mesquite-stabilized dunes that reached up to 1 m above the surrounding level surface. Rather than lose valuable time by entirely removing these dunes, we closely cropped the main mass of each dune to reduce the amount of space left unexcavated. The time thus saved was used to open more squares in the shallow areas, thereby vastly increasing the amount of exposed site area. Since the sites continued underneath the dunes, the few artifacts pulled upward into the dunes by root and animal activity were of little value, and those sediments were not screened.

All fill was screened through 1/8-inch hardware cloth. This finer mesh was used because the Southwestern standard, 1/4-inch mesh, is too large to catch many of the smaller biface-thinning and notching flakes required for monitoring the presence or absence of exotic lithic materials (Carmichael and Franklin 1999).

Site maps, including contour intervals, were made by John Schuster of the Agency for Conservation Archaeology, Eastern New Mexico University, using a total station. Individual maps of each feature were made by project staff with a tape and the triangulation method from the nearest grid points.

5. Honea's Site (LA 8053)

Four components of LA 8053 were investigated, two prehistoric and two historic. The prehistoric components are discussed here. The two historic components (a homestead and a conglomerate quarry), were reported in Wiseman (2001a). Other prehistoric components, including thermal features and artifacts, lie outside of the project zone and were not investigated.

The site is north of the South Seven Rivers drainage and west of the US 285 right-of-way (Fig. 1 and Appendix 10), on top of the first terrace and on the upper part of its dissected southward-facing slope above the South Seven Rivers channel (Fig. 5.1). A thin mantle of eolian clayey silty sand covers the parts of the site on fairly level ground. The dissected slopes consist of terrace gravel capped in places by the clayey silty sand. The modern vegetation includes spaced creosote bushes, bunchgrass, Christmas cholla, prickly pear, and other plants native to this, the northern end of the Chihuahuan Desert. Mesquite bushes and the sediments they anchor dominate the terrace. The elevation of the site is 3,300 ft (1,006 m) above mean sea level.

The prehistoric component was recorded in the early 1960s by Kenneth Honea of the Laboratory of Anthropology, Museum of New Mexico, for the Highway Cultural Inventory Project. By today's methods, the site measures 70 m north-south and 80 m east-west. Roughly the southern half of the site fell within the current highway construction project.

The prehistoric features at this site consisted of many burned-rock and nonrock thermal features. Those excavated within the highway construction zone were dated to between 385 BC and AD 1915. The cultural depth of the site varies from the surface to 15 cm.

A single grid was established over the part of the site within the construction project zone. The main datum was placed at the northwest corner of the grid, which lay several meters outside the construction project limits. At the end of the fieldwork, 2 ft sections of rebar were driven below the surface at the main datum (0N/0W) and at 0N/50E and surrounded with concrete collars. They were then covered with a few centimeters of sediment to conceal them.

All surface artifacts and burned-rock fragments within the construction project area, including all five analytical areas within that zone (see below), were inventoried and collected. Density plots were used as a guide for the excavations (Figs. 5.2 and 5.3).

Two blocks of excavated squares, the West Block and the East Block, centered on the observable rock thermal features and the primary surface artifact concentrations defined by the density plots (Figs. 5.4–5.6). The south half of the East Block was excavated because of the occurrence there of surface sherds of Chupadero Black-on-white, the only painted pottery noted on the surface of the site. All features found in that area were discovered through excavation, for no hint of them was observed on the surface.

Because of temporal and feature differences noted during the excavations, the project zone was subdivided during the laboratory phase into five analytical areas: Northwest, Northeast, Southwest, Southeast, and West Periphery (Fig. 5.4). These units formed the basis for some of the analyses and interpretations in this report.

In some cases, the analyses focused on the Northwest, Northeast, and Southeast analytical areas because they were represented by both surface and excavated collections. This was particularly important when considering attributes of very small items; these items were underrepresented in the Southwest and West Periphery Areas because no deposits from these areas were screened.

As expected, the density and distribution of burned rocks and artifacts varied across the site surface (Figs. 5.2 and 5.3). About 600 artifacts were collected from an area of 3,880 sq m, a density of about one surface artifact per 6 sq m. However, two marked concentrations of artifacts and observable thermal features were defined and served as the focal points of the excavations.

All excavated squares were scraped to compact sediments (hardpan). Final depths fell mainly between 5 and 8 cm. A total of 678 1 by 1

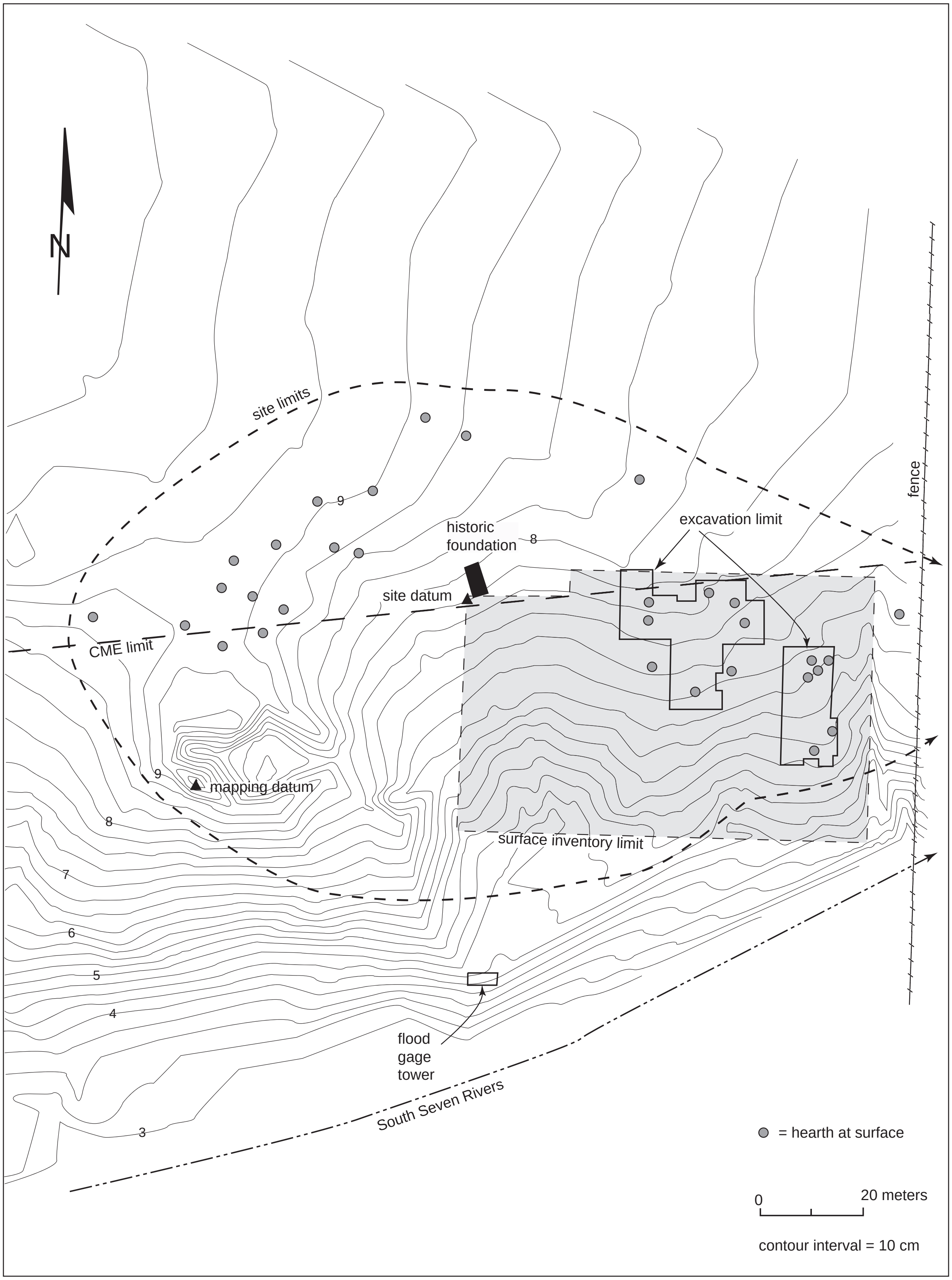


Figure 5.1. LA 8053, showing thermal features and historic components.

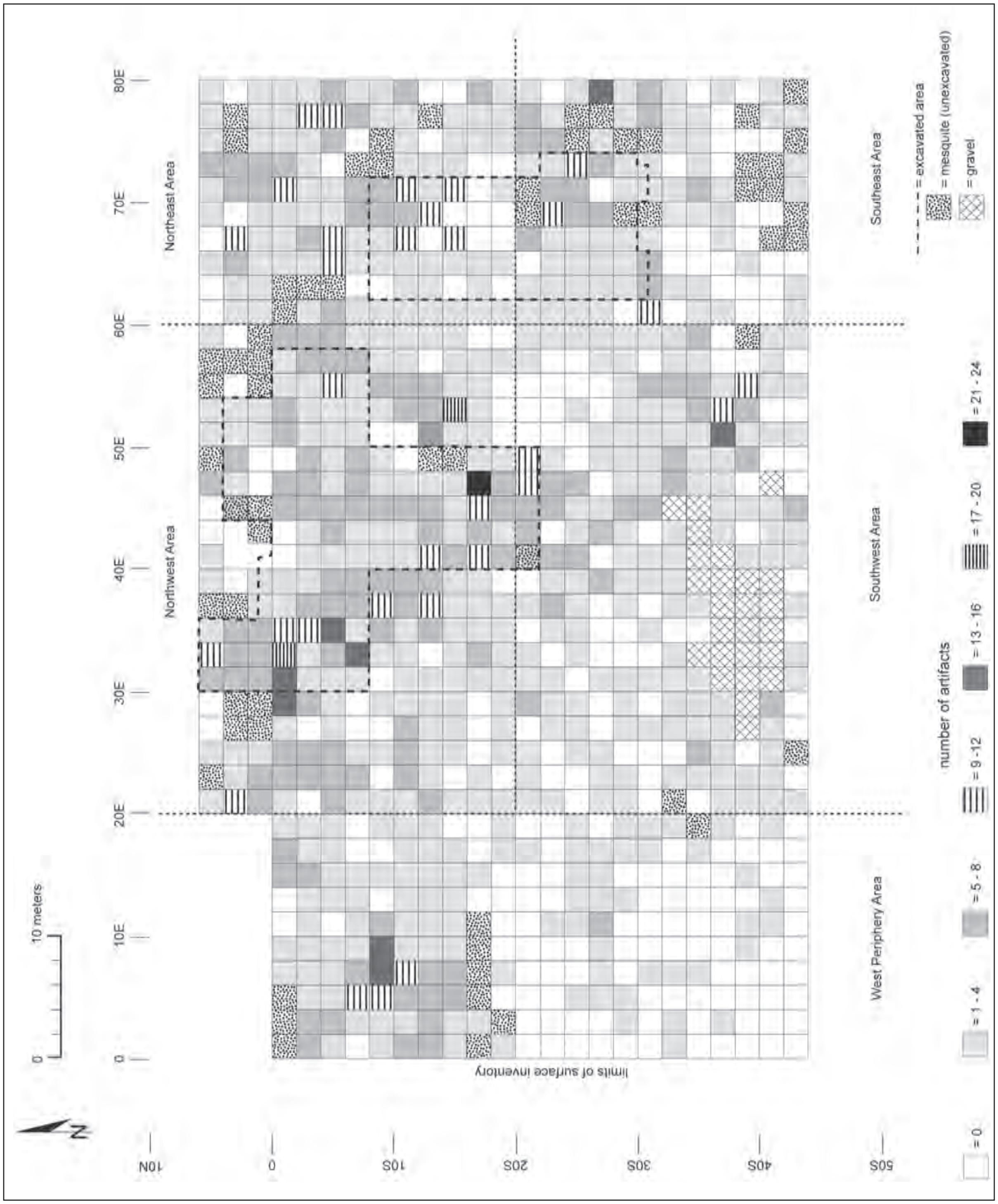


Figure 5.2. Density plot of burned rock, LA 8053.

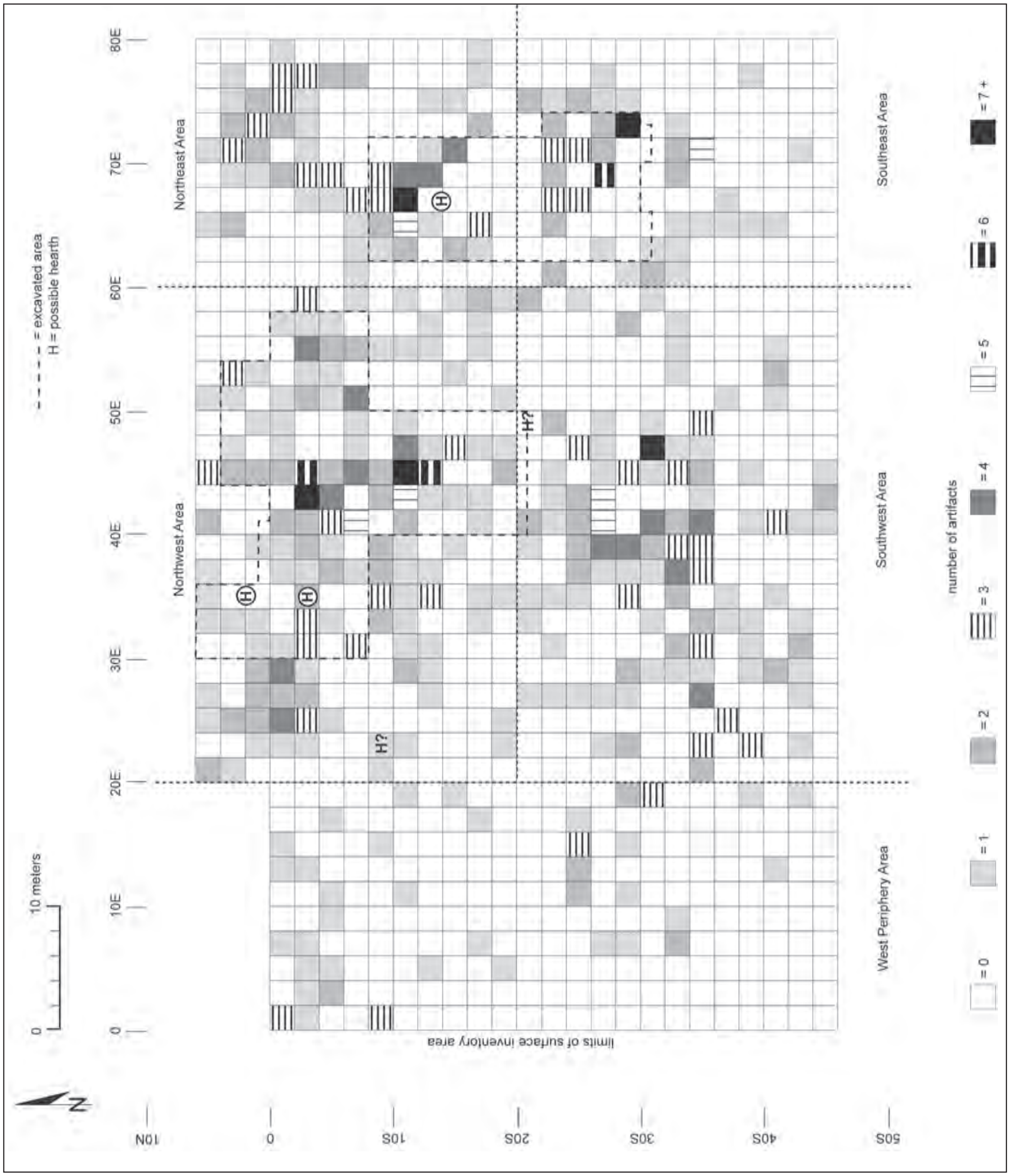


Figure 5.3. Density plot of surface artifacts, LA 8053.

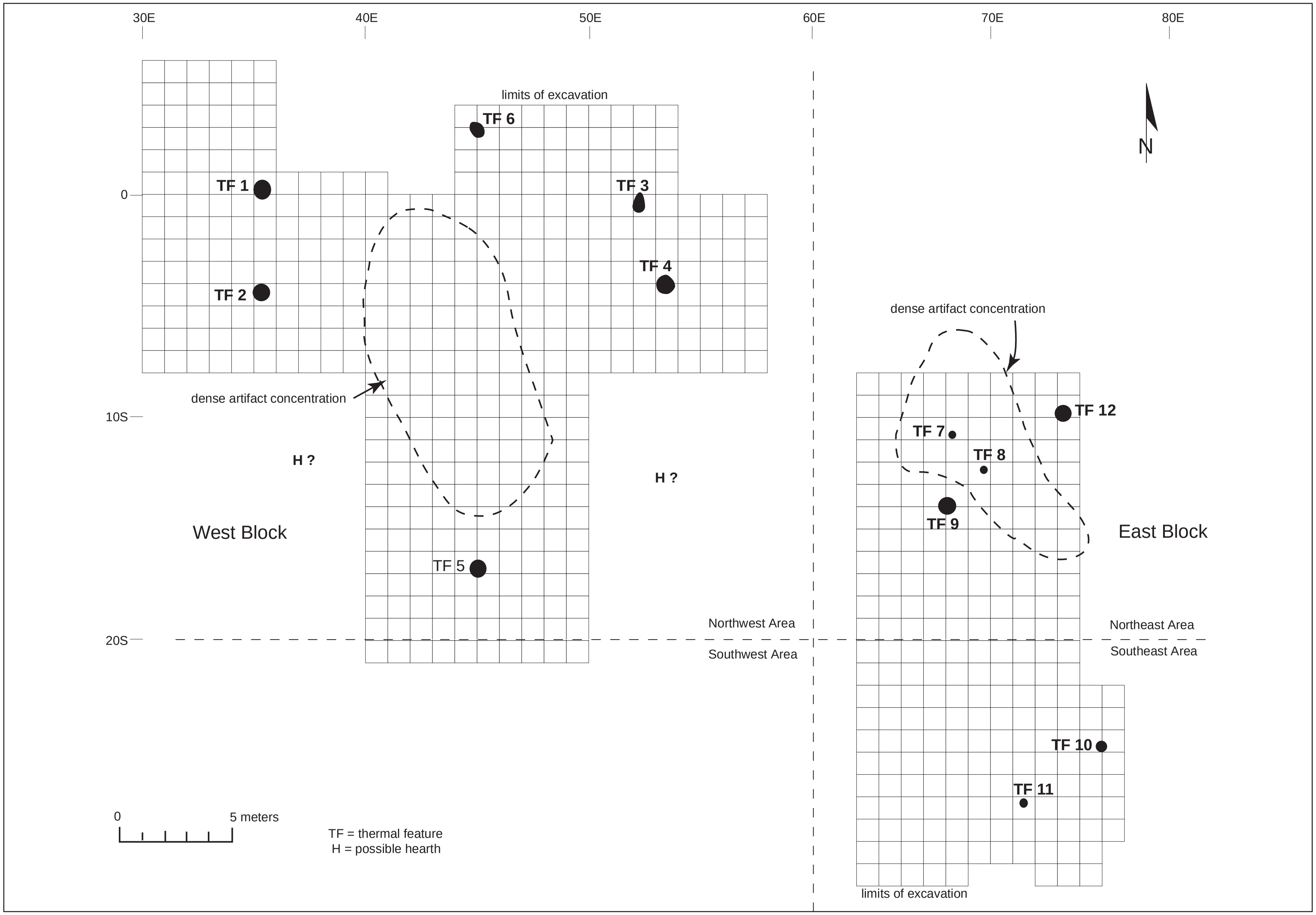


Figure 5.4. Thermal features and the two major chipping debris concentrations, LA 8053.

Figure 5.5. West Block excavations, LA 8053, looking southeast.

Figure 5.6. East Block excavations, LA 8053, looking south.

m squares were excavated, 435 in the West Block and 243 in the East Block.

Thermal Features

Twelve excavated and two unexcavated thermal features were ultimately identified within the construction project zone (Figs. 5.7–5.21). Of these, six excavated and two unexcavated features occurred in or near the West Block excavations, and all occurred within the Northwest Area. Six excavated features occurred in the East Block excavations, four in the Northeast Area and two within the Southeast Area.

It should be noted that prior to excavation, only the rock thermal features (seven in or near the West Block and two in the East Block) were seen on the surface. Nonrock thermal features (one in the West Block and four in the East Block) were brought to light during the excavations. The two rock thermal features near the West Block could not be excavated in the time available. No thermal features denoted by surface indications were observed in the Southwest or West Periphery Areas of the site.

The excavated thermal features (TF) are of two types: rock and nonrock (Table 5.1). All of the rock thermal features (TFs 1, 2, 3, 4, 5, 9, 12) were originally about 1 m in diameter, but taphonomic factors had disturbed them to varying degrees by the time of this project. The worst disturbed, TF 5, was 3 m in diameter at the time of our excavation. Each rock thermal feature consisted of a few dozen fragmentary rocks broken by heating. Pits were lacking at most of these features, suggesting that most of them were built on the former ground surface.

In only two places could we see that the ancient and modern ground surfaces did not precisely coincide. At the time of excavation, it was noted that the rocks of TF 1 actually sat on the modern surface. This feature produced an Archaic period date from charcoal flecks clinging to the undersides of and interstices among the rocks. In contrast, the rocks of nearby TF 2 were buried in the ground to the extent that only their top surfaces were exposed to view prior to excavation. The difference in elevation between the tops of the rocks of the two features was only 2 to 3 cm. It's safe to conclude from this evidence that TF 2 predated TF 1. All other rock thermal features in the vicinity (TFs 3, 4, 5, and two unexcavated ones) were exposed on the modern surface to the same extent as TF 2.

Prior to excavation, TF 9 was mostly buried beneath surface sediments in a low spot. Uneven erosion had exposed some of the burned rocks and culturally stained fill on one side of the feature, signaling the presence of the feature. Excavation revealed that the rocks and stained fill lay in a 2 cm deep pit rather than on the original ground surface. The consolidated sediments into which the pit had been dug lay about 8 cm below the modern ground surface. In this particular case, the modern ground surface had been built up around the base of a clump of bunch grass.

The nonrock thermal features (TFs 6, 7, 8, 10, 11) were of two sizes, large and small (see Wiseman 2001b). Only one large example, TF 6, was present at LA 8053. This feature had an irregular oval shape and consisted of fine, moderately dark (stained) sediment that filled a 2 cm deep basin. This fine-grained fill was homogeneous in color and composition and lacked readily observable bits of charcoal and other items.

The small nonrock thermal features were generally the size and shape of a pie pan. They were round to oval, and the bottoms were flattish or sometimes rounded. The average diameter was about 30 cm, and the depth ranged from 3 to 6 cm. Normally, the fine-grained fill was homogeneous in composition and light gray. Readily observable bits of charcoal and other items were usually absent. Occasionally, a few small burned-rock fragments were also present (e.g., TF 10, LA 8053).

All of the thermal features at Honea's site are small and of the shapes and sizes normally believed to have been used as campfires, that is, facilities for roasting small amounts of food for immediate consumption, or providing light and heat.

Recent studies of burned-rock thermal features, including replication experiments by Texas archaeologists, have shown that accumulations of burned-rock features of the size found here could have been used as ground-surface baking facilities (Black et al. 1997). Functions such as providing light and heat are not ruled out by a baking function, but a broader range of functions and activities at such sites is possible.

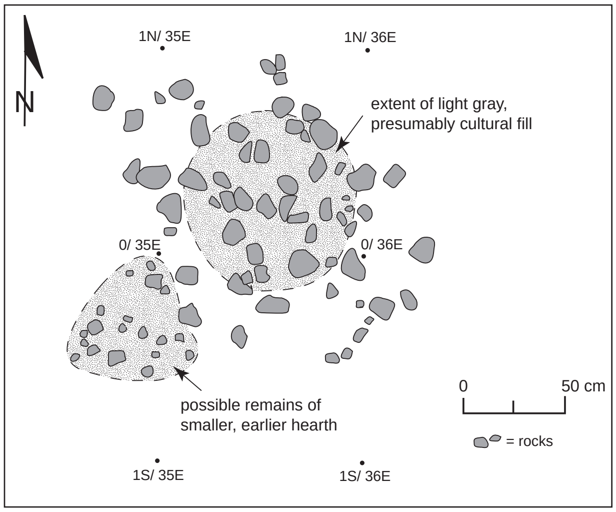


Figure 5.7. TF 1, LA 8053.

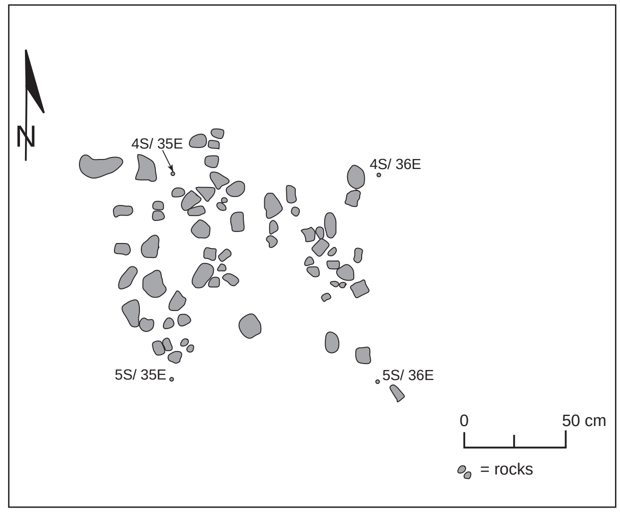


Figure 5.8. TF 2, LA 8053.

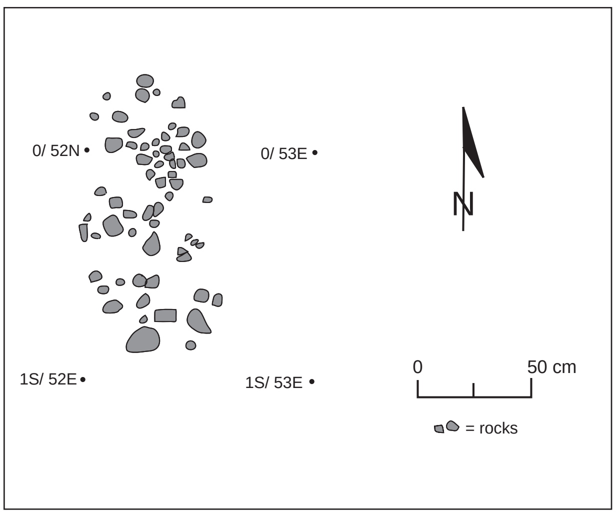


Figure 5.9. TF 3, LA 8053.

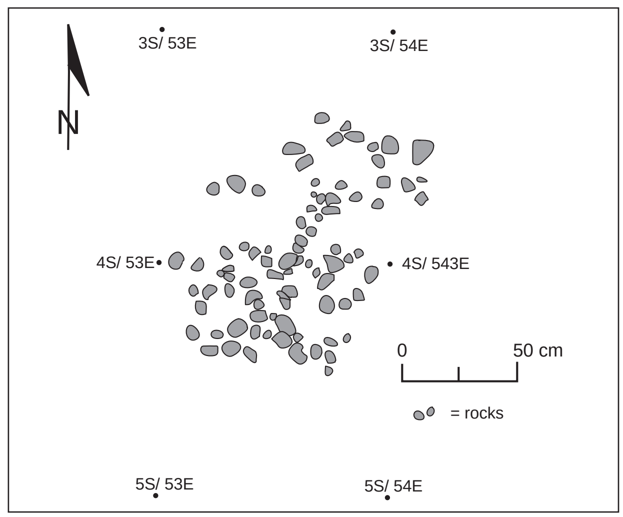


Figure 5.10. TF 4, LA 8053.

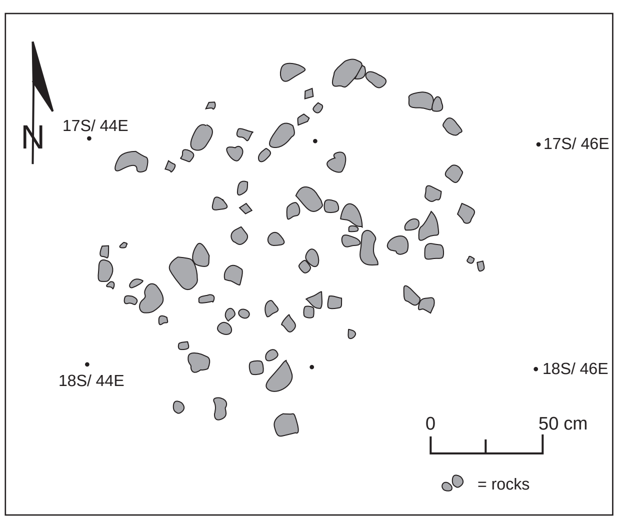


Figure 5.11. TF 5, LA 8053.

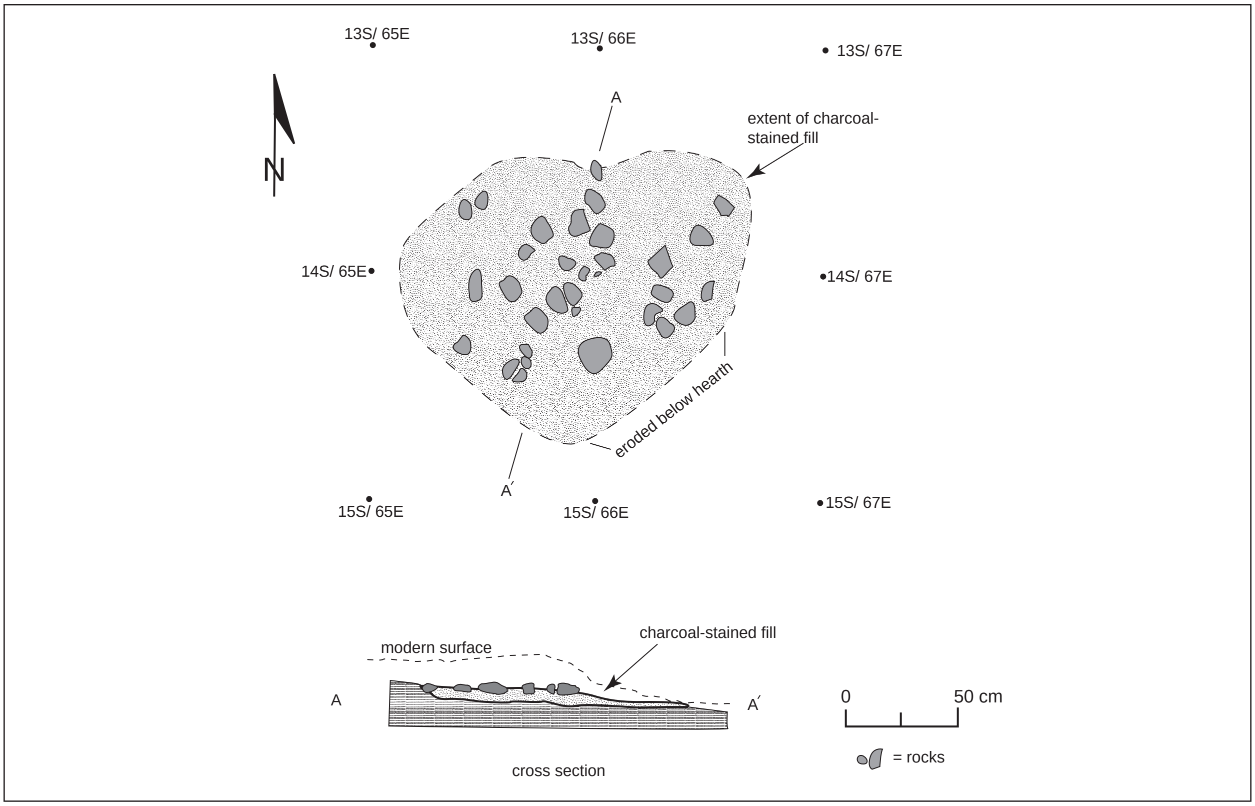


Figure 5.12. TF 9, LA 8053.

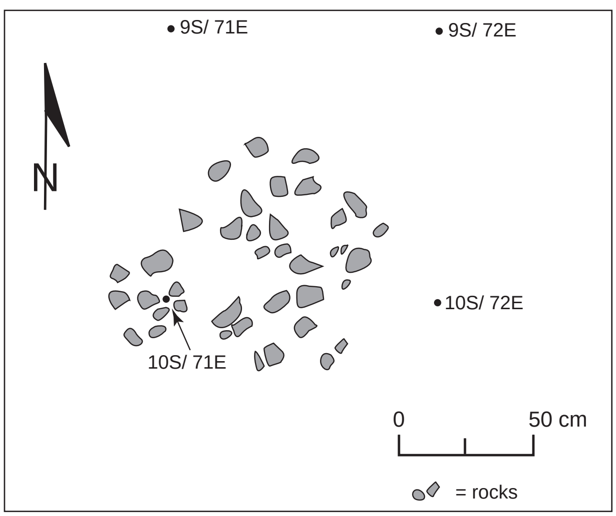


Figure 5.13. TF 12, LA 8053.

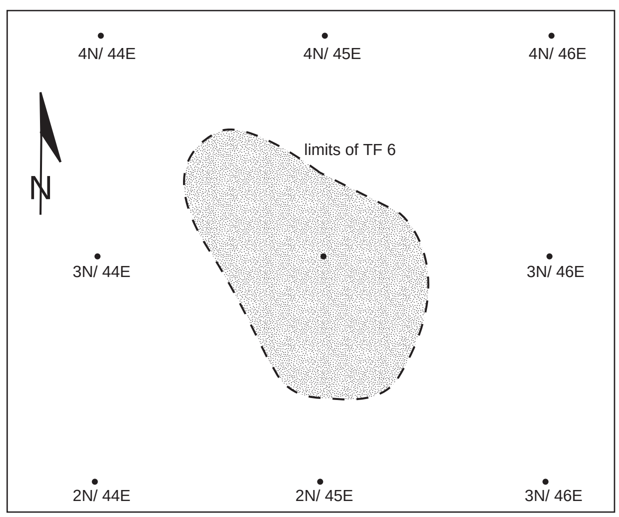


Figure 5.14. TF 6, LA 8053.

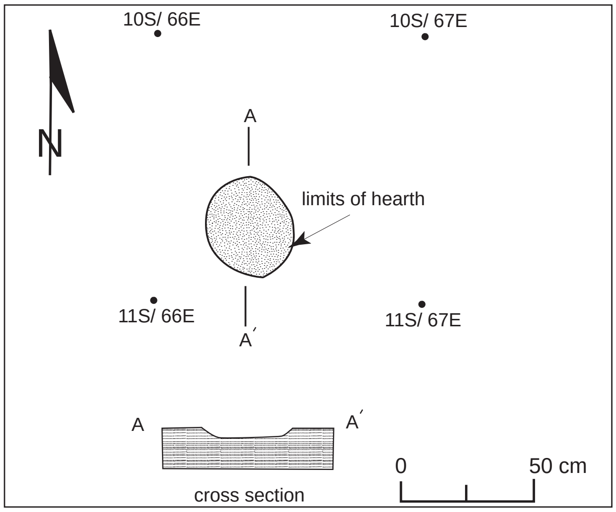


Figure 5.15. TF 7, LA 8053.

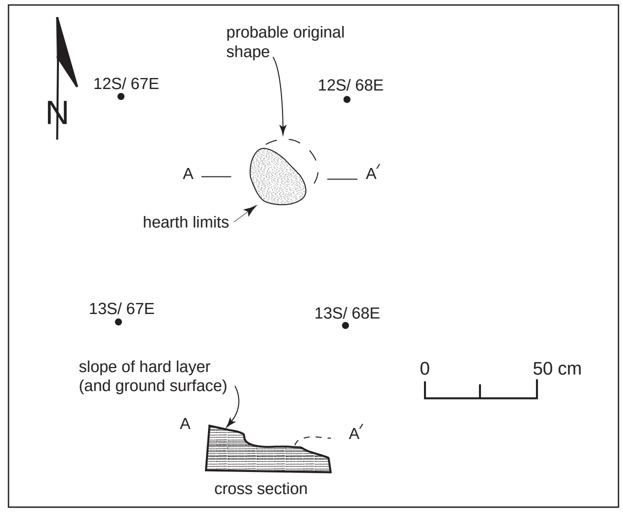


Figure 5.16. TF 8, LA 8053.

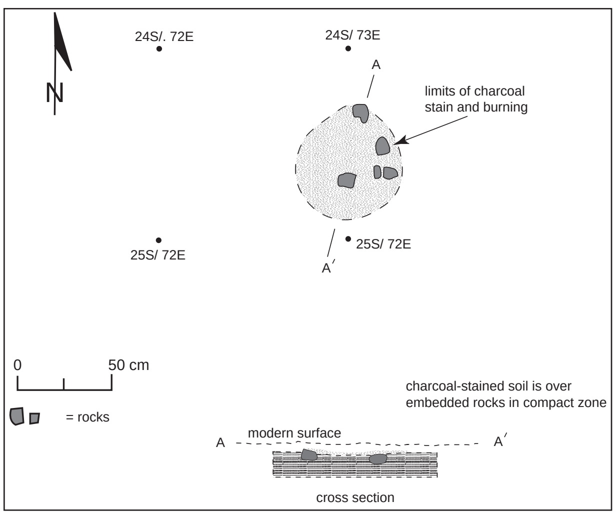


Figure 5.17. TF 10, LA 8053.

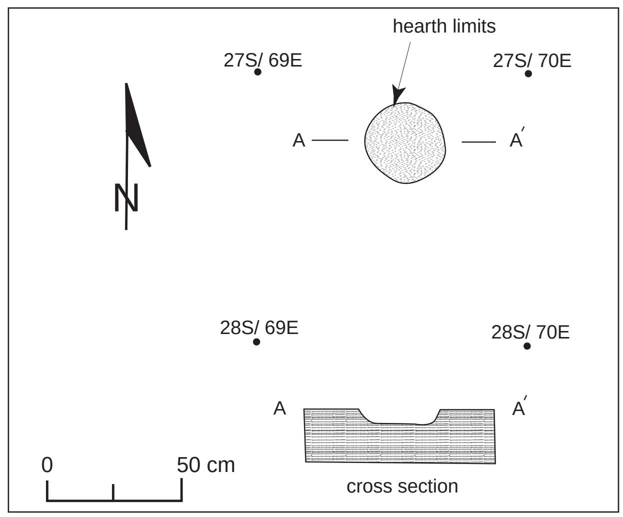


Figure 5.18. TF 11, LA 8053.

Figure 5.19. TF 4, LA 8053, before excavation.

Figure 5.20. TF 4, LA 8053, after excavation.

Figure 5.21. TF 7, LA 8053, after excavation.

Table 5.1. Thermal features, LA 8053

Feature	Size (m)	C-14 Dates and Comments
		Rock Thermal Features
TF 1	1.60 x 1.80 x 0.12	1 date of cal. 355/290/230 BC (Beta-122654)
TF 2	1.20 x 1.25 x 0.10	No charcoal or stain
TF 3	1.25 x 0.65 x 0.10	No charcoal or stain
TF 4	1.15 x 1.15 x 0.12	No charcoal or stain
TF 5	3.25 x 3.50 x 0.12	No charcoal or stain; rocks greatly scattered
TF 9	1.25 x 1.55 x 0.15	Feature intact; few rocks; 1 date of cal. AD 1065, 1075, 1155 (Beta-122658)
TF 12	0.85 x 1.05 x 0.10	No charcoal or stain
		Large Nonrock Thermal Feature
TF 6	1.35 x 0.80 x 0.02	2 dates of cal. AD 1020 (Beta-122655) and AD 1055, 1090, 1150 (Beta-122656)
		Small Nonrock Thermal Features
TF 7	0.37 x 0.30 x 0.04	1 date of cal. AD 1205 (Beta-122657)
TF 8	0.25 x 0.20 x 0.04	Partly intact; not dated
TF 10	0.60 x 0.65 x 0.05	5 small rocks in fill; 1 date of cal. AD 1180 (Beta-122660)
TF 11	0.30 x 0.30 x 0.06	2 dates of cal. AD 885 (Beta-122662) and AD 975 (Beta-122661)

Together, the six excavated and two unexcavated thermal features in the West Block formed a distinct oval in plan, and the primary concentration of lithic debris was within the oval. TF 6 differs from the other seven features in that it lacks rocks and dates 1,000 or more years later than the only other dated feature in the cluster, TF 1 (see discussion of radiocarbon dates elsewhere in this report). These two factors suggest that TF 6 does not belong with the remaining features, and an undiscovered thermal feature completing the oval may underlie the sand sheet immediately north of TF 6. Thus, the oval of features measured at least 20 m north-south and 17 m east-west.

This arrangement of thermal features is very intriguing. If we can assume for the moment that all of the rock features were contemporary, then it may signify a single encampment of seven to eight individuals or small groups that acted in concert. A scenario that could account for the concentration of lithic debris within the oval is that the knappers of the group sat inside the oval with his back to his campfire. Such an arrangement would facilitate discussions of the work at hand, events of the day, planning of future efforts, and the like.

Unfortunately, we have only one date (ca. 300 BC) for the seven rock features, and can only guess if it is accurate and representative of all of them. The arrow point distributional data suggests otherwise, generally agreeing with the nonrock TF 6 date of ca. AD 1050.

The East Block also has an interesting arrangement of the rock thermal features and the primary lithic debitage concentration. Here, the elongate artifact distribution lies between the two features, with TF 9 to the southwest and TF 12 to the northeast. The shape of the lithic concentration with respect to each thermal feature is reminiscent of how people sitting around campfires shift position to stay out of the smoke (Binford 1978).

Artifacts

Lithic debitage dominates the artifacts from LA 8053: 597 came from the surface and 1,745 from the excavations—a total of 2,342. The next most abundant artifact class is pottery: 45 sherds came from the surface and 83 from the excavations, a total of 128. The 17 formal artifacts include metate and mano fragments, dart and arrow points, end scrapers, and a graver tool. Sixteen manufacture roughouts or early-stage bifaces are described under lithic manufacture debris. A Pecos Valley "diamond" is unmodified, but because it was imported to the site from some distance, it, too, is described as an artifact.

Plant Processing–Related Artifacts

Metate (n = 1)

The one metate fragment (FS 365, Fig. 5.22) is part of a highly portable basin metate with a single, well-developed grinding surface. The edges were pecked and ground to an oval shape that closely outlines the grinding surface. The artifact is made of quartz sandstone. It measures 160+ by 93+ by 43+ mm (+ indicates incomplete dimension). The grinding depression is 13+ mm deep. It was recovered from the surface of 26N/22W, well away from the excavation blocks. It was burned subsequent to breakage.

Manos (n = 2)

Two mano fragments each have one well-developed grinding surface and little to no edge-shaping. FS 362 is a one-hand type mano, but FS 359 is too small to be certain of the type (Fig. 5.23). FS 359 is made of vesicular dolomite. It measures 94+ by 64+ by 39+ mm. It was recovered from the surface of highway cut, well away from the excavation blocks. It was burned subsequent to breakage. FS 362 is made of mesocrystalline calcite. It measures 55+ by 82+ by 32+ mm. It was recovered from the surface of 11N/9W, well away from the excavation blocks.

Animal-Related Artifacts

Projectile Points (n = 10, 2 dart points and 8 arrow points; also see Appendix 2)

Dart points. FS 164 (Fig. 5.24a) is a complete Pecos dart point, rectangular stem variety (Katz and Katz 1985a) made from the blade of a broken point of unknown type. Judging by its asymmetrical shape, this point was reworked. It

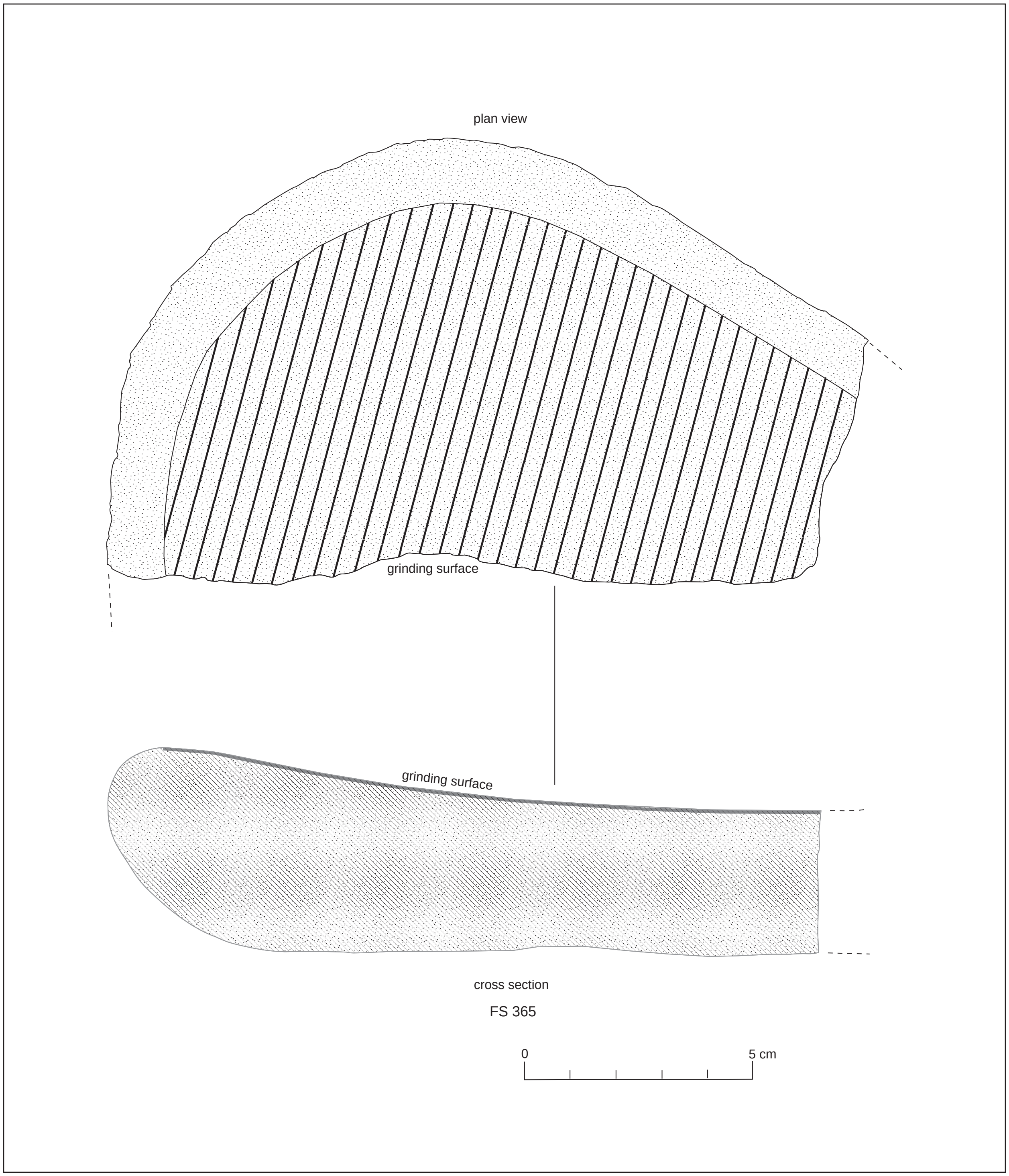


Figure 5.22. Metate fragment, LA 8053.

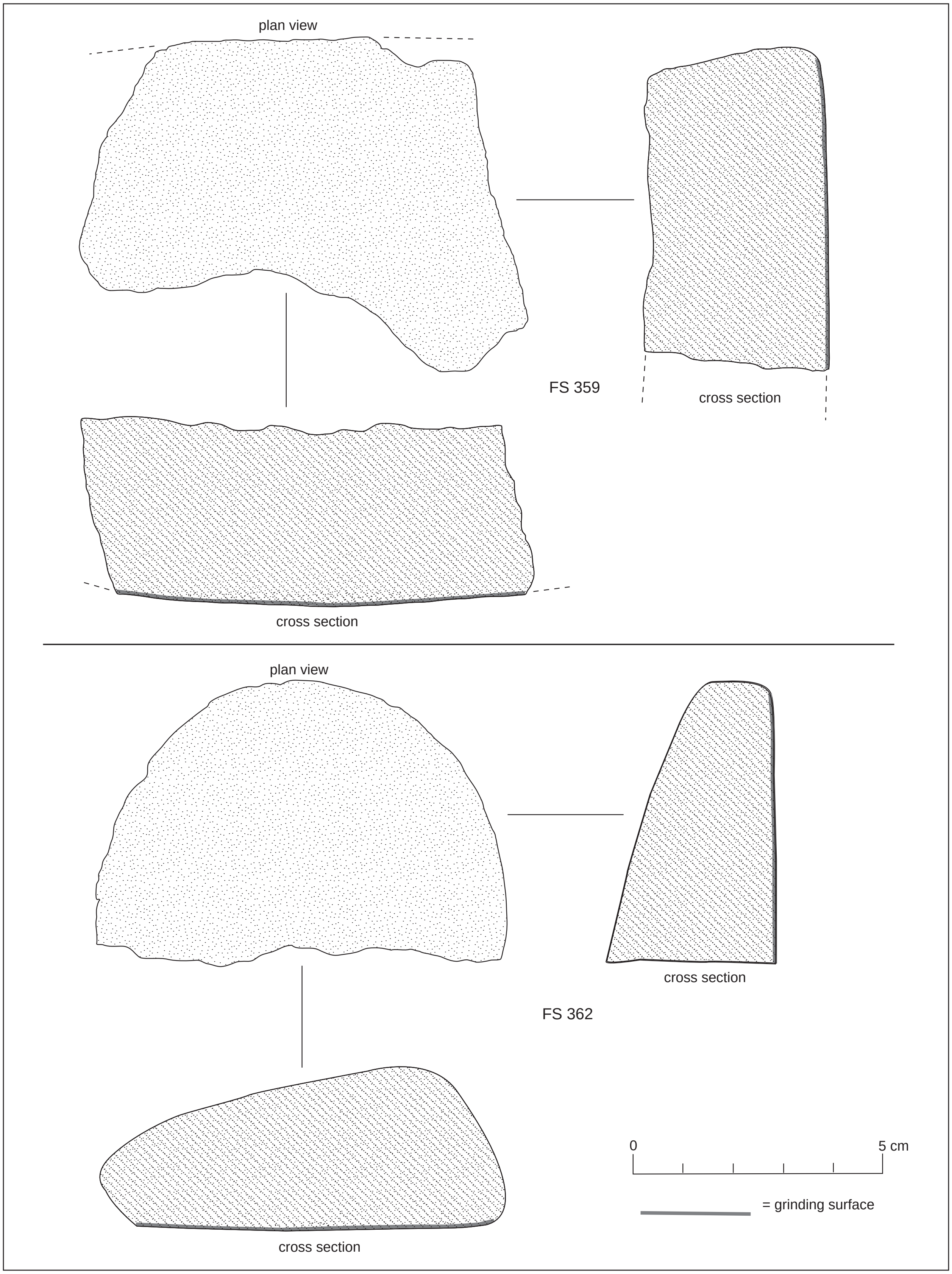


Figure 5.23. Manos, LA 8053.

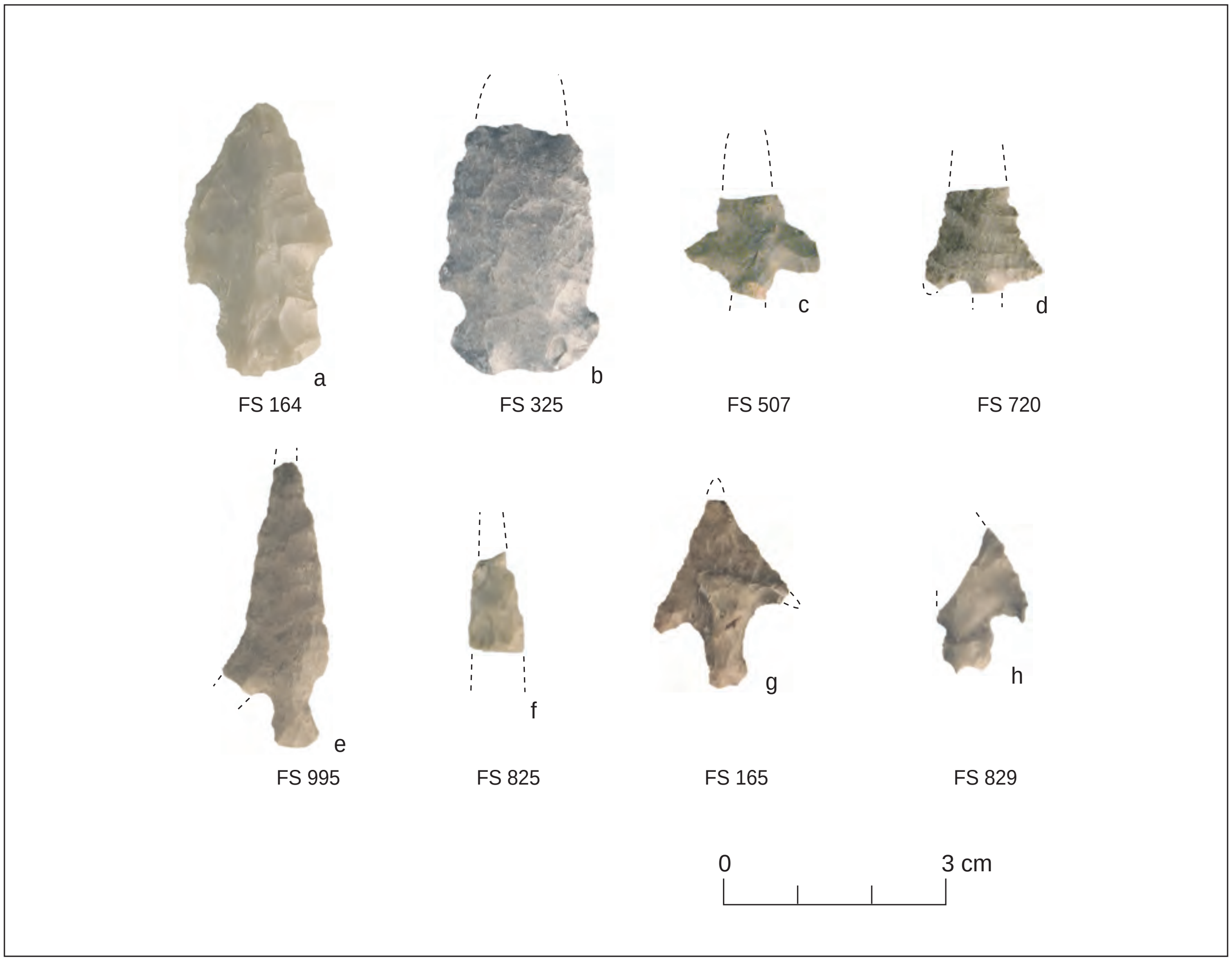


Figure 5.24. Projectile points, LA 8053.

is made of Edwards chert (good visual criteria; fluoresces medium) and comes from the surface of 32S/10E, well away from the excavation blocks. It dates to the Terminal Archaic or the Brantley phase, AD 1 to 750 (Katz and Katz 1985a).

FS 325 (Fig. 5.24b) is a Trinity-like dart point (Turner and Hester 1993) with a broken, reworked tip. In spite of its appearance, the reworked distal edge evidently was not used for scraping because the retouch angle is acute (shallow) and the edge is not worn. It is made of local gray chert and comes from the surface of 2N/32E, about 5 m west of TF 1. It dates to the Late Archaic or the McMillan phase, 1000 BC to AD 1 (Katz and Katz 1985a). Turner and Hester (1993: Fig. 3-7) suggest a Middle to Late Archaic date for Trinity points, with a range of about 2500 to 300 BC.

Arrow points. Broadly speaking, the arrow points can be typed as Livermore-like and Perdiz-like (Figs. 5.24c–5.24h). The Livermore-like points, represented by three blade bases (FS 507, 720, 995); a thick, elongate blade midsection (FS 825); and two tip fragments (FS 623, 791), are reminiscent of a point style documented at the Neff site, near Roswell (Wiseman 1971). All are made from materials believed to be local to the Guadalupe and Delaware Mountains region. In Texas, Livermore points date to about AD 900–1400 (Turner and Hester 1993).

FS 165 (Fig. 5.24g) is stemmed and has a short, triangular blade. Except that the base is not pointed, it is clearly Perdiz-like in overall characteristics. The material is local chert. Turner and Hester (1993) give a date of AD 1200–1500 for the Perdiz.

FS 829 (Fig. 5.24h) appears to have been a stemmed point, but we cannot be certain that the base, as it currently exists, is the original one. The one remaining blade edge is convex. Tentatively, this point could be a Perdiz. The material is local chert.

Both types of points—Livermore and Perdiz—are best known in Texas. Livermore points are found mainly in the Trans-Pecos region of West Texas and the Guadalupe Mountains region of New Mexico. The Perdiz is found throughout most of Texas, although only occasionally in the Panhandle region (Prewitt 1995).

Six of the arrow points (FS 507, 623, 720, 791, 825, 829), including the possible Perdiz, came from excavated sediments in the West Block (Fig. 5.25). Their nearness to specific thermal features raises the question of whether the TF 1 date (ca. 300 BC) truly represents this group of hearths, as suggested earlier. The ca. AD 1050 date of TF 6, not believed to be temporally associated with the oval cluster of hearths, is much closer in agreement with that of the arrow points, especially the Livermore-like specimens.

A nearly complete Livermore-like point, FS 995, was retrieved from the vicinity of TF 11 at the south end of the east excavation block. The Perdiz-like point, FS 165, comes from well south of the west excavation block.

End Scrapers (n = 2)

FS 778 is a thick flake with unifacially flaked distal and lateral edges (Fig. 5.26). The proximal end may be too thick to haft. It is made of limestone and comes from 4N/45E, within the west lithic debris concentration.

FS 1060 (Fig. 5.26) is a thick flake with a unifacially flaked distal end and one lateral edge. The proximal end may be too thick to haft. Cortex covers 40 percent of the dorsal surface, and it appears to be heat-treated. The material is wide-banded, fingerprint chert, and its provenience is 13S/71E, within the east lithic debris concentration.

Miscellaneous Artifacts

Informal Flake Tools (Utilized Flakes) (n = 17)

Seventeen flakes display use-wear or microscopic intentional retouch on an edge. The basic assumptions are that unifacial wear or retouch generally denotes a scraping edge, and bifacial wear or retouch generally denotes a cutting edge. While these simple correlations may not be accurate, they do provide an initial starting point for discussion.

The significance of edge configuration, whether straight, convex, or concave, is uncertain. It may or may not be important, but it was monitored nonetheless.

Intentional retouch was more common than use-wear at LA 8053, unifacial wear/retouch was far more common than bifacial wear/retouch, and straight edges were selected more often than convex or concave edges for use or intentional retouching.

The salient features of the informal flake tools from LA 8053 can be summarized as follows (Table 5.2): (1) The length of use-wear along a given unifacial edge ranges from 5 to 17 mm, for an average of 11 mm. (2) The length of intentional retouch along a given unifacial edge ranges from 6 to 24 mm, an average of 15 mm. (3) The intentional retouch on the one bifacial edge is 18 mm long.

The distribution of informal tools (Fig. 5.27) is very interesting. With three exceptions, none of the tools come from either of the artifact concentrations. The three exceptions come from the east primary refuse area within the East Block. But in each case their proveniences are very near thermal features, where they appear to be associated more closely with the small nonrock thermal features (especially TF 7). However, an association of one tool with a large thermal feature (TF 9) cannot be ruled out.

Graver Tool (n = 1)

A graver point (FS 689; Fig. 5.26) was formed by its use on the distal edge of a thick flake that may have broken during use. The point selected for graver use is on what may be a natural fracture. It is local gray chert and comes from 4S/44E.

Pecos Valley "Diamond" (n = 1)

A single rather large, medium brown, hexagonal, double-pointed, quartz crystal has one natural, sharp, intact point (i.e., unworn), and the other end is broken. This crystal, occurring naturally in gypsum beds in the Roswell/Artesia region (Northrup 1959), several kilometers northeast of Honea's site, would have been brought to

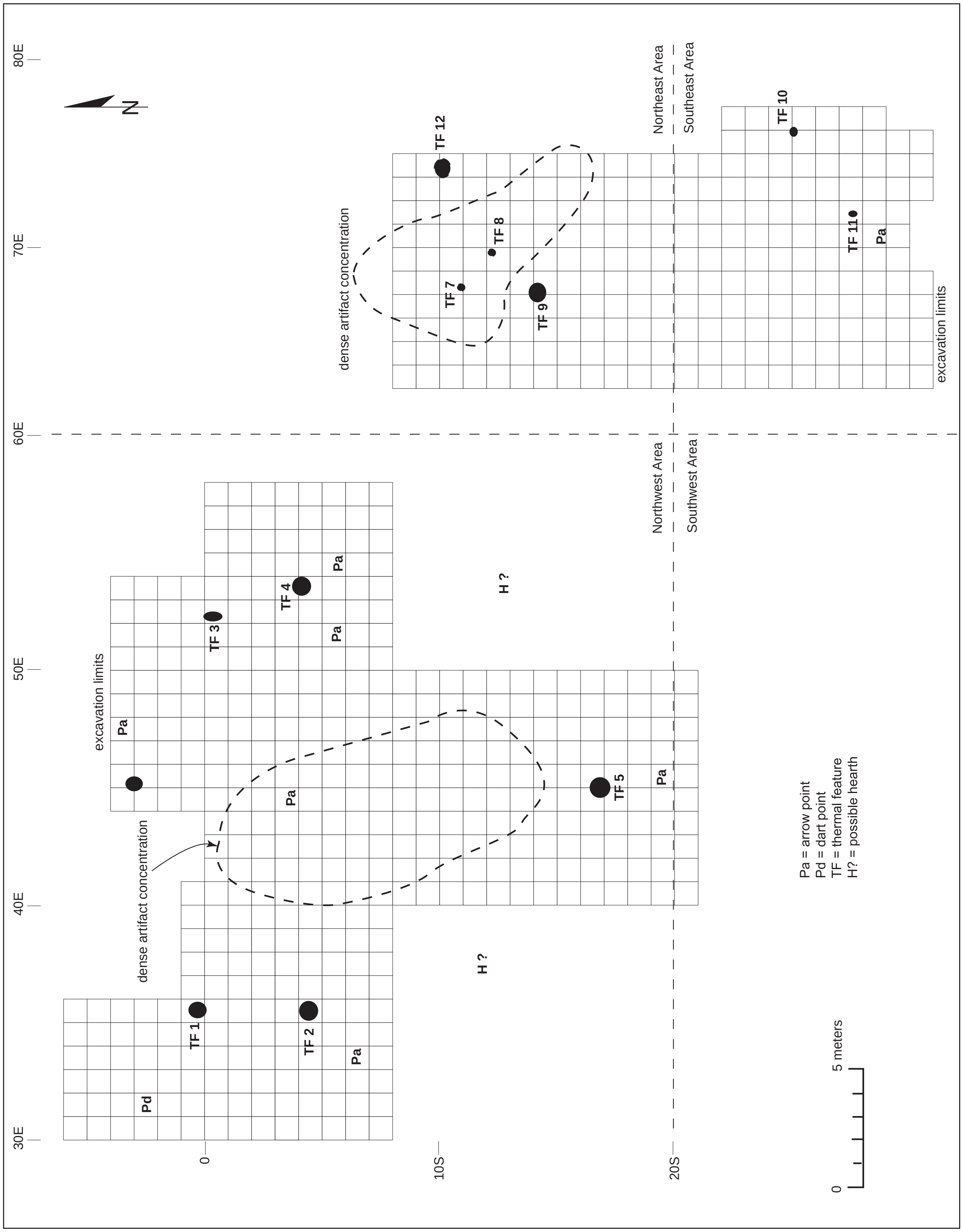


Figure 5.25. Distribution of projectile points, LA 8053.

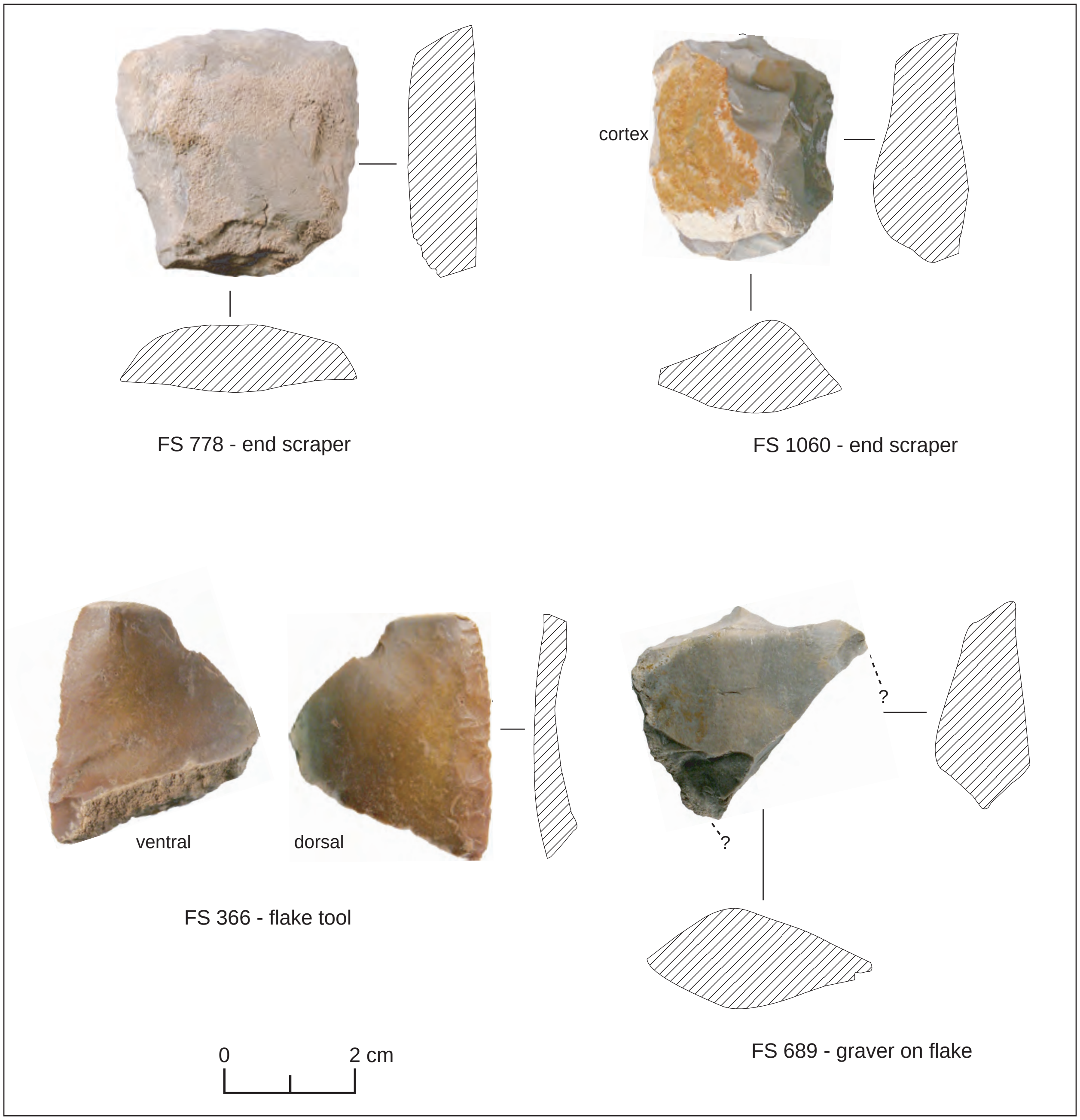


Figure 5.26. Other artifacts, LA 8053.

Table 5.2. Informal flake tools, LA 8053

	Unifacial			Bifacial	Total
	Straight Edge	Convex Edge	Concave Edge	Convex Edge	
Use-wear	4	1	-	-	5
Intentional retouch	6	2	3	1	12
Total	10	3	3	1	17

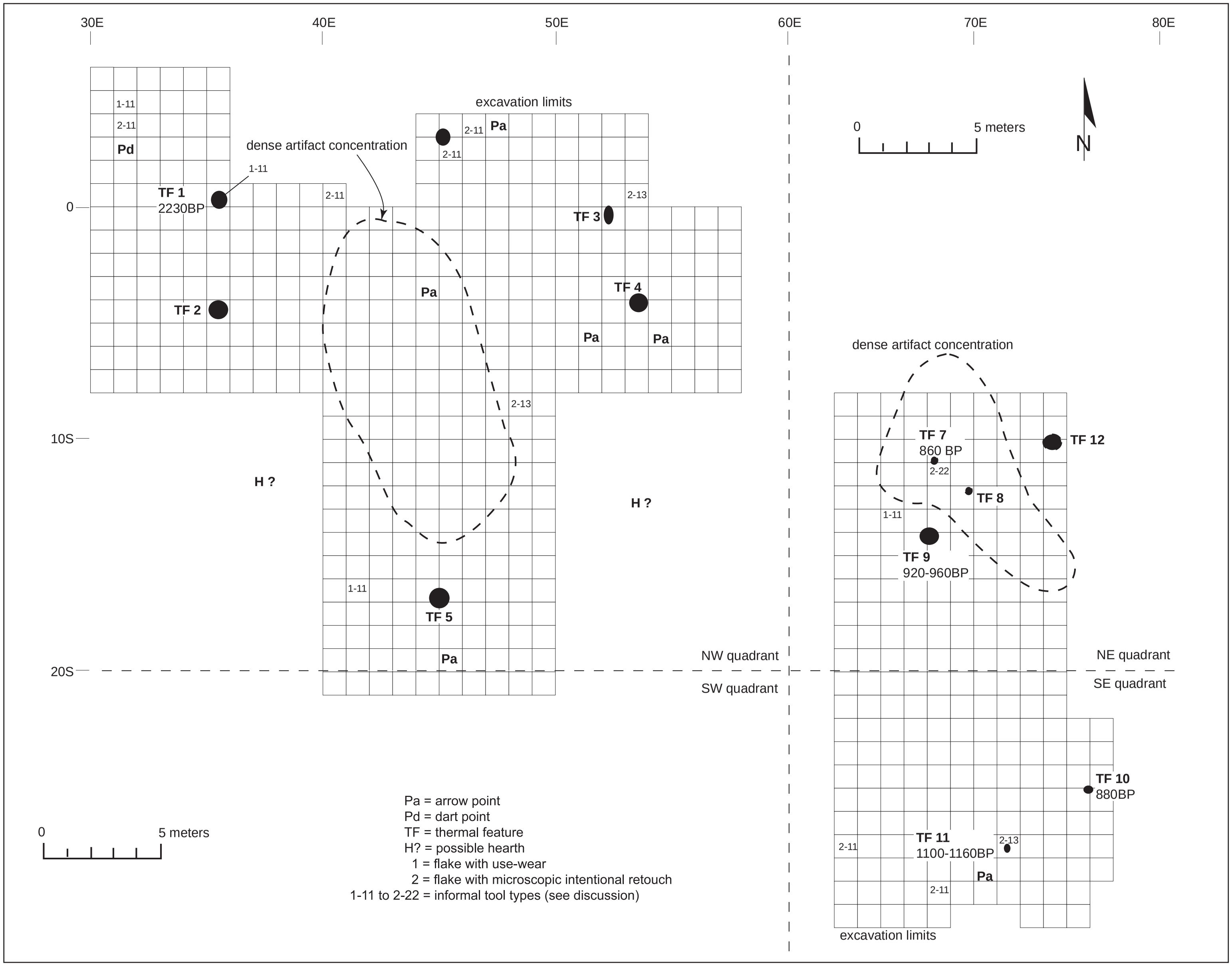


Figure 5.27. Distribution of informal tools (utilized flakes), LA 8053.

Honea's site, perhaps as a curiosity. It comes from the surface of 2S/2E.

Pottery

A total of 128 sherds, representing a minimum of 14 vessels, was recovered from the surface (n = 45) and excavations (n = 83) at Honea's site (Table 5.3; also see Appendix 4). These sherds represent four previously defined types: South Pecos Brown, Jornada Brown, El Paso Brown, and Chupadero Black-on-white. Several miscellaneous categories reflect sherds that are currently unassignable to named types, but all appear to belong to wares made in the Sierra Blanca region, immediately northwest of the Seven Rivers Basin.

The pottery assemblage is dominated by plain brown pottery. South Pecos Brown and Jornada Brown and related variations account for 83 percent of the sherd count and 64 percent of the minimum number of vessels. One interesting variation is the presence of a what appears to be an intentionally smudged interior surface on three of the South Pecos Brown sherds.

The two El Paso Brown sherds are probably from the same vessel and possess what appears to be Capitan monzonite. This particular intrusive igneous material is found in the western Capitan and southern Jicarilla Mountains of the northern Sierra Blanca region (Hill 1996).

Painted types are dominated by Chupadero Black-on-white, but the 17 sherds appear to comprise only two vessels, one bowl and one jar. The primary tempering material in all sherds is crushed potsherd, which suggests that these vessels were made in the Sierra Blanca region, rather than in central New Mexico (Kelley 1979).

A few sherds of a red-slipped brown and/or red-on-terracotta and an indeterminate red-on-terracotta (either Broadline Red-on-terracotta or San Andres Red-on-terracotta; remaining line width of 4+ mm) represent slipped and painted varieties of brown wares made in the Sierra Blanca region.

The majority of the Jornada Brown and South Pecos Brown sherds were recovered from the West Block excavations (Figs. 5.28–5.31). In the East Block excavations, the story is very different—Jornada Brown occurs almost exclusively in the main lithic artifact concentration at the north end, while South Pecos Brown and South Pecos Brown, smudged interior variety sherds occur almost exclusively near TF 10 and TF 11 in the south end.

As discussed in the section on the radiocarbon dates, the Chupadero Black-on-white bowl appears to have been used in conjunction with TF 10.

Chipped Stone Manufacture Debris

Debris from the manufacture of tools and other cultural items constitutes the majority of cultural materials recovered from Honea's site. The roughout and biface categories, considered to be manufacture breakage and rejects, are discussed in this section. Descriptions of lithic material types are in Appendix 1, details of individual items are in Appendix 5, and definitions of terms used for various other debris categories (cores, flakes, etc.) are in Appendix 6.

Table 5.3. Pottery, LA 8053

Type or Category	Sherds	%	MNI	%
Jornada Brown	50	39.1%	3	21.4%
Jornada Brown or South Pecos Brown	2	1.6%	2	14.3%
South Pecos Brown or Jornada Brown	2	1.6%	-	-
South Pecos Brown	48	37.5%	2	14.3%
South Pecos Brown, smudged interior surface	3	2.3%	1	7.1%
El Paso Brown	2	1.6%	1	7.1%
Red-fired brown (intentional)	1	0.8%	1	7.1%
Red-slipped brown or red-on-terracotta	1	0.8%	1	7.1%
Indeterminate red-on-terracotta	2	1.6%	1	7.1%
Chupadero Black-on-white bowl	14	10.9%	1	7.1%
Chupadero Black-on-white jar	3	2.3%	1	7.1%
Total	128	100.0%	14	100.0%

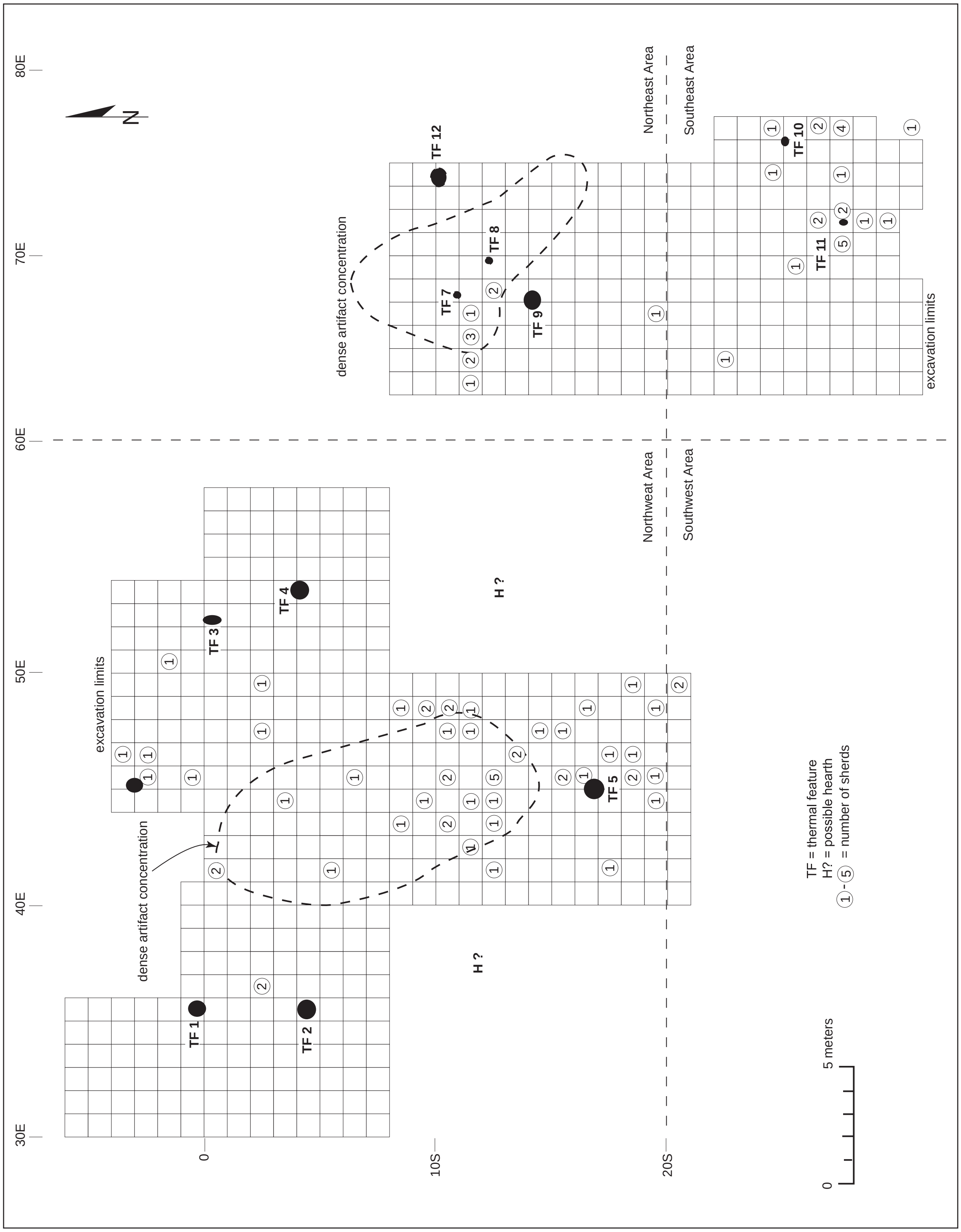


Figure 5.28. Distribution of all pottery sherds, LA 8053.

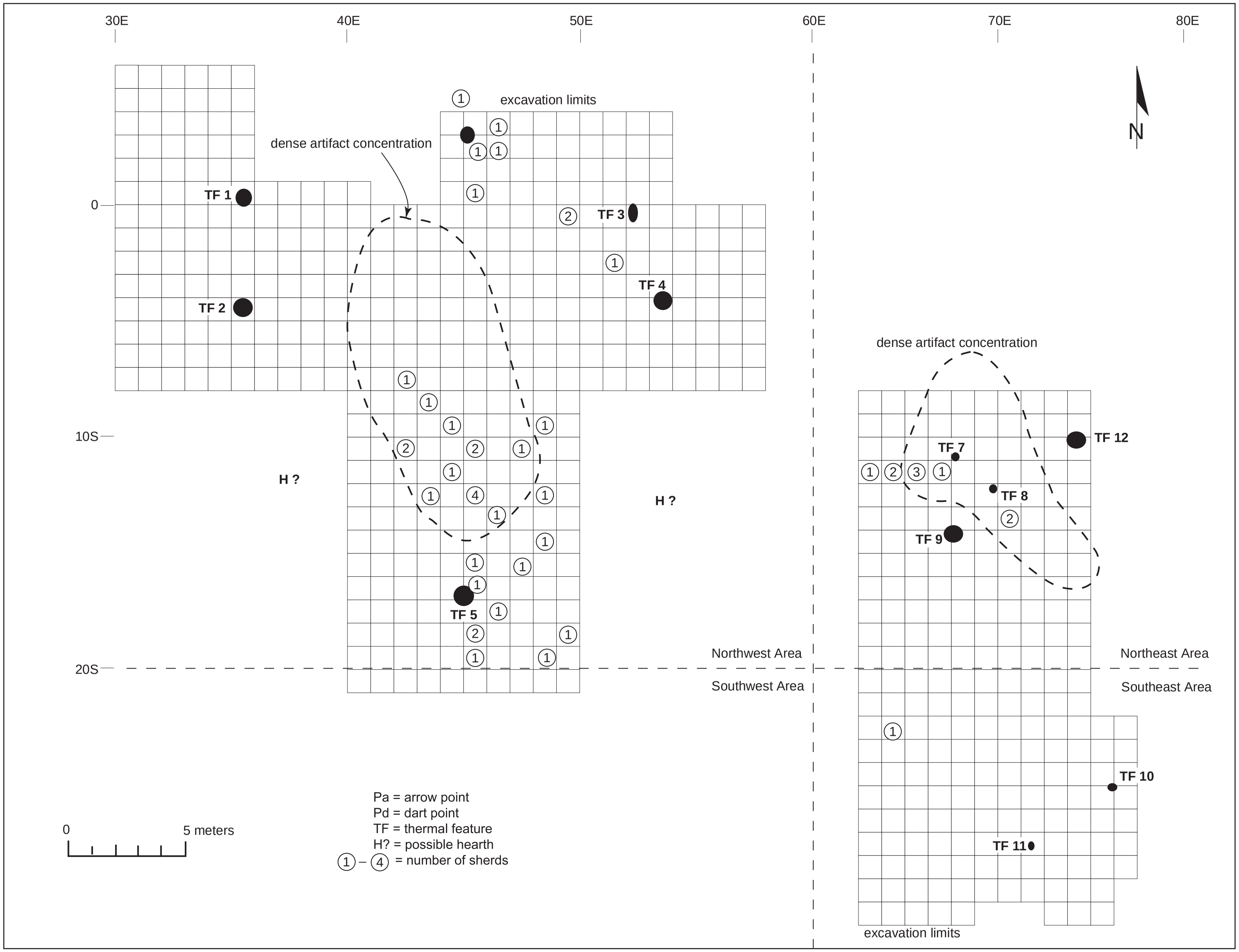


Figure 5.29. Distribution of Jornada Brown sherds, LA 8053.

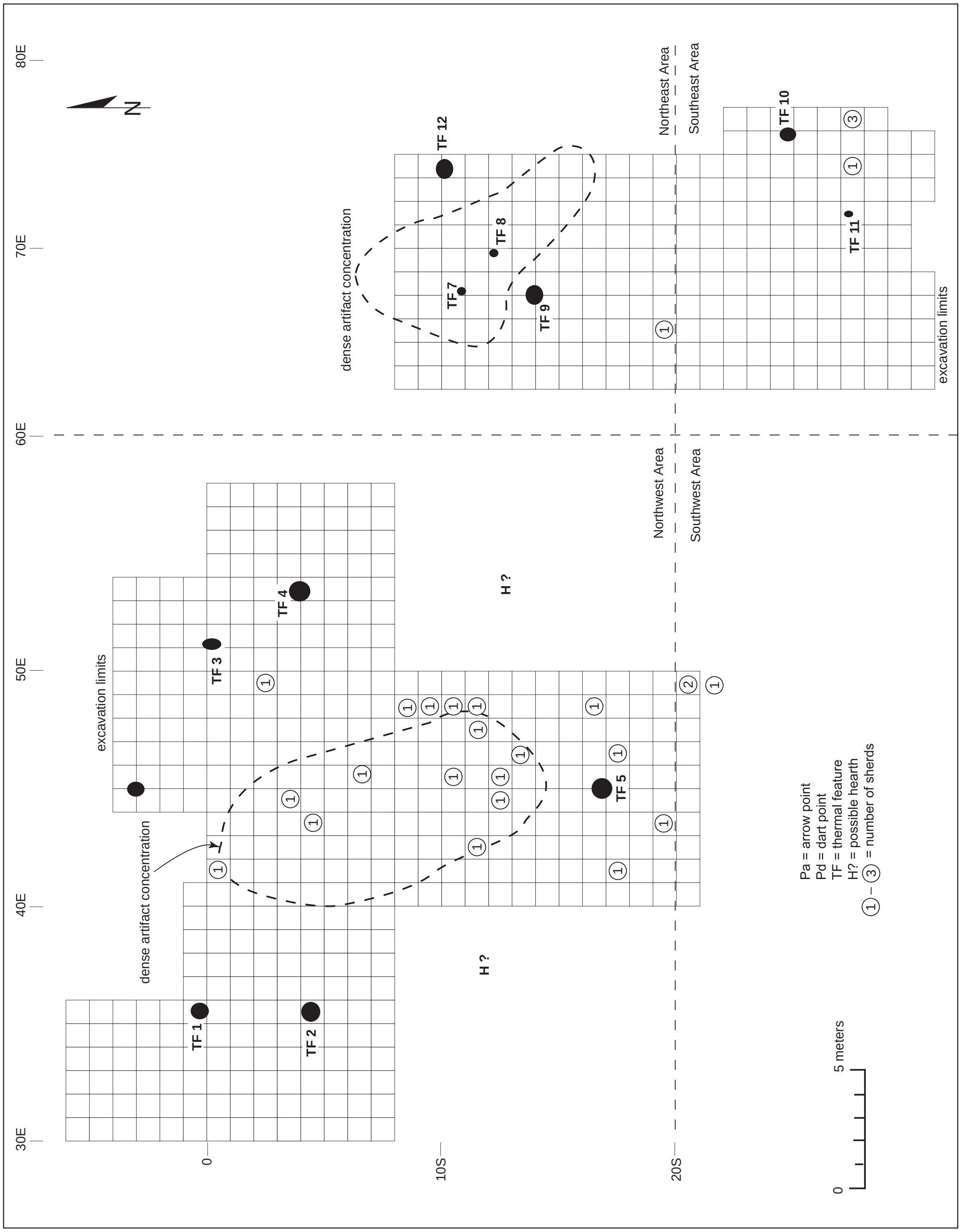


Figure 5.30. Distribution of South Pecos Brown sherds, LA 8053.

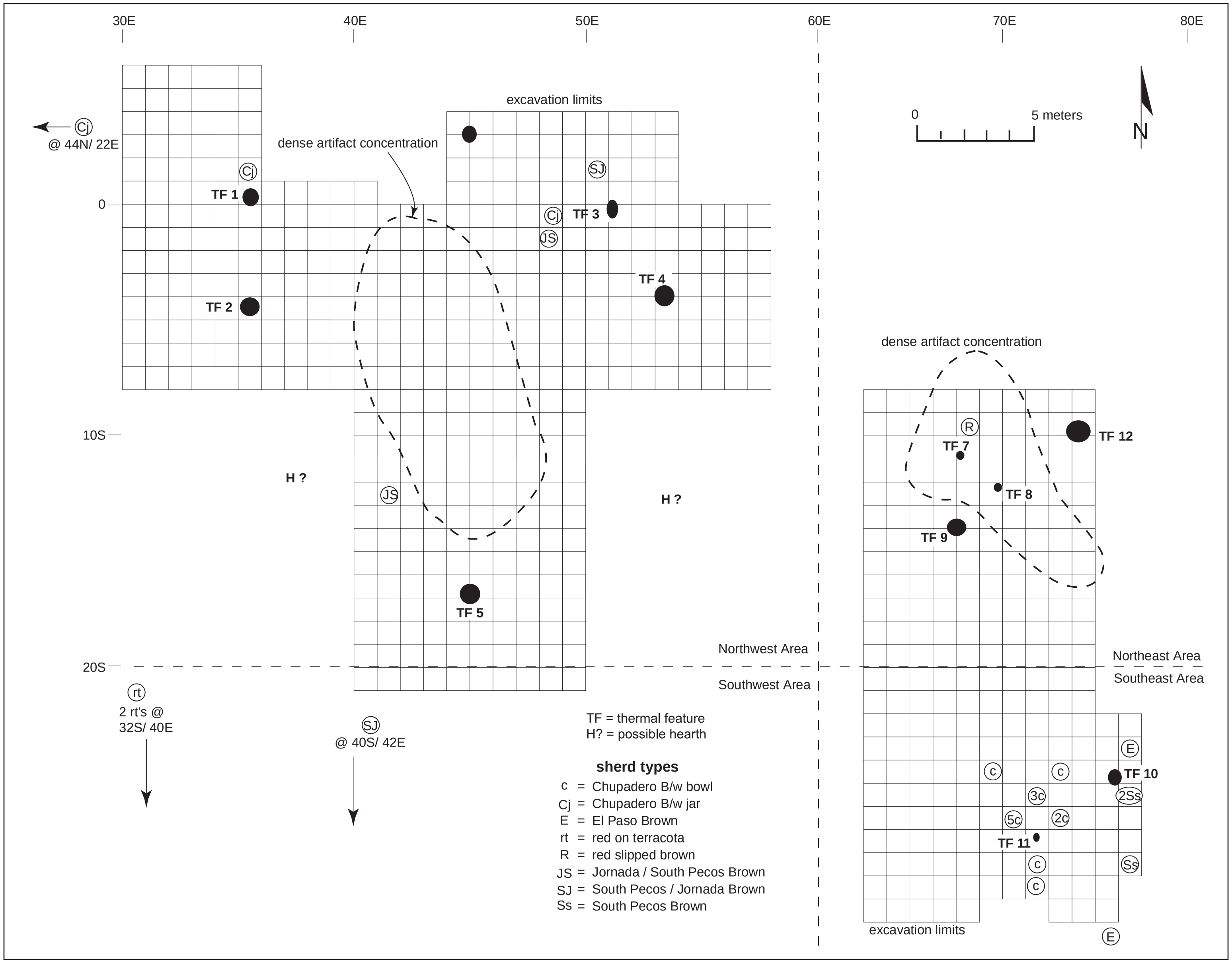


Figure 5.31. Distribution of various other sherds, LA 8053.

Manufacture Bifaces

Oval/lenticular roughouts or Class 1 first-stage bifaces (n = 5). The five oval/lenticular roughouts (FS 275, 812, 967, 993, 1032; Fig. 5.32) from Honea's site are all fragmentary and made of local cherts. FS 993 and FS 1032 were heat treated or unintentionally burned.

Square/round roughouts or Class 2 first-stage bifaces (n = 11). Of the 11 square/round roughouts from Honea's site (FS 48, 133, 145, 230, 579, 623, 647, 749, 777, 996, 1001; Fig. 5.33), all are made of local cherts, and all but two are heat-treated. The average measurements of the complete Class 2 roughouts (n = 7) are as follows: length 34 mm (range 27–43 mm), width 28 mm (range 21–42 mm), thickness 13 mm (range 10–17 mm), weight 13.2 g (range 6.3–24.6 g).

On the whole, these items have smaller average sizes in all dimensions than those from LA 38264 East. Although one can imagine any number of reasons for this, we suspect that the answer simply lies in the fact that LA 8053 dates later than the majority of the occupations at LA 38264 East. Thus, the LA 8053 knappers may have been satisfying their tool-stone needs from sources already picked over by the earlier inhabitants.

Fine bifaces (second-stage bifaces; n = 2). The two fine bifaces from Honea's site are fragmentary (FS 290, 1005; Fig. 5.34). FS 1005 is made of local chert, and its red coloration around fissures in the stone suggest that it was heat-treated. FS 290 is made of Tecovas chert.

Distribution. Interestingly, the manufacture bifaces were generally recovered from positions near thermal features (Fig. 5.35). Only two came

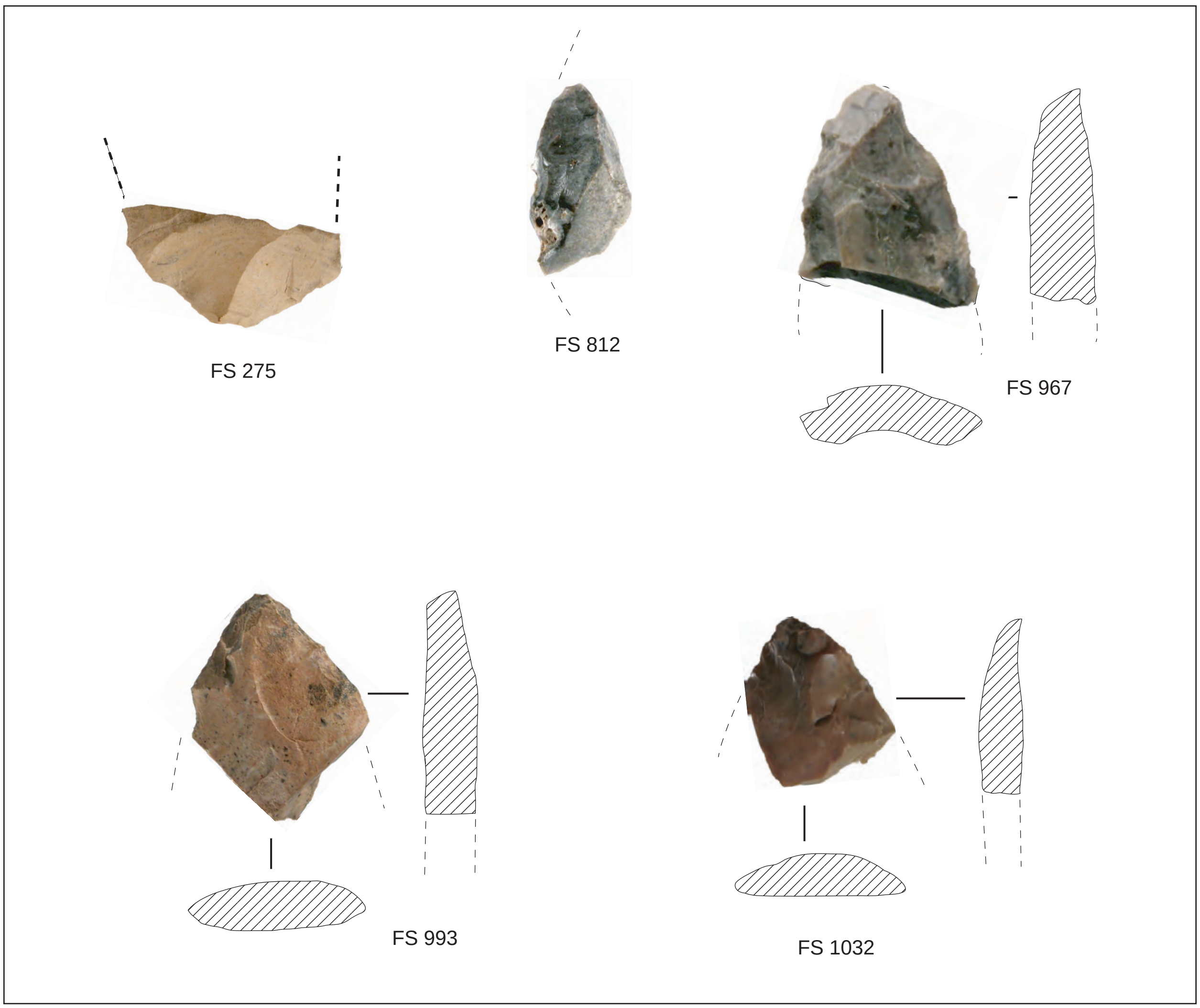


Figure 5.32. Class 1 first-stage bifaces (oval to lenticular roughouts), LA 8053.

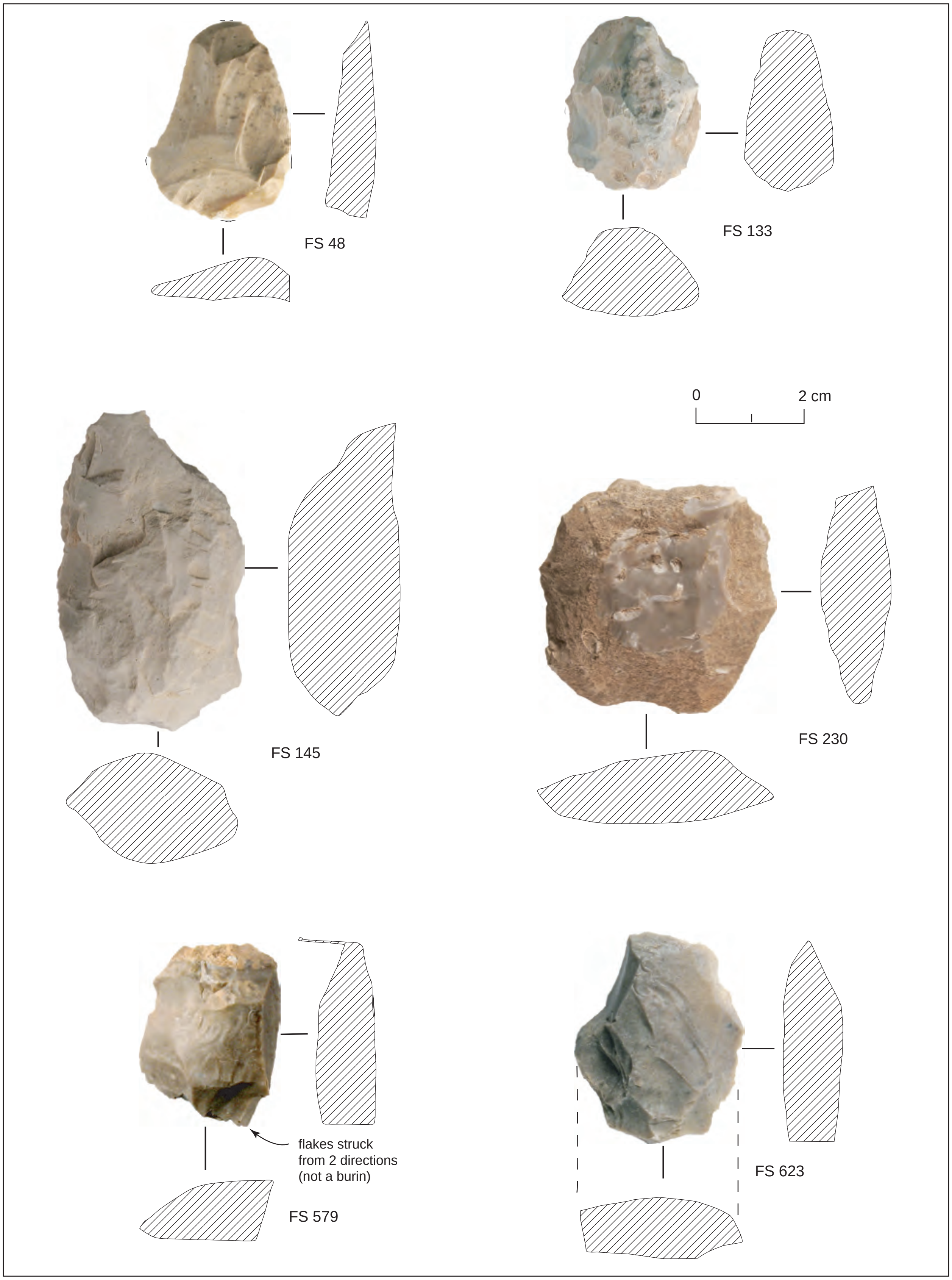


Figure 5.33. Class 2 first-stage bifaces (round to square roughouts), LA 8053.

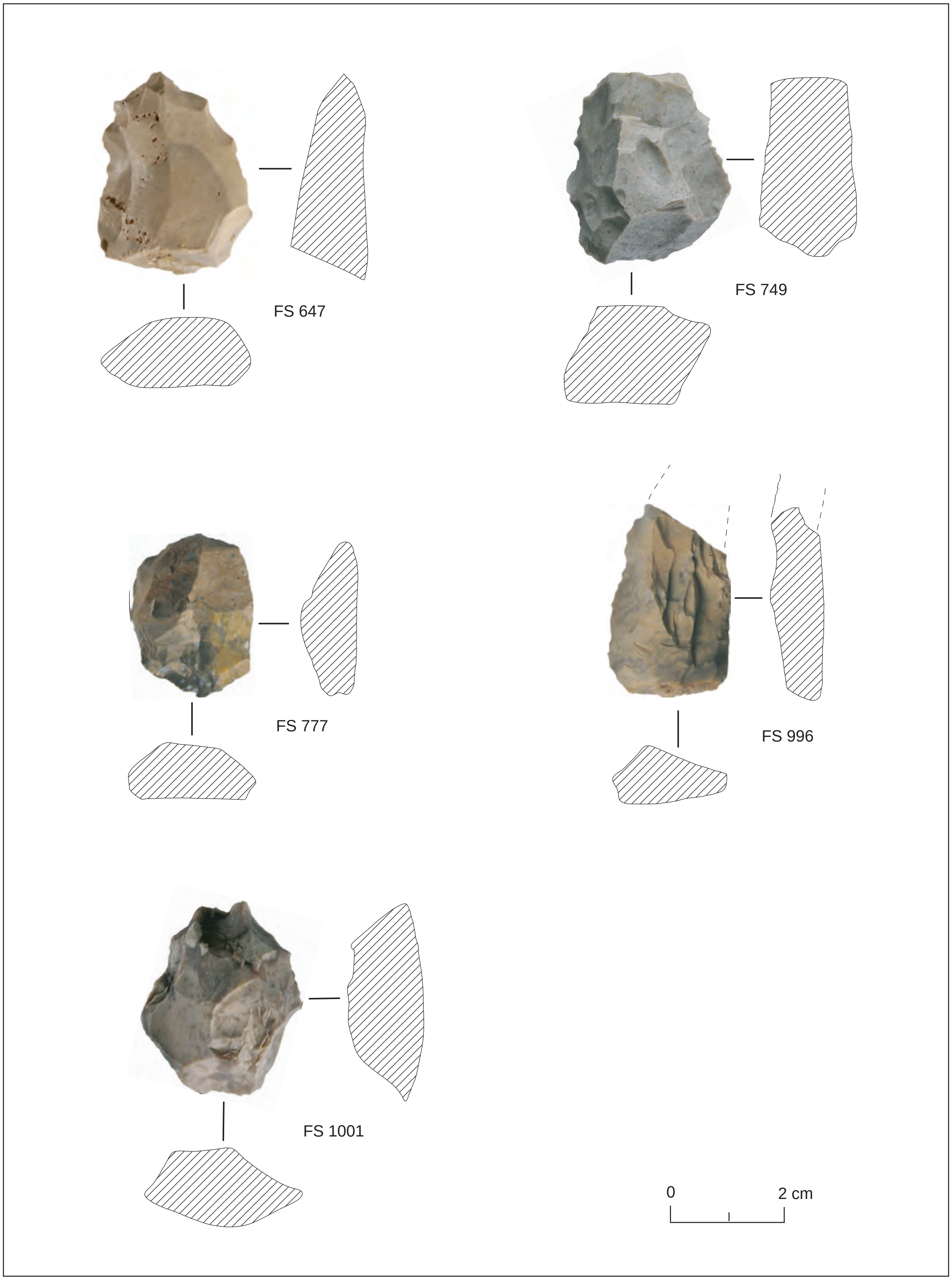


Figure 5.33 (continued)

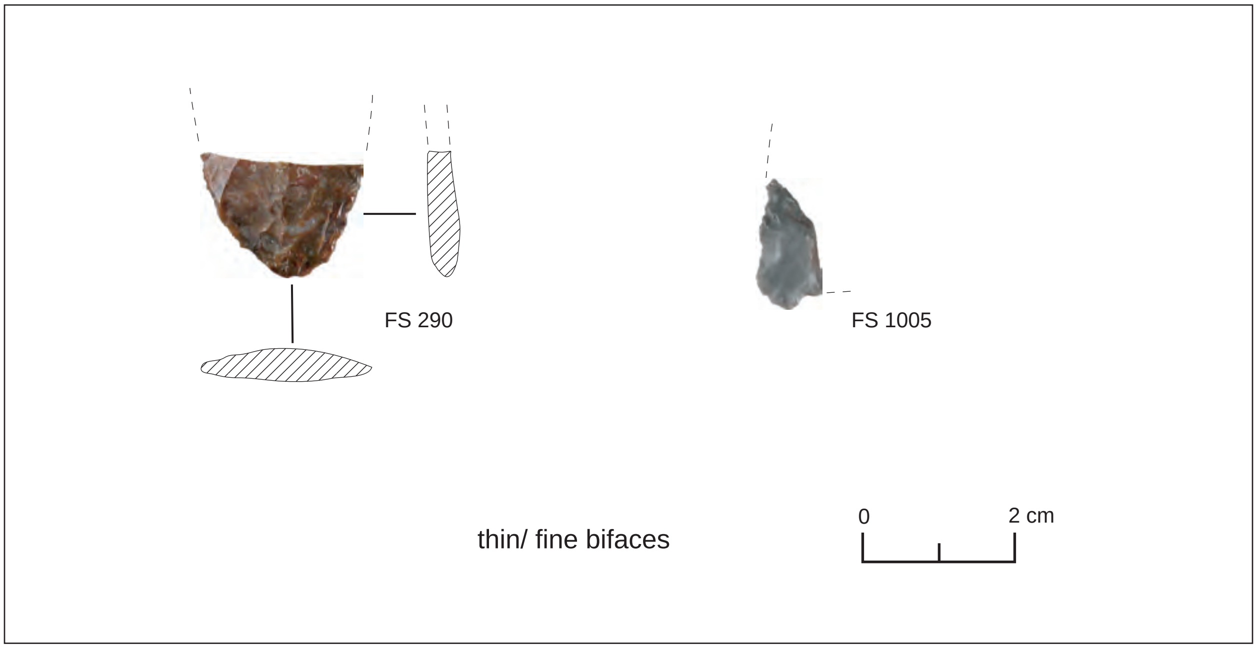


Figure 5.34. Fine (second-stage) bifaces, LA 8053.

from within one of the lithic debris concentrations, in the West Block. This is not surprising since we should expect them to have been kept with other possessions, and the logical place for such possessions would be near the thermal features, where people could keep warm, cook and eat food, and sleep. The surprising aspect is that so many of the bifaces appear to have been dropped or lost there.

Curiously, no manufacture bifaces were recovered in the north end of the East Block, where two rock thermal features, two nonrock thermal features, and the second lithic debris concentration were recorded.

Lithic Debitage (n = 3,270)

Lithic manufacture debris—cores, flakes, and shatter—constitutes the bulk of the items recovered from Honea's site (Table 5.4). The analysis of these materials, following the methods I've used in the Roswell region over the past 20 years, focuses on reconstructing the lithic technology and on identifying materials and sources. See Appendixes 1 and 6 for a discussion of raw materials and definitions of terms. Analysis of these materials is discussed in terms of the five areas defined within the construction project zone.

A total of 3,270 pieces of lithic manufacture debris were recovered from the site surface and excavations; all were subjected to full analysis.

The cores, core-reduction flakes, biface-thinning flakes, exotic materials, and assemblages from each area are described below. Pieces of debitage bearing use-wear or intentional retouch are described in the section on tools.

Cores. The 110 cores from all areas include six subtypes (Tables 5.5–5.9). Overall, the single-platform core is the most common, although, apparently because of sample sizes, this fact is expressed mainly in the figures for the site overall and the Northwest Area. Two-platforms-adjacent and cobble/pebble cores are also present in each area but in smaller numbers. Two-platforms-parallel cores, three-platform cores, and flake cores (flakes used as cores or sources of flakes) are absent from some of the areas. Interestingly, flake cores are so numerous in the Northwest Area that they form a significant component (17 of 110, or 15.5 percent) of the site's core assemblage.

Materials are dominated by local gray cherts and, to a lesser extent, by limestone (Tables 5.5–5.9). Cores of other chert, chalcedony, and siltite/quartzite are spottily represented among the areas, and cores of "other" materials are absent altogether.

Because the samples are small, core sizes were calculated for each area without considering core or material type (Tables 5.10–5.11). Interestingly,

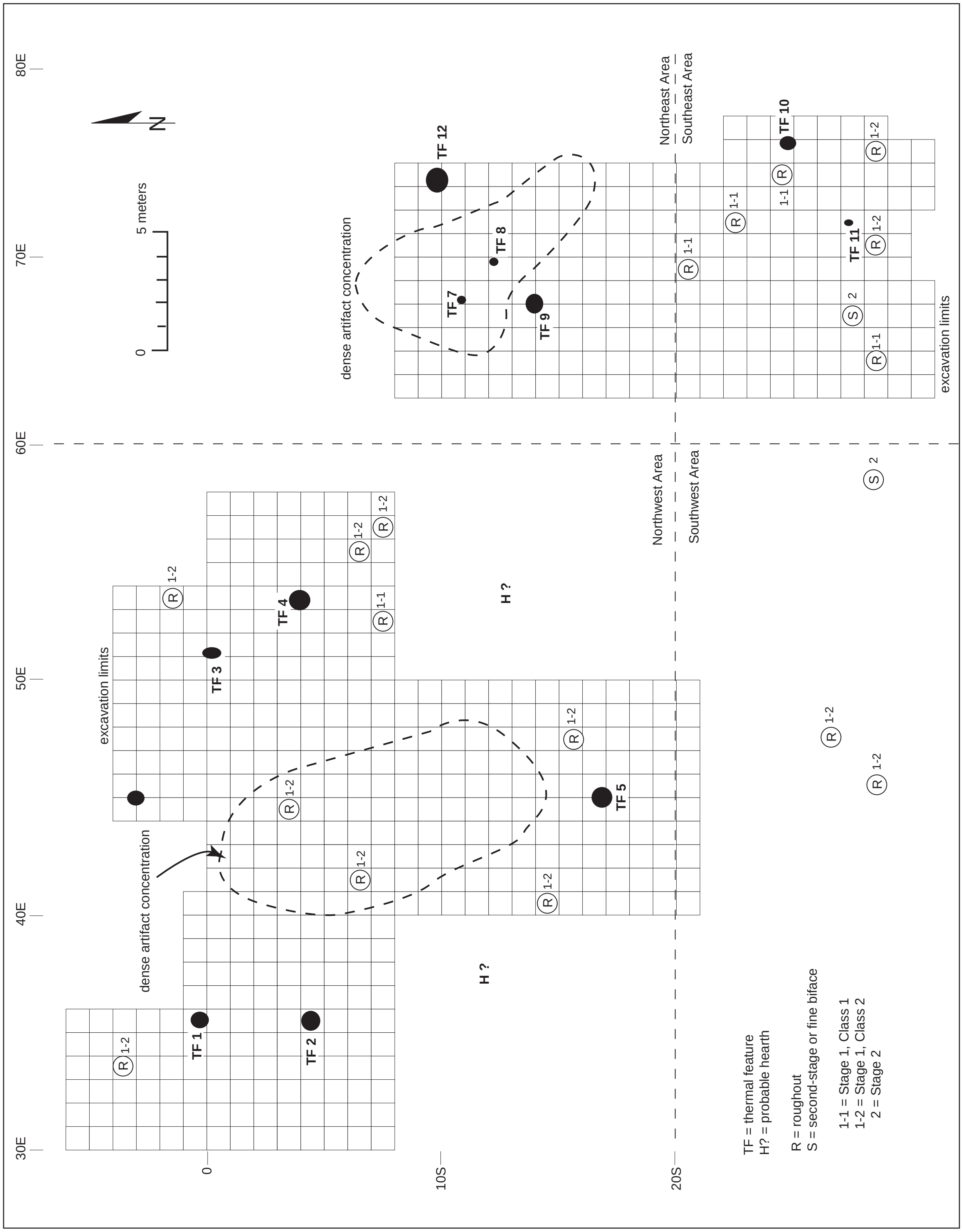


Figure 5.35. Distribution of manufacture bifaces by stage and class, LA 8053.

Table 5.4. Lithic manufacture debris type by area, LA 8053

Frequency Column %	Northwest	Northeast	Southwest	Southeast	West Periphery	Total
			Cores			
One platform	24	3	3	6	5	41
	1.2%	0.6%	2.0%	1.3%	6.8%	1.3%
Two platforms adjacent	13	4	3	2	1	23
	0.6%	0.8%	2.0%	0.4%	1.4%	0.7%
Two platforms parallel	1	1	-	-	-	2
	0.0%	0.2%	-	-	-	0.1%
Three platforms	5	-	1	1	1	8
	0.2%	-	0.7%	0.2%	1.4%	0.2%
Cobble/pebble	7	2	4	4	2	19
	0.3%	0.4%	2.6%	0.9%	2.7%	0.6%
Flake	11	-	3	3	-	17
	0.5%	-	2.0%	0.7%	-	0.5%
Total cores	61	10	14	16	9	110
	3.0%	1.9%	9.2%	3.5%	12.2%	3.4%
			Flakes			
Core	1373	392	106	300	41	2212
	66.9%	73.8%	69.3%	65.2%	55.4%	67.6%
Decortication	29	6	1	8	-	44
	1.4%	1.1%	0.7%	1.7%	-	1.3%
Biface	61	15	2	22	1	101
	3.0%	2.8%	1.3%	4.8%	1.4%	3.1%
Indeterminate	133	30	2	46	1	212
	6.5%	5.6%	1.3%	10.0%	1.4%	6.5%
Total flakes	1596	443	111	376	43	2569
	77.8%	83.4%	72.5%	81.7%	58.1%	78.6%
			Shatter			
Total	395	78	28	68	22	591
	19.2%	14.7%	18.3%	14.8%	29.7%	18.1%
Table total	2052	531	153	460	74	3270
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 5.5. Lithic debitage classes by material and heat treatment, Northwest Area, LA 8053

Frequency Column %	Cores	Flakes			Shatter	Total
		Core Reduction	Biface Thinning	Other		
Material						
Local chert	42	680	49	139	360	1270
	68.9%	49.5%	80.3%	85.8%	91.1%	61.9%
Other chert	2	90	6	11	20	129
	3.3%	6.6%	9.8%	6.8%	5.1%	6.3%
Chalcedony	1	4	1	4	2	12
	1.6%	0.3%	1.6%	2.5%	0.5%	0.6%
Limestone	16	588	-	6	11	621
	26.2%	42.8%	-	3.7%	2.8%	30.3%
Siltite/quartzite	-	6	-	1	-	7
	-	0.4%	-	0.6%	-	0.3%
Other	-	5	5	1	2	13
	-	0.4%	8.2%	0.6%	0.5%	0.6%
Total	61	1373	61	162	395	2052
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Heat Treatment						
No	55	1283	25	130	366	1859
	90.2%	93.4%	41.0%	80.2%	92.7%	90.6%
Yes	2	45	25	20	11	103
	3.3%	3.3%	41.0%	12.3%	2.8%	5.0%
Possibly	2	18	-	2	12	34
	3.3%	1.3%	-	1.2%	3.0%	1.7%
Indeterminate	2	27	11	10	6	56
	3.3%	2.0%	18.0%	6.2%	1.5%	2.7%
Total	61	1373	61	162	395	2052
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 5.6. Lithic debitage classes, Northeast Area, LA 8053

Frequency Column %	Cores	Flakes			Shatter	Total
		Core Reduction	Biface Thinning	Other		
			Material			
Local chert	7	285	14	33	72	411
	70.0%	72.7%	93.3%	91.7%	92.3%	77.4%
Other chert	1	34	1	-	4	40
	10.0%	8.7%	6.7%	-	5.1%	7.5%
Chalcedony	-	6	-	-	1	7
	-	1.5%	-	-	1.3%	1.3%
Limestone	2	64	-	2	1	69
	20.0%	16.3%	-	5.6%	1.3%	13.0%
Siltite/quartzite		3	-	1	-	4
	-	0.8%	-	2.8%	-	0.8%
Other	-	-	-	-	-	-
	-	-	-	-	-	-
Total	10	392	15	36	78	531
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
			Heat Treatment			
No	7	360	7	30	69	473
	70.0%	91.8%	46.7%	83.3%	88.5%	89.1%
Yes	1	15	4	2	2	24
	10.0%	3.8%	26.7%	5.6%	2.6%	4.5%
Possibly	2	6	-	2	4	14
	20.0%	1.5%	-	5.6%	5.1%	2.6%
Indeterminate	-	11	4	2	3	20
	-	2.8%	26.7%	5.6%	3.8%	3.8%
Total	10	392	15	36	78	531
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 5.7. Lithic debitage classes, Southwest Area, LA 8053

Frequency Column %	Cores	Flakes: Core Reduction	Flakes: Biface Thinning	Flakes: Other	Shatter	Total
			Material			
Local chert	13	66	2	3	27	111
	92.9%	62.3%	100.0%	100.0%	96.4%	72.5%
Other chert	-	6	-	-	1	7
	-	5.7%	-	-	3.6%	4.6%
Chalcedony	-	-	-	-	-	-
	-	-	-	-	-	-
Limestone	1	34	-	-	-	35
	7.1%	32.1%	-	-	-	22.9%
Siltite/quartzite	-	-	-	-	-	-
	-	-	-	-	-	-
Other	-	-	-	-	-	-
	-	-	-	-	-	-
Total	14	106	2	3	28	153
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
			Heat Treatment			
No	12	101	1	1	28	143
	85.7%	95.3%	50.0%	33.3%	100.0%	93.5%
Yes	1	1	1	2	-	5
	7.1%	0.9%	50.0%	66.7%	-	3.3%
Possibly	1	1	-	-	-	2
	7.1%	0.9%	-	-	-	1.3%
Indeterminate	-	3	-	-	-	3
	-	2.8%	-	-	-	2.0%
Total	14	106	2	3	28	153
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 5.8. Lithic debitage classes, Southeast Area, LA 8053

Frequency Column %	Cores	Flakes			Shatter	Total
		Core Reduction	Biface Thinning	Other		
Material						
Local chert	12	200	17	44	58	331
	75.0%	66.7%	77.3%	81.5%	85.3%	72.0%
Other chert	3	25	1	4	7	40
	18.8%	8.3%	4.5%	7.4%	10.3%	8.7%
Chalcedony	-	4	1	3	1	9
	-	1.3%	4.5%	5.6%	1.5%	2.0%
Limestone	-	70	-	-	1	71
	-	23.3%	-	-	1.5%	15.4%
Siltite/quartzite	1	-	-	-	1	2
	6.3%	-	-	-	1.5%	0.4%
Other	-	1	3	3	-	7
	-	0.3%	13.6%	5.6%	-	1.5%
Total	16	300	22	54	68	460
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Heat Treatment						
No	16	274	7	40	65	402
	100.0%	91.3%	31.8%	74.1%	95.6%	87.4%
Yes	-	18	9	5	1	33
	-	6.0%	40.9%	9.3%	1.5%	7.2%
Possibly	-	4	-	1	2	7
	-	1.3%	-	1.9%	2.9%	1.5%
Indeterminate	-	4	6	8	-	18
	-	1.3%	27.3%	14.8%	-	3.9%
Total	16	300	22	54	68	460
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 5.9. Lithic debitage classes, West Periphery Area, LA 8053

Frequency Column %	Cores	Flakes			Shatter	Total
		Core Reduction	Biface Thinning	Other		
			Material			
Local chert	7	30	1	1	21	60
	77.8%	73.2%	100.0%	100.0%	95.5%	81.1%
Other chert	1	3	-	-	-	4
	11.1%	7.3%	-	-	-	5.4%
Chalcedony	-	-	-	-	-	0
	-	-	-	-	-	0.0%
Limestone	1	8	-	-	-	9
	11.1%	19.5%	-	-	-	12.2%
Siltite/quartzite	-	-	-	-	-	0
	-	-	-	-	-	0.0%
Other	-	-	-	-	1	1
	-	-	-	-	4.5%	1.4%
Total	9	41	1	1	22	74
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
			Heat Treatment			
No	9	39	-	1	22	49
	100.0%	95.1%	-	100.0%	100.0%	94.2%
Yes	-	-	1	-	-	1
	-	-	100.0%	-	-	1.9%
Possibly	-	1	-	-	-	1
	-	2.4%	-	-	-	1.9%
Indeterminate	-	1	-	-	-	1
	-	2.4%	-	-	-	1.9%
Total	9	41	1	1	22	52
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 5.10. Core dimensions by area, LA 8053

	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
		Northwest		
Mean	45.85	34.87	23.52	74.41
SD	18.06	15.25	12.52	128.83
Range	82.00	65.00	57.00	710.40
Number	60	60	60	60
		Northeast		
Mean	47.40	36.60	22.00	59.63
SD	16.81	14.37	9.85	63.08
Range	49.00	45.00	30.00	173.40
Number	10	10	10	10
		Southwest		
Mean	47.21	33.07	22.14	43.40
SD	8.65	10.48	8.28	37.92
Range	29.00	36.00	25.00	110.30
Number	14	14	14	14
		Southeast		
Mean	36.13	27.25	16.31	19.09
SD	9.50	6.73	4.70	15.58
Range	31.00	23.00	13.00	55.90
Number	16	16	16	16
		West Periphery		
Mean	60.00	44.33	27.33	109.50
SD	17.64	18.89	15.48	182.55
Range	54.00	64.00	51.00	571.70
Number	9	9	9	9

Table 5.11. Correlation matrix of core dimensions by area, LA 8053

	Length	Width	Thickness	Weight
	Northwest (N = 60)			
Length	1.0000			
Width	.9251	1.0000		
Thickness	.8659	.8265	1.0000	
Weight	.8680	.8177	.8726	1.0000
	Northeast (N = 10)			
Length	1.0000			
Width	.8454*	1.0000		
Thickness	.6722**	.4441**	1.0000	
Weight	.8357*	0.9763	.3699**	1.0000
	Southwest (N = 14)			
Length	1.0000			
Width	.8372	1.0000		
Thickness	.8565	.7768	1.0000	
Weight	.9287	.8557	.9183	1.0000
	Southeast (N = 16)			
Length	1.0000			
Width	.6754*	1.0000		
Thickness	.4992**	.6951*	1.0000	
Weight	.7613	.8069	.7923	1.0000
	West Periphry (N = 9)			
Length	1.0000			
Width	.8282*	1.0000		
Thickness	.9206	.8775*	1.0000	
Weight	.8410*	.9431	.9418	1.0000

Pearson's r, 2-tailed test; significant at the .001 level unless otherwise specified.
* Significant at the .01 level.
** Not significant.

the cores from the Northwest, Northeast, and Southwest Areas are very similar in average length, width, and thickness, and slightly less so in weight. In contrast, the cores from the Southeast Area are considerably smaller in all dimensions, half or less the averages for the three areas just mentioned (especially in the weights). The West Periphery cores are just the opposite, having average dimensions half again larger than those from the Northwest, Northeast, and Southwest Areas.

Correlation statistics of core size and weight (Tables 5.12–5.13) suggest high standardization of dimensions of cores from the Northwest and Southwest Areas, and spotty high correlations for various combinations of attributes among the assemblages from the other areas. However, given the probability that standardizations of dimensions may in part be imposed by the natural geometry of the pieces of material used as cores, we consider only those correlation coefficients in the 0.8s and 0.9s to be significant from a cultural standpoint. Correlations in the 0.7s and 0.6s are considered less significant or even insignificant although the notations in the tables (as generated by the statistical package) suggest otherwise. We should also not overlook the probability that the knappers were selecting for the blockier (as opposed to more tabular) pieces of material in the first place.

Our assessment of the correlation data is that the cores from the Northwest and Southwest Areas resulted from well-controlled knapping methods. In contrast, those from the other areas represent less control, perhaps because of knapper inexperience, but more likely because of the use of lower-quality chunks of raw material.

Overall, heat treatment of material to improve

Table 5.12. Core dimensions by type, LA 8053

	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
		One Platform		
Mean	46.13	34.67	23.67	76.23
SD	17.90	16.46	11.11	118.34
Range	74.00	65.00	36.00	529.20
Number	24	24	24	24
		Two Platforms Adjacent		
Mean	50.50	38.17	28.75	115.55
SD	22.16	16.00	16.57	209.03
Range	70.00	44.00	53.00	700.90
Number	12	12	12	12
		Two Platforms Parallel		
Mean	61.00	59.00	39.00	176.10
SD	-	-	-	-
Range	-	-	-	-
Number	1	1	1	1
		Three Platforms		
Mean	52.20	37.20	31.60	114.46
SD	22.82	17.67	17.14	140.99
Range	48.00	40.00	37.00	311.40
Number	5	5	5	5
		Cobble/Pebble		
Mean	36.43	28.86	18.00	28.09
SD	8.22	10.17	6.22	37.37
Range	24.00	32.00	20.00	106.10
Number	11	11	11	11
		Flake Cores		
Mean	41.91	32.27	15.91	27.57
SD	15.81	13.18	4.91	32.63
Range	49.00	33.00	14.00	105.00
Number	11	11	11	11

Table 5.13. Correlation matrix of core dimensions by type, Northwest Area, LA 8053

	Length	Width	Thickness	Weight
		1 Platform (N = 24)		
Length	1.0000			
Width	.9176	1.0000		
Thickness	.8159	.7996	1.0000	
Weight	.8705	.8942	.8160	1.0000
		2 Platforms Adjacent (N = 12)		
Length	1.0000			
Width	.9505	1.0000		
Thickness	.9561	.9308	1.0000	
Weight	.9453	.8436	.9169	1.0000
		2 Platforms Parallel (N = 1)		
Length	1.0000			
Width	-	1.0000		
Thickness	-	-	1.0000	
Weight	-	-	-	1.0000
		3 Platforms (N = 5)		
Length	1.0000			
Width	.9684*	1.0000		
Thickness	.9948	.9835*	1.0000	
Weight	.9393**	.9898*	.9533**	1.0000
		Cobble/Pebble (N = 7)		
Length	1.0000			
Width	.8178**	1.0000		
Thickness	.7432**	.9301*	1.0000	
Weight	.7527**	.9218*	.9435*	1.0000
		Flake Cores (N = 11)		
Length	1.0000			
Width	.9613	1.0000		
Thickness	.8995	.8771	1.0000	
Weight	.9473	.9041	.8905	1.0000

Pearson's r, 2-tailed test; significant at the .001 level unless otherwise specified.
* Significant at the .01 level.
** Not significant.

knapping quality was employed infrequently on cores (Tables 5.5–5.9). Some areas (Southeast and West Periphery) produced no heat-treated cores, while others produced only small numbers. Where present, percentages of heat-treated cores ranged from 3.3 to 10.0 percent. Possibly heat-treated specimens account for another 3.3 to 20.0 percent of the assemblages, for maximum totals of up to 30.0 percent. These figures are generally higher than those for the core-reduction flakes, probably in part because of small-sample problems with the cores.

Core-reduction flakes. One-fourth (n = 507) of the 2,212 core-reduction flakes are complete. Summary statistics (Tables 5.14–5.18) indicate that, on average, they are small, somewhat longer than wide, and lightweight (2–8 g). A Pearson correlation matrix (Tables 5.14–5.18) indicates that the complete-flake dimensions are not strongly correlated. We feel that this indicates a general lack of standardization of flake shapes, even though the actual statistics assign a two-tailed significance of .001 to most correlations. Our judgment is based on the fact that, in studies of other assemblages from the region, those values have been higher overall.

Other characteristics of the core-reduction flakes include the following (Tables 5.5–5.9 and 5.19). The primary materials are local cherts, with limestone running a slow second in all areas except the Northwest Area. There, limestone flakes are almost as numerous as local cherts. Heat treatment was rarely observed, the total positive and "possible" cases ranging from 1.8 to 7.4 percent.

Depending upon the area, cortex platforms (Northeast, Southwest, Southeast) or single-flake-scar (West Periphery, Northwest) striking

Table 5.14. Complete core-reduction flakes, Northwest Area, LA 8053

Dimensions

	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	23.47	20.64	7.3	7.24
SD	13.69	11.54	5.05	16.19
Range	85	66	36	163.2
Number	323	323	323	323

Correlation Matrix

	Length	Width	Thickness	Weight
Length	1.0000			
Width	.8070	1.0000		
Thickness	.8485	.8335	1.0000	
Weight	.7615	.7714	.8428	1.0000

Pearson's r, 2-tailed test; significant at the .001 level.

Table 5.15. Complete core-reduction flakes, Northeast Area, LA 8053

Dimensions

	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	18.38	16.15	5.04	3.25
SD	10.95	7.62	3.45	7.72
Range	65.00	35.00	17.00	49.60
Number	91	91	91	91

Correlation Matrix

	Length	Width	Thickness	Weight
Length	1.0000			
Width	.8548	1.0000		
Thickness	.8659	.8249	1.0000	
Weight	.8784	.7882	.8343	1.0000

Pearson's r, 2-tailed test; significant at the .001 level.

Table 5.16. Complete core-reduction flakes, Southwest Area, LA 8053

Dimensions

	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	25.00	23.64	7.77	5.90
SD	10.11	10.83	3.45	6.14
Range	40.00	41.00	11.00	20.40
Number	22	22	22	22

Correlation Matrix

	Length	Width	Thickness	Weight
Length	1.0000			
Width	.7439	1.0000		
Thickness	.8067	.7905	1.0000	
Weight	.8085	.9296	.8122	1.0000

Pearson's r, 2-tailed test; significant at the .001 level.

Table 5.17. Complete core-reduction flakes, Southeast Area, LA 8053

Dimensions

	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	19.19	18.44	5.76	2.80
SD	8.34	8.22	3.01	3.69
Range	38.00	34.00	12.00	19.30
Number	59	59	59	59

Correlation Matrix

	Length	Width	Thickness	Weight
Length	1.0000			
Width	.6203	1.0000		
Thickness	.7252	.8125	1.0000	
Weight	.7924	.7542	.8185	1.0000

Pearson's r, 2-tailed test; significant at the .001 level.

Table 5.18. Complete core-reduction flakes, West Periphery Area, LA 8053

Dimensions

	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	26.58	25.92	7.92	7.86
SD	9.13	10.49	3.90	11.75
Range	30.00	37.00	12.00	40.60
Number	12	12	12	12

Correlation Matrix

	Length	Width	Thickness	Weight
Length	1.0000			
Width	.8253	1.0000		
Thickness	.8297	0.874	1.0000	
Weight	.7202*	.9467	.8159*	1.0000

Pearson's r, 2-tailed test; significant at the .001 level unless otherwise specified.
* Significant at the .01 level.

Table 5.19. Core-reduction flake attributes by area, LA 8053

Frequency Column %	Northwest	Northeast	Southwest	Southeast	West Periphery
		Platform Types			
Cortex	69	27	8	19	2
	21.0%	29.7%	36.4%	32.2%	16.7%
Single flake scar	120	22	6	18	3
	36.6%	24.2%	27.3%	30.5%	25.0%
Multiple flake scar	40	18	3	7	3
	12.2%	19.8%	13.6%	11.9%	25.0%
Pseudodihedral	11	2	-	3	-
	3.4%	2.2%	-	5.1%	-
Edge/ridge remnant	84	22	5	11	4
	25.6%	24.2%	22.7%	18.6%	33.3%
Pointed	4	-	-	1	-
	1.2%	-	-	1.7%	-
Total	328	91	22	59	12
	100.0%	100.0%	100.0%	100.0%	100.0%
		Distal Termination Type			
Feathered	249	67	14	45	6
	75.9%	73.6%	63.6%	76.3%	50.0%
Modified feathered	35	6	4	6	1
	10.7%	6.6%	18.2%	10.2%	8.3%
Hinged or stepped	35	15	2	8	3
	10.7%	16.5%	9.1%	13.6%	25.0%
Broken during detachment	7	3	2	-	2
	2.1%	3.3%	9.1%	-	16.7%
Indeterminate	2	-	-	-	-
	0.6%	-	-	-	-
Total	328	91	22	59	12
	100.0%	100.0%	100.0%	100.0%	100.0%
		Dorsal Cortex			
0%	157	48	7	30	5
	48.3%	53.3%	31.8%	55.6%	41.7%
1-10%	33	11	2	5	2
	10.2%	12.2%	9.1%	9.3%	16.7%
11-25%	40	12	4	4	3
	12.3%	13.3%	18.2%	7.4%	25.0%
26-50%	42	6	4	9	1
	12.9%	6.7%	18.2%	16.7%	8.3%
51-75%	28	6	3	1	-
	8.6%	6.7%	13.6%	1.9%	-
76-90%	11	6	-	1	1
	3.4%	6.7%	-	1.9%	8.3%
91-99%	7	-	1	2	-
	2.2%	-	4.5%	3.7%	-
100%, including platform	7	1	1	2	-
	2.2%	1.1%	4.5%	3.7%	-
Total	325	90	22	54	12
	100.0%	100.0%	100.0%	100.0%	100.0%

platforms are the most common, but in either case, they still comprise only one-fourth to one-third of the platform types. Surprisingly, edge-remnant (destroyed) platforms are also well represented in each area, suggesting knapper inexperience, clumsiness, or lack of concern.

Given the number of edge-remnant/destroyed platforms, it is therefore surprising that half to three-quarters of the distal edge terminations are feathered. If we combine the modified-feathered with the feathered platforms, then the flake-detachment success rate runs between 58 and 87 percent. In my experience, these are high figures for southeastern New Mexico assemblages.

In assemblages characterized by high percentages of cortex platforms, we would expect the dorsal-cortex profiles to be heavily weighted towards the presence of cortex and therefore a departure from the normally expected fall-off profile (Fig. 5.36). That is, in a normal fall-off profile, when the percentages of each category are graphed, the line tends to be a smooth, even curve as it drops from a high on the left (no cortex) to a low on the right (most cortex). Such is not the case with the core-reduction flakes from Honea's site. Although none of the area profiles precisely match the "normal" expectation, the overall incidence of dorsal cortex in each area is low.

Biface-thinning flakes. Like the other debitage categories, the majority (81 percent, or 82 of 101) of biface-thinning flakes are of local cherts (Tables 5.5–5.9). Nearly 40 percent (40 of 101) are heat-treated, indicating that this technique for improving the knappability of materials was conducted late in the manufacture sequence. More precisely, heat treating was conducted mainly on bifaces prior to their reduction into finished artifacts. This finding is confirmed by the high incidence of heat treating displayed by the manufacture bifaces.

Overall, biface-thinning flakes comprise small percentages of the debitage assemblage in each area (Table 5.4). However, differences do exist, and three groups can be defined. The Southwest and West Periphery Areas contain the smallest percentages (1.3 and 1.4 percent, respectively, but these areas were not excavated or screened), the Northwest and Northeast Areas contain intermediate percentages (2.9 and 2.8 percent, respectively), and the Southeast Area contains the largest percentage (4.7 percent). Each shift from one group to the next is about double the previous one.

Shatter. For the most part, the shatter category represents knapping failure incurred during initial use of the cores (Table 5.4). This type of failure at each of four areas (Northwest, Northeast, Southwest, and Southeast) produced these items at the rate of about one-fifth to one-fourth of the total assemblages. The rate in the West Periphery Area was noticeably higher—nearly one-third.

Imported lithic materials. The debitage assemblage from Honea's site contains no materials known to originate or suspected of originating from sources outside southeastern New Mexico. In fact, only two items from the entire site, a Pecos dart point (FS 164) and a fine or second-stage biface (FS 290), represent known or suspected imported items. The Pecos point is made of Edwards chert from west-central or central Texas and gives a medium response under ultraviolet light stimulation. The second-stage biface is Tecovas chert from the Texas Panhandle.

Local gray chert study. The rationale for and method of this study are described in Wiseman (2000a:71–80) and Wiseman (2002:77–82). Earlier applications of this approach have found that most presumed local gray cherts give little (warm) or no response to ultraviolet light and that very small numbers of flakes give a medium or bright response. However, several (but not all) sites located a short distance from the city of Roswell have produced much larger numbers of flakes that respond in the medium and bright categories, thereby distinguishing these assemblages from all others analyzed to date. While the meaning of this difference is still being evaluated, the method holds promise for detecting intraregional differences in cultural relationships.

As can be seen in Fig. 5.37, the gray chert assemblage falls within the main grouping of sites defined to date. Thus, Honea's site is "normal" for the region in this regard.

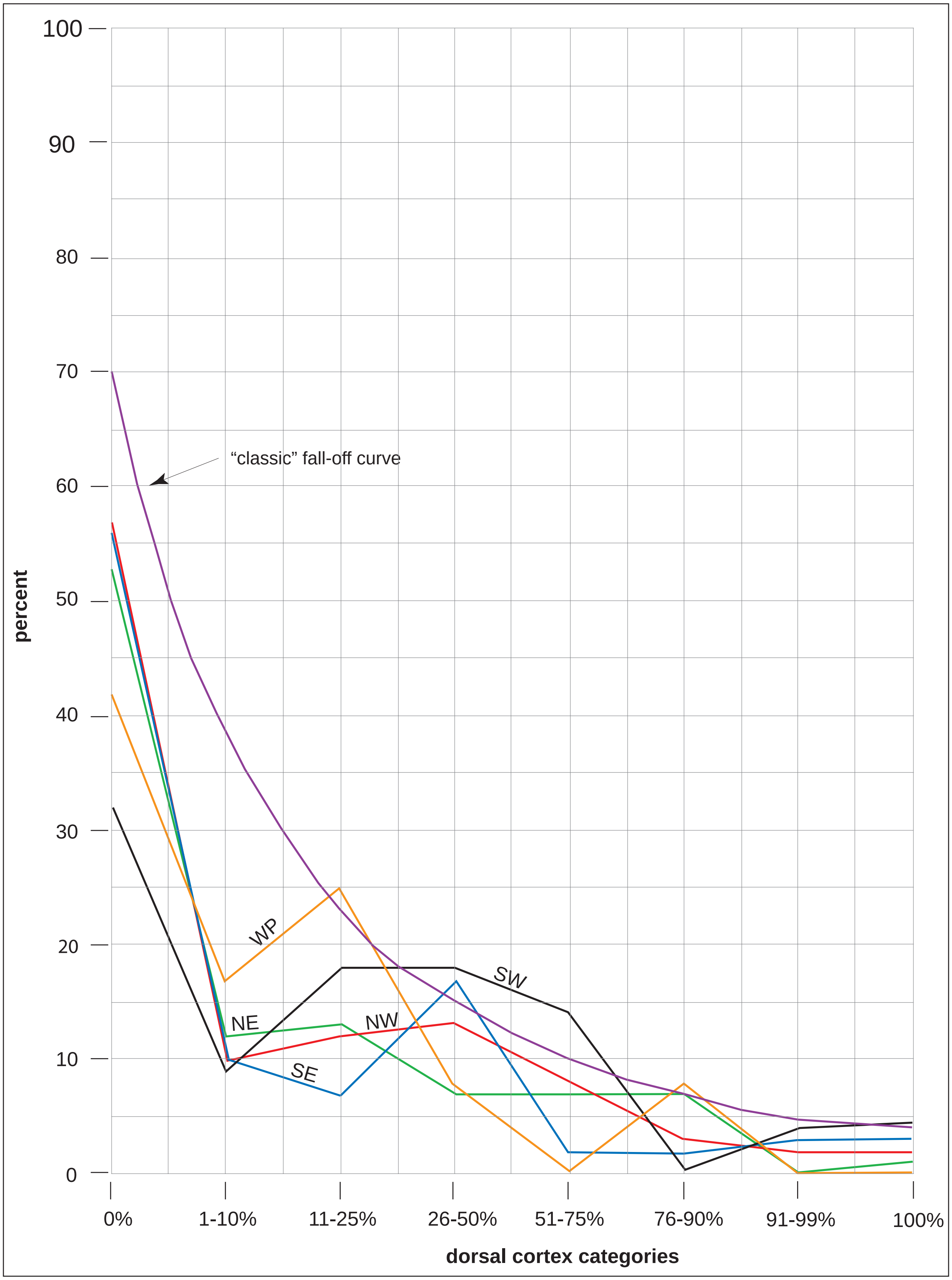


Figure 5.36. Percentage of dorsal cortex on core-reduction flakes by area, LA 8053.

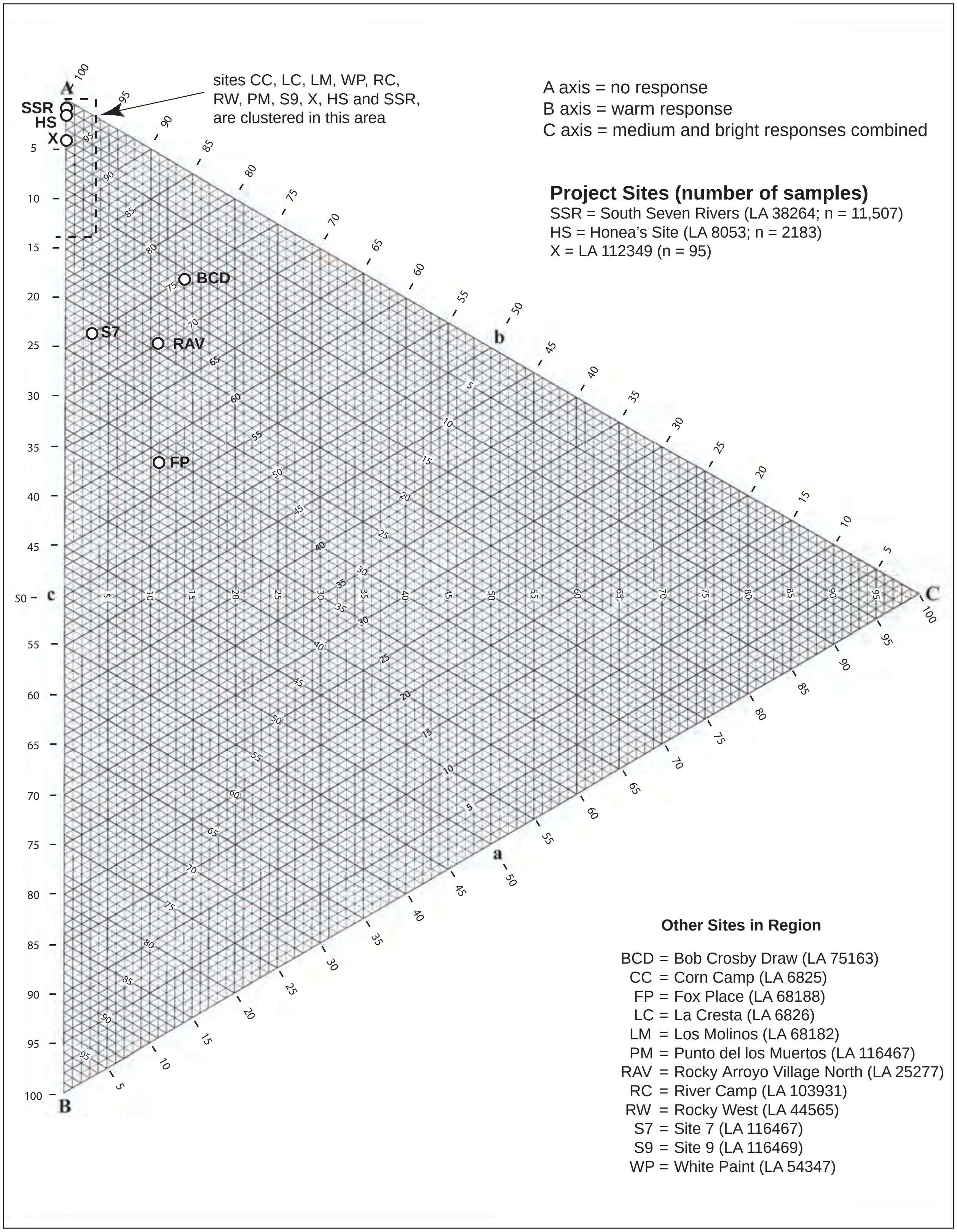


Figure 5.37. Response to ultraviolet light of local gray chert from project and area sites.

Chipped Stone Manufacturing Technology: The Site as a Whole

Materials

All materials are local to the region. Local gray cherts comprise the overwhelming majority of materials in each area. Limestone is also fairly well represented.

Heat Treatment

The overall incidence of heat treatment is low and found most commonly among the biface-thinning flakes and manufacture bifaces. Heat treating was most often performed on first-stage bifaces prior to their further reduction to finished artifacts.

Cores

The usual varieties of core types are present, but no one type dominates all areas. Thus, core preparation for flake removal does not appear to be particularly standardized.

Core-Reduction Flakes

These items tend to be slightly longer than they are wide and rather thick. The percentage of successful flake removals, as gauged by feathered and modified-feathered (i.e., nonhinged and nonstepped) distal terminations, is rather high for a southeastern New Mexico assemblage. However, the percentage of complete flakes is low overall, suggesting a high breakage rate at the time of detachment from the core.

Biface-Thinning Flakes

These items are present in low numbers throughout the site. Since they display the highest percentages of heat treatment, this technique for improving knappability evidently was employed more often at the biface stage than on cores and core-reduction flakes.

Broken Flakes and Shatter

The rate of broken flakes and pieces of shatter produced during the flake-production and biface-forming phases varied from about one-fifth to one-fourth of the total assemblages in all areas but the West Periphery, where nearly one-third of the assemblage is notably higher.

Imported Materials

No cores, flakes, or shatter are made of imported materials, but one second-stage biface is Tecovas chert, and one Pecos point is Edwards chert.

Local Gray Chert Ultraviolet Profile

The entire local gray chert assemblage, as well as that from each area, falls within the normal signature for hunter-gatherer sites in the region. Thus, it differs significantly from the signatures for the farming sites like the Fox Place (Wiseman 2002) and Rocky Arroyo village and at least one large, open camp, the Bob Crosby Draw site (Wiseman 2000a).

Differences in Chipped Stone Manufacturing Technology between Site Areas

Only those attributes of lithic technology and raw material that display marked variation across the site are discussed here. Given the generally small sample sizes for most areas within the site, caution should be observed when contemplating the potential significance of the differences noted in Table 5.20. Nonetheless, several observations of interest and potential significance can be made.

Materials

The tool stones represented among the chipping debris differ more or less from one area to the next (Fig. 5.38). Except for the Northeast and West Periphery Areas, the curves of which are very nearly identical, the material distributions among the areas are even more distinct for the core-reduction flakes (Fig. 5.39). The primary difference is the amount of local gray cherts; all other materials are represented about the same in each area.

Cores

Single-platform cores are the most common type in three areas: Northwest, Southeast, and West

Table 5.20. Lithic debitage categories by area, LA 8053

	Northwest	Northeast	Southwest	Southeast	West Periphery
Cores:					
Dominant type	1 platform	2 platforms adjacent	cobble/pebble	1 platform	1 platform
Average weight[1]	4x	3x	2x	1x	5.5x
Control of geometry	more	less	more	less	less
Heat treatment	moderate	some	some	none	none
Core-Reduction Flakes:					
Weight[2]	100.0%	45.0%	-	39.0%	-
Heat treatment	some	some	very low	some	none
Biface-Thinning Flakes:					
Percent of assemblage[3]	2.9%	2.8%	-	4.7%	-
Heat treatment (% of sample)	41.0%	27.0%	-	41.0%	-
Sample size	61	15	2	22	1

[1] Average weight of Southeast Area multiplied by these factors.
[2] Percentage of average Northwest Area weight (excavated and surface-collected flakes).
[3] Excavated and screened samples only.

Periphery (Table 5.20; Fig. 5.40). In the Northeast Area, two-platforms-adjacent cores are more typical, and in the Southwest Area, cobble/pebble cores are more common. The significance of these differences does not appear to be cultural or temporal.

Core weights are generally graduated from lightest to heaviest in the following order by area: Southeast, Southwest, Northeast, Northwest, West Periphery. Thus, the average heaviest cores are found in the Northwest and West Periphery Areas. Correspondingly, the lighter cores are found in the Southeast Area. Core geometry, as gauged by better standardization of metric attributes, is best controlled in the Northwest and Southwest Areas.

Core heat treatment is most common in the Northwest Area. The Northeast and Southwest Areas display some heat treatment, while the Southeast and West Periphery Area cores appear to lack core heat treatment altogether.

Core-Reduction Flakes

The average weight of core-reduction flakes from the Northwest area is twice or more that of those from the Northeast and the Southeast Areas. Does this indicate that the knappers in the Northeast and Southeast Areas were striking smaller flakes on average, or that they were scavenging many of their flakes from the Northwest Area?

Dorsal cortex on core-reduction flakes can be used as a general guide to original material unit size and geometry and therefore to core-reduction strategy. That is, where raw materials of suitable size and shape are available and the knappers are reasonably skilled, we would expect to find an inverse ratio between the amount of dorsal cortex and the number of core-reduction flakes in an assemblage. Stated another way, with raw material units of sufficient size and shape, the cortex can be removed expeditiously, resulting in few flakes with full or nearly full dorsal cortex, and more flakes with less and less cortex.

In the earlier years of lithic analysis, archaeologists characterized flakes as primary (decortication and early-stage core-reduction flakes possessing much cortex), secondary (some cortex), and tertiary (no cortex). In the ideal core-reduction assemblage, one would find few primary flakes, more secondary flakes, and many tertiary flakes. Experience has shown that the general percentages of these flake "types" should be on the order of 5, 25, and 70 percent, respectively (percentages of core-reduction flakes only). Ideally, a curve constructed of percentage-cortex values would progress smoothly and evenly from 0 to 100 percent (see "classic curve" in Fig. 5.36).

How do the core-reduction flake assemblages by area at LA 8053 compare to the ideal "classic" dorsal cortex curve? In Figure 5.36 we see that

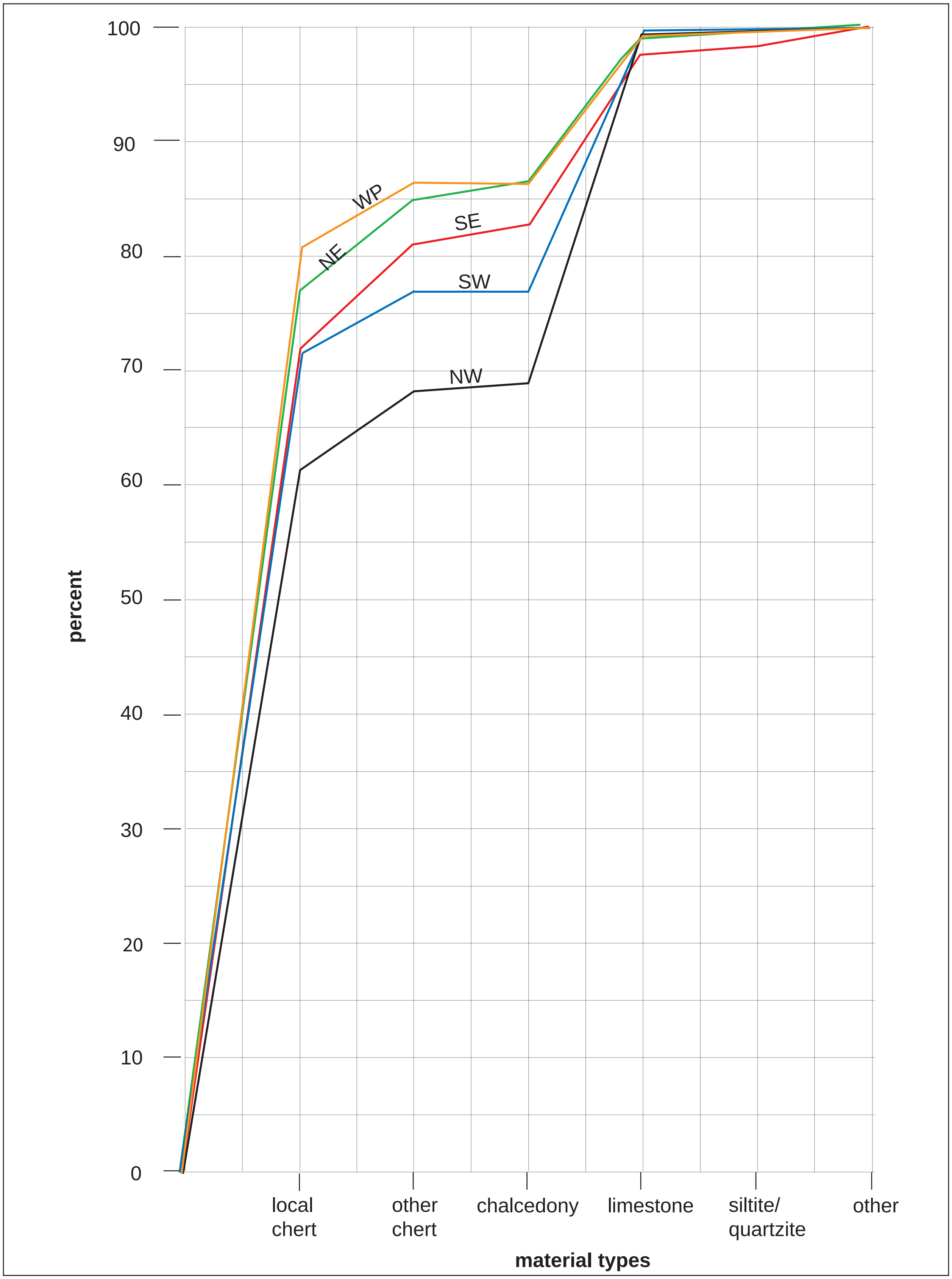


Figure 5.38. Percentage of material type by area for all categories of lithic debris, LA 8053.

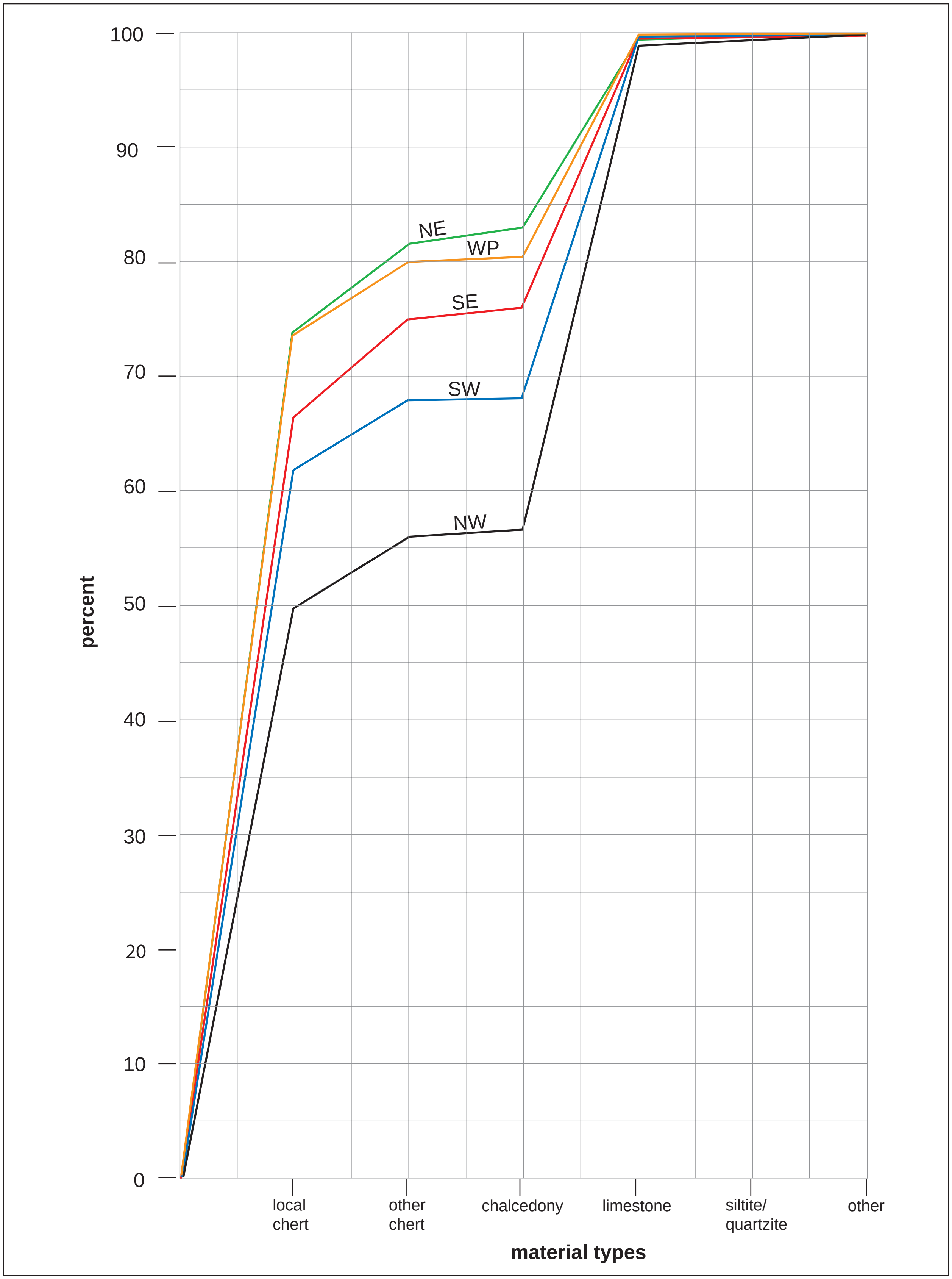


Figure 5.39. Percentage of material type by area for core-reduction flakes, LA 8053.

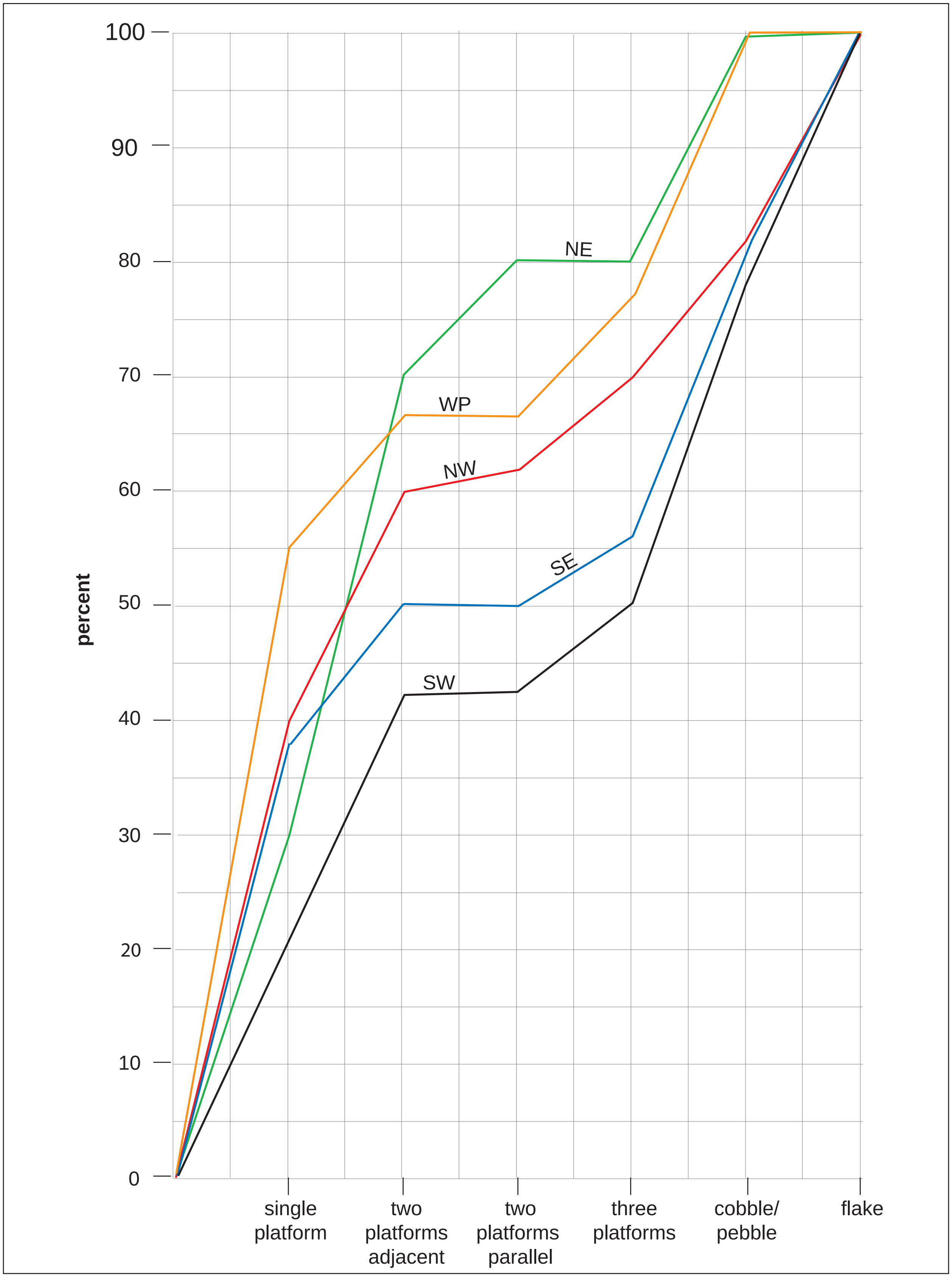


Figure 5.40. Percentage of core types by area, LA 8053.

the assemblages for Northwest, Northeast, and Southeast Areas have about 50 to 55 percent "tertiary" flakes, rather than about 75 percent, and from none to about 5 percent "primary" flakes. In between these two extremes, the curves are anything but smooth and even. While this latter characteristic in the cases of the West Periphery and Southwest Areas (41 and 106 cored-reduction flakes, respectively) is undoubtedly due to small sample sizes and the absence of excavated and screened fill, such is probably not the case for the Northeast and Southeast Areas (392 and 300 core-reduction flakes, respectively) and especially not the Northwest Area, with its 1,373 CRFs. In fact, the curves for these three areas have secondary peaks, two at 11–25 percent (Northeast and Southeast) and one at 26–50 percent (Northwest). This same phenomenon, which has been noted in assemblages in other sites in the region (e.g., Wiseman 2000a, 2002, 2004), is believed to result from the necessity of using small raw material units that make total decortication impossible. Such seems to be the case at LA 8053 as well.

Core-reduction flakes from the various areas displayed heat treatment to varying but relatively minor degrees. When both positive and possible instances of heat treatment are combined, the Northwest, Northeast, and Southeast Area core-reduction flake totals are similar (6.4, 5.3, and 7.4 percent, respectively) (Table 5.21). However, if we look only at the core-reduction flakes positively identified as heat treated, then the assemblage from the Southeast Area displays twice as many heat-treated core-reduction flakes as the Northwest and Northeast assemblages (6.1, as opposed to 3.2 and 3.8 percent, respectively). Heat treatment was nearly absent in the West Periphery Area and was minimally recognized in the Southwest Area, both areas having produced small core-reduction flake assemblages.

Biface-Thinning Flakes

In the analysis areas where excavations and screening were done and expressed as percentage of assemblage, biface-thinning flakes are nearly twice as common in the Southeast Area as in the Northwest and Northeast Areas. Interestingly, the incidence of heat treatment of biface-thinning flakes is decidedly lower in the Northeast Area than in the Northwest and Southeast Areas.

Floral Remains

Flotation samples recovered and analyzed from eight features (TFs 1, 6, 7, 8, 9, 10, 11, and 12) revealed numerous species of plants (see McBride, this volume). Only the remains of five species or genera (sedge family, hedgehog cactus, saltbush/greasewood, mesquite, and agave) are charred, suggesting that they were introduced into the sites by the prehistoric occupants. All five species/genera are known to have been food items for prehistoric peoples. The presence of these species/genera in thermal features may ultimately have related to their use as fuel but does not automatically rule out the possibility of their initial introduction into the site as food.

Faunal Remains

Bird eggshell (n = 2) and mussel shell (n = 18) are the only faunal remains recovered from Honea's site. The thickness of the bird eggshell fragments is comparable to that of medium to large birds (ducks and larger). We cannot be certain whether this eggshell is the result of prehistoric human use or a more modern introduction by other agencies. The two fragments came from the same square, 5 m northeast of TF 4 in the Northwest Area.

Table 5.21. Heat treatment in core-reduction flakes by area, LA 8053

Presence of Heat Treatment	Northwest	Northeast	Southwest	Southeast	West Periphery
Positive	3.2%	3.8%	0.9%	6.1%	-
Possible	3.2%	1.5%	0.9%	1.3%	2.4%
Total positive and possible	6.4%	5.3%	1.8%	7.4%	2.4%
Negative	93.4%	91.5%	95.3%	91.3%	95.2%
Indeterminate	3.2%	2.8%	2.9%	1.3%	2.4%

The thickness and appearance of the 18 mussel shell fragments compare well with those of the most common mussel found in sites of the region, Pecos pearly mussel (*Cyrtonaias tampicoensis*). No hinges were recovered. Their distribution within the site is interesting (Fig. 5.41). Three pieces came from the Southeast Area (in the vicinity of TFs 10 and 11), three pieces from the Northeast Area (vicinity of TFs 7, 8, 9, and 12), and all but one of the remainder from a restricted part of the Northwest Area (vicinity of TFs 3, 4, and 6). A single fragment came from 4 m southwest of TF 5, also within the Northwest Area.

Radiocarbon Dates and Feature Relationships at Honea's Site

Only 6 of the 12 thermal features excavated at LA 8053 produced charcoal and could be radiocarbon dated. Nine radiocarbon dates were obtained for these six features, and seven of those required use of the AMS (accelerator mass spectrometer) method (Appendix 7). More than one date was obtained for each of three features. These dates and the feature relationships are discussed in detail in Addressing the Data Recovery Questions.

Summary of Findings at Honea's Site

The surface artifacts were collected in 2 by 2 m squares. These collections, when plotted, defined two surface artifact concentrations. These and a small concentration of painted pottery at a third locus suggested a basic site structure and focal points for excavations. Several rock thermal features were noted on the surface prior to excavation. Five nonrock thermal features were discovered only because of the widespread nature of the excavations. In fact, it is precisely this aspect, the discovery of hidden features and the elucidation of intrasite patterning among features and artifact distributions, that determined the methodological approach used at this site.

Within time constraints, broad-scale stripping excavations conducted in 1 by 1 m squares led to a detailed examination of large portions of the site within the project zone. This approach permitted us to better define the site content and layout than would have been the case had we merely excavated the features observable from the surface. Seven of nine rock thermal features within the project area and five nonrock thermal features were excavated.

The artifact-density plots also provided the rationale for further subdivisions of the site into Northwest, Northeast, Southwest, Southeast, and West Periphery during the lithic debitage analysis. These subdivisions were analyzed separately to search for differences among the areas and discover whether meaningful patterns existed.

Lithic debitage dominates the artifact assemblage. Artifacts include 1 metate fragment, 2 mano fragments, 2 dart points, 8 arrow points, 2 end scrapers, 17 informal flake tools, 1 graver tool, 1 Pecos Valley Diamond (double-terminated quartz crystal), 128 pottery sherds, 16 first-stage bifaces, and 2 second-stage bifaces.

The lithic debitage of cores, flakes, and pieces of shatter consists only of locally available materials. The two examples of an exotic tool stones recovered from Honea's site are a second-stage biface of Tecovas chert and a Pecos-type point. In an assessment of differences in lithic reduction, the debitage from this site was divided into five site areas. Several potentially significant differences were found among the assemblages from the areas. These differences for cores are manifested in dimension, dominant type, weight, control of geometry, and heat treatment. For core-reduction flakes, potentially important differences were found with regard to weight and heat treatment, and for biface-thinning flakes, percentage of total lithic debris assemblage (cores, flakes, etc.) and heat treatment. Unfortunately, the three analytical areas for which we have excavation data also represent multiple occupations as demonstrated by radiocarbon dates (see below). Accordingly, we cannot assign these differences to specific occupations or compare them between occupations. But the mere fact that such differences exist demonstrates that we need to develop better excavation techniques for recovering and analyzing information from these sites.

Thirteen flotation samples representing the fills of eight thermal features (four rock, four nonrock) were scanned for economic plant remains. The carbonized remains of five species and/or genera were noted, including sedge

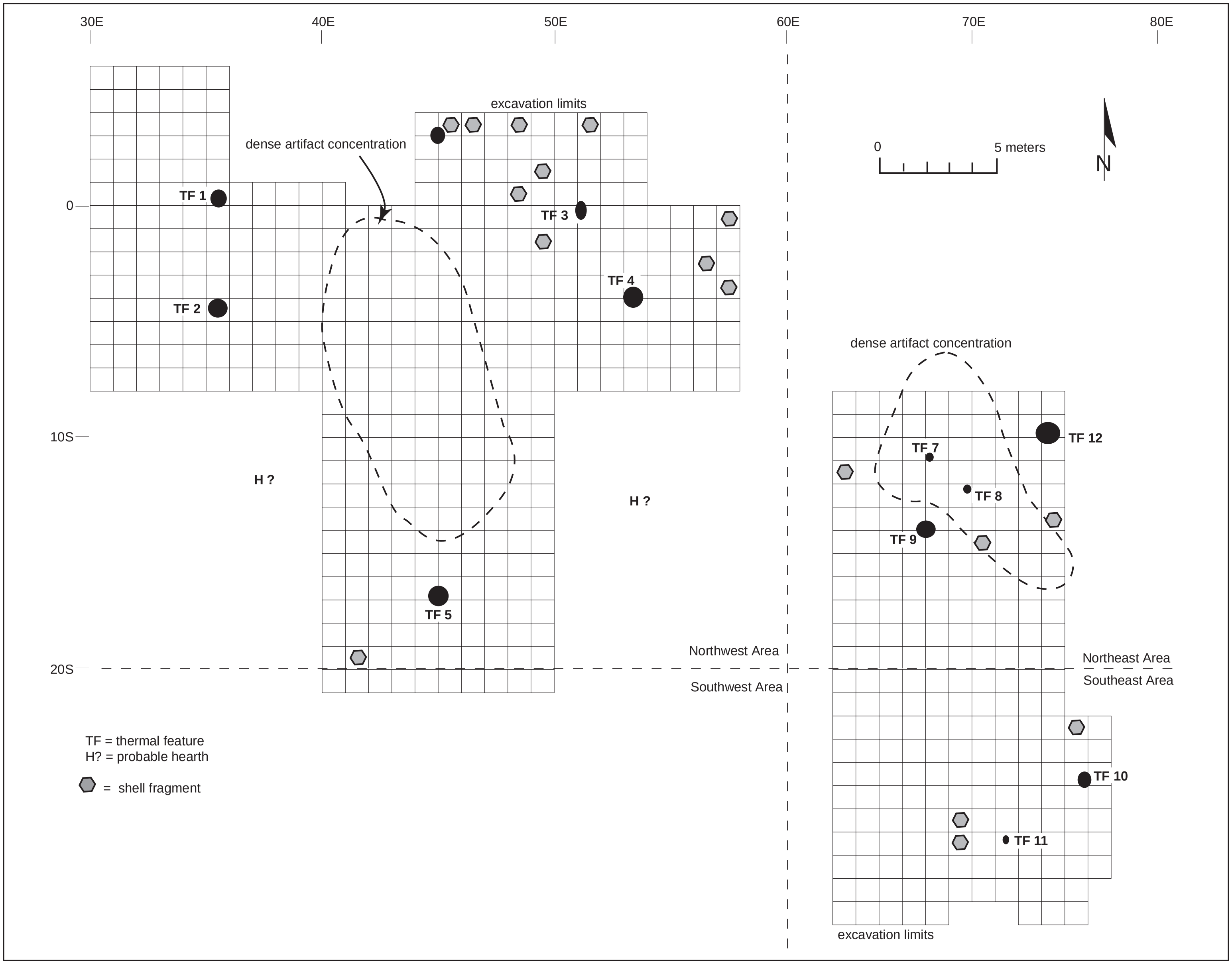


Figure 5.41. Distribution of mussel shell fragments, LA 8053.

family, hedgehog cactus, mesquite, saltbush/ greasewood, and agave; some may represent fuelwood, but that does not rule out the use of other parts of these plants for food. Samples of saltbush/greasewood and mesquite were also radiocarbon dated.

Faunal remains were limited to mussel shell fragment and eggshell fragments. None of these items could be identified to species. However, the mussel shell is probably Texas pearly mussel, and the eggshell appears to be from a large bird such as duck or turkey. While we feel fairly certain that the mussel shell fragments are the result of collection or consumption by the prehistoric inhabitants of the site, we are not so certain about the eggshell fragments.

Nine radiocarbon dates were obtained from six thermal features. Using the OxCal routine (Bronk Ramsey 2002), at least four separate periods of occupation can be discerned: (1) the late McMillan phase of the Late Archaic period, in this case 1000 BC–AD 1 (TF 1); (2) the early Globe phase of the early Late Prehistoric period, AD 750–1000 (TF 11); (3) the late Globe phase and possibly slightly into the early Oriental phase, AD 1000–1175 (TF 6 and TF 9); and (4) the late Globe/early Oriental phase, about AD 1030–1260 (TF 7 and TF 10).

The broad-scale excavation technique employed at this site, combined with the radiocarbon results and lithic debris and pottery distributions, have permitted us to elucidate several aspects of internal site structure. These are summarized as six phenomena representing at least four and possibly as many as six separate occupations, which are listed below in approximate chronological order.

1. West Block

An oval of at least five excavated and two unexcavated rock thermal features surrounds a lithic debris concentration. A single radiocarbon date for rock thermal feature TF 1 suggests a late McMillan phase (Late Archaic period) occupation, which I believe also dates the other rock thermal features (TFs 2, 3, 4, 5 and two unexcavated examples) and most of the lithic debris concentrated within the oval. The thermal features are all of one type, and because of the physical arrangement of the features surrounding the lithic debris concentration, the entire configuration probably represents an encampment of at least seven cooperating commensal groups.

2. East Block (South End)

Nonrock thermal feature TF 11 is radiocarbon dated to the early Globe phase (AD 750–1000) and as such represents the second oldest occupation identified among the excavated features at LA 8053. As discussed later in this volume, the Chupadero Black-on-white bowl sherds recovered from its vicinity may or may not be associated with the use of this feature.

3. West Block

A nonrock thermal feature (TF 6) dating to late in the Globe phase (Late Prehistoric period) and a small concentration of brown ware sherds (which may not relate directly to the thermal feature) partially overprint the McMillan configuration. TF 6 may or may not have been contemporaneous with TF 9 in the north end of the East Block.

4. East Block (North End)

Two rock thermal features are on either side of a small, dense concentration of lithic chipping debris. TF 9 was radiocarbon dated to the late Globe phase (Late Prehistoric period) and may or may not have been contemporaneous with TF 6 in the West Block. I am guessing that TF 9 was contemporaneous with TF 12, the other rock thermal feature at this locus, as well as with the majority of the lithic debris in the concentration lying between the two features. A few potsherds recovered from the lithic debris concentration may or may not belong to the TF 9 and TF 12 occupation.

5. East Block (North End)

Two nonrock thermal features were recorded within the lithic chipping debris concentration associated with TFs 9 and 12. TF 7 is radiocarbon dated to the Globe/Oriental transition period. Since TF 8 is undated, I do not know if it was contemporaneous with TF 7. The few potsherds recovered from the vicinity of these two thermal features may or may not belong to the use of these features. TF 7 may be the latest occupation exposed by our work at this site and may or may not have been contemporaneous with TF 10, in the south end of this block.

6. East Block (South End)

TF 10 is a nonrock thermal feature radiocarbon dated to the Globe/Oriental transition period. It may or may not have been contemporaneous with TF 7, located to the north. The Chupadero Black-on-white bowl sherds recovered nearby may belong to the TF 10 occupation, but the dates of the two are in general agreement.

6. South Seven Rivers (LA 38264)

LA 38264 has numerous prehistoric and historic components scattered along the edge of the south terrace of the South Seven Rivers drainage (Appendix 10). The historic remains included both Native American and Euroamerican components (Wiseman 2001a).

A thin sand mantle covers the west half of the site, while a continuation of the sand mantle and several low (1 m high), widely spaced, mesquite-stabilized dunes cover the east half. Throughout the site, the ground surface is readily visible among widely spaced clumps of bunch grass, creosote bush, and saltbush. The elevation of the site is 1,003 m (3,290 ft) above mean sea level. The Seven Rivers drainage, comprising the North Seven Rivers and South Seven Rivers channels, marks the north end of the Chihuahuan Desert along the Pecos Valley.

LA 38264 East, the part of the site lying east of the highway, was recorded in 1974 as X29ED45. Henderson (1976) called it SMU 45. LA 38264 West, the part of the site west of US 285, was recorded in March 1996 by NMDOT archaeologists (Levine 1996). The length of the site (east and west parts combined, including the highway right-of-way) is 500 m. The maximum width is 70 m, with an average of 40 m. About 70 percent of LA 38264, involving tracts on both sides of US 285, lay within CMEs 1 and 2 of the construction project.

The prehistoric and historic Native American components include a number of burned-rock and nonrock features that may date as early as 2120 BC and as late as AD 1915. East of the highway the areas among the features are characterized by a thin scatter of burned rocks and artifacts. West of US 285 the burned-rock and artifact concentrations are discrete and generally lack artifacts and burned rocks in the intervening spaces. The cultural depth of the site varies from surficial to 20 cm, except an annular midden (TF 4), the bottom of which lay 50 cm below the modern surface.

Independent grids were established east and west of the highway.

East of the highway the main datum was established at the southeast corner of the grid, which lay several meters outside the construction project limits (Fig. 6.1). At the end of the field work, 2 ft lengths of rebar were driven below the ground surface at the main datum (0N/0W) and grid points 20N/0W and 0N/20W and surrounded with concrete collars to improve permanency. They were then covered with a few centimeters of sediment to conceal them.

West of the highway the main datum was established at the southwest corner of the grid (Fig. 6.2). At the end of the fieldwork, 2 ft sections of rebar were driven at the main datum (0N/0E) and grid points 0N/30E and 20N/30E, but only the datum was concreted. All were covered with a few centimeters of sediment to conceal them.

All burned-rock fragments (Fig. 6.3) and surface artifacts (Fig. 6.4) within the construction project area were counted, and the artifacts were collected according to the procedures described earlier. Density maps were made for both classes of material.

East of the highway, the cultural remains were spread continuously, though not evenly, throughout. This differential spread of materials clearly demonstrates that these large sites are composed of numerous separate yet contiguous occupations or foci of activity. The primary question is whether these foci were contemporaneous or whether they represent two or more temporally distinct occupations.

West of the highway, only the main concentrations of artifacts and burned rocks were density mapped. Surface artifacts outside these concentrations were particularly sparse in distribution; they were piece-plotted with compass and tape, then collected. Burned rocks outside the main concentration were also sparsely scattered and were not inventoried or mapped.

Excavations were confined to the east side of the highway and denoted in the records and collections as LA 38264 East (Fig. 6.5). The latest construction maps at the time, acquired after completion of the surface inventories and collections, indicated that the main artifact concentration west of the highway lay outside the construction project. Accordingly, no excavations

Figure 6.1. LA 38264 East, showing surface inventory area.

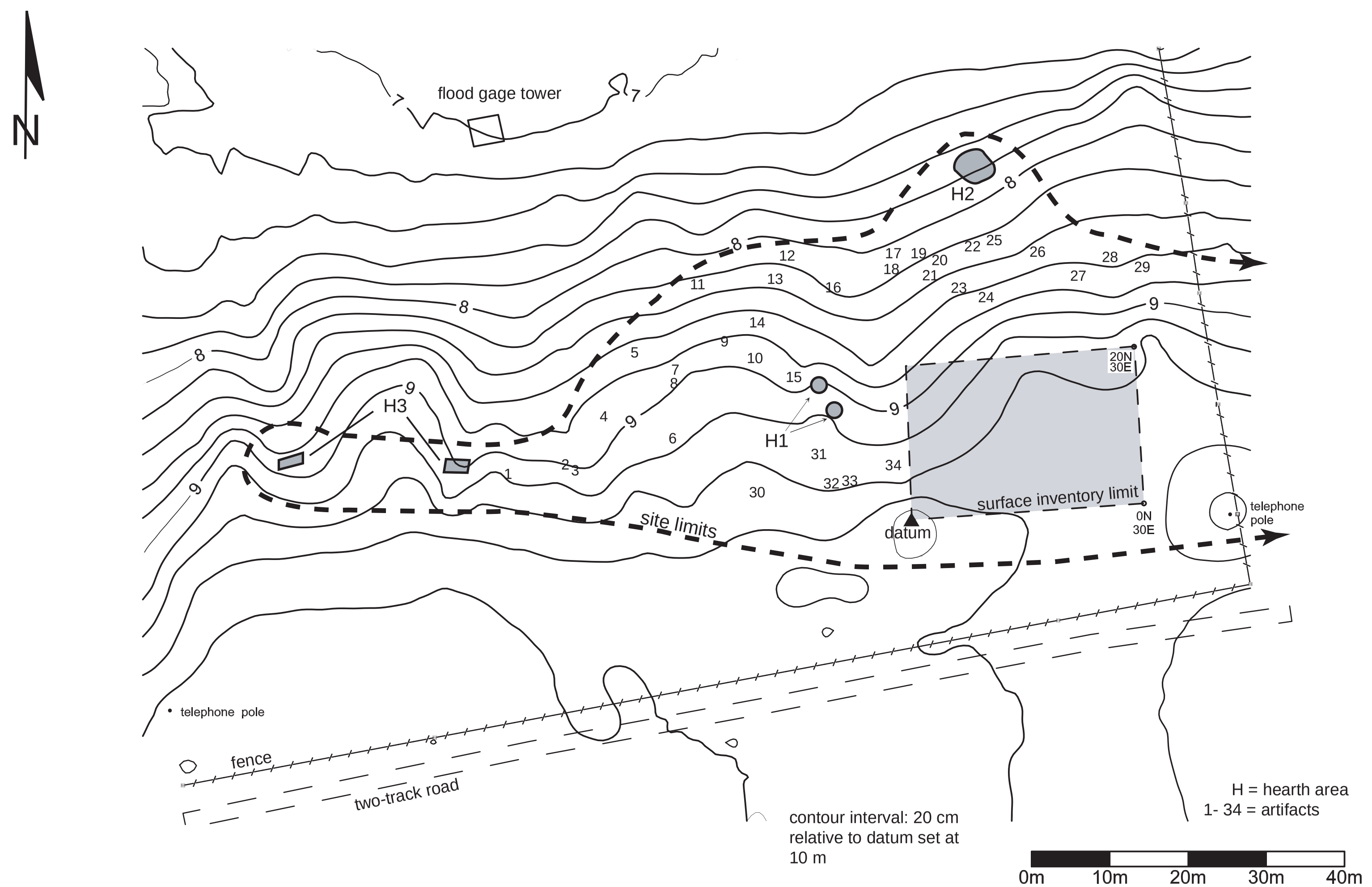


Figure 6.2. LA 38264 West, showing surface inventory limit and point-provenienced items (numbers).

Figure 6.3. Distribution of surface burned rock, LA 38264 East.

Figure 6.4. Distribution of surface artifacts, LA 38264 East.

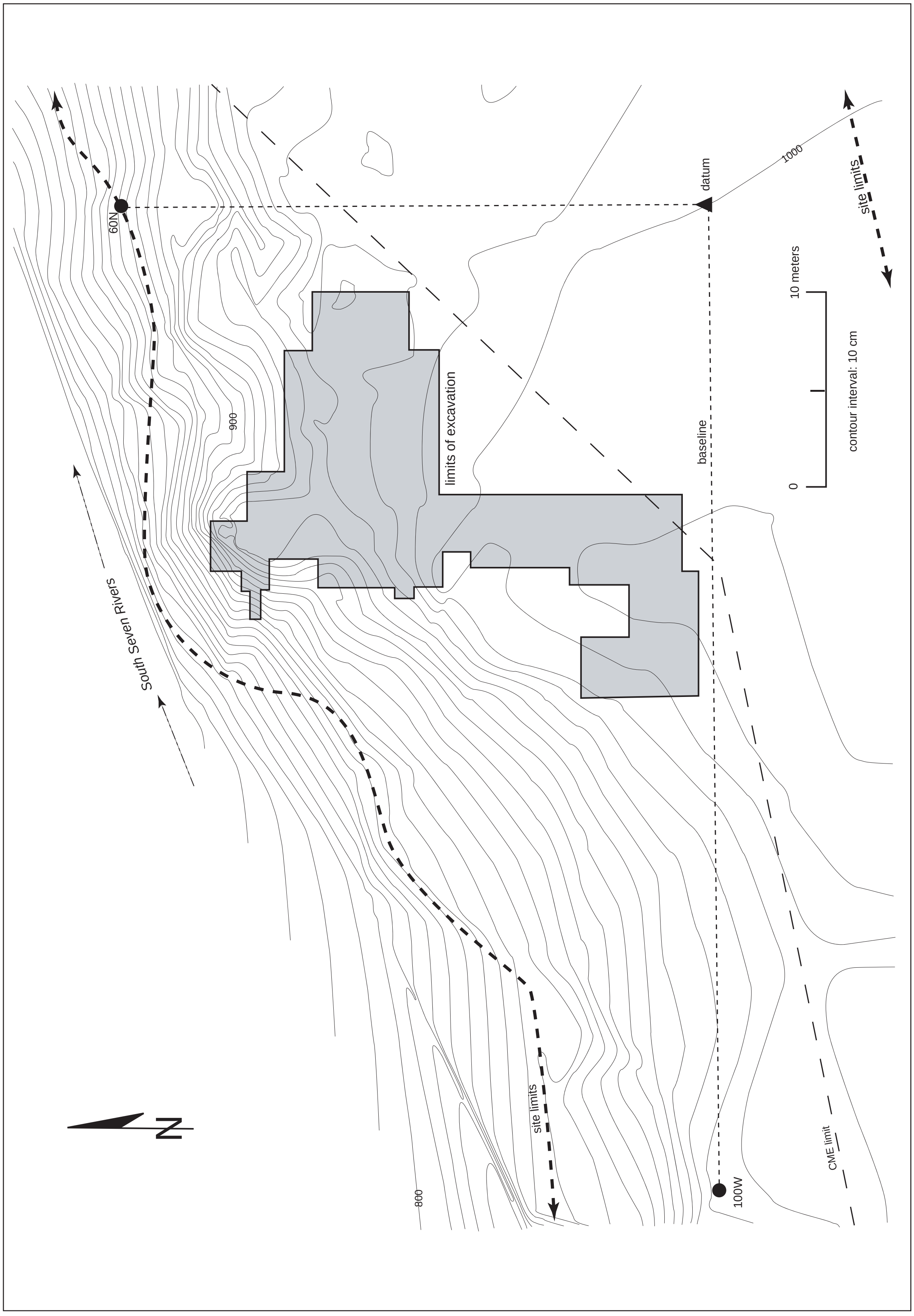


Figure 6.5. Excavation area, LA 38264 East.

were conducted west of the highway.

East of the highway, excavation started with the squares south and southeast of the communal baking facility, TF 4, and the work progressed toward that feature (Fig. 6.6). (*Communal baking facility* is the term used throughout the remainder of this report; this feature type is known more commonly as a ring midden, agave roaster, midden circle, or annular thermal feature.) The principal aim was to open up the area on top of the terrace and adjacent to the communal baking facility to look for the presence and patterning of other features and artifacts associated with the ring midden.

Once excavations reached the communal baking facility, two trenches of hand-excavated, 1 by 1 m squares sectioned the ring midden north to south and east to west to ascertain feature depth and the presence or absence of an interior rock-lined pit, and to obtain profiles of the feature.

These objectives accomplished, attention was then turned to exploring peripheral areas of the site. This was accomplished by extending the strip zone south, then west. Had time permitted, additional squares would have been excavated eastward from this southward extension to expose what appeared to be more burned-rock features in that area. We intentionally excavated a single, large, contiguous area of the site for one major reason—to ascertain the degree of interconnectedness of collections, observations, and artifact densities, as well as the presence or absence of additional features from one end of the excavated area to the other.

The minimalist approach, that is, the selective placement of small excavation units with unexcavated spaces between them, results in voids in observations and collections. Such voids may obscure the relationships among the features and artifacts of the site and severely hamper the generation of comprehensive, integrated interpretations of site history and use. Here, as elsewhere on the project, we discovered features that did not show on the surface and probably would have been missed if we had employed the minimalist strategy.

Because of our broad-scale stripping in areas normally not excavated by archaeologists—that is, between concentrations of burned-rock features—we uncovered several nonrock hearths. Although these features have occasionally been discovered at other sites in the region, their discovery has usually been accidental and their significance overlooked (Wiseman 2001b). Despite their paucity of discolored fill (medium gray and lacking in visible charcoal), we have had excellent luck in dating them by the AMS radiocarbon method.

Broad-scale stripping, as at Honea's site, also permitted us to more accurately define and characterize different sectors of occupation and occupation intensity across the excavated area. These sectors are given designations according to cultural content and presumed use of the space (Figs. 6.7 and 6.8). Thus, we have the communal baking facility, the preparation or staging area adjacent to that facility, the central or main camp, and the peripheral camp (Wiseman 1998). But the radiocarbon dates for a number of features, all of which are described and discussed later in this report, cast doubt on these distinctions.

The patterning in the surface lithic debitage also suggested that we should partition the site into analytical subareas to decide whether or not different lithic reduction technologies were employed through time. Areas 1, 2, and 3 were defined within LA 38264 East (also called the East Area in this report). LA 38264 West (also called the West Area in this report) constituted a fourth area (Fig. 6.4).

In LA 38264 West, 9,135 sq m were inventoried for artifacts, but only the main concentration, near the highway, was inventoried and density-mapped for both burned rocks and artifacts (Fig. 6.3). The following figures pertain to that main concentration; the numbers of artifacts recovered from the rest of the West Area are inconsequential.

The main concentration within the West Area contained 4,480 sq m of space. In all, 131 artifacts were recovered, for a surface artifact density of about one artifact per 34 sq m. Burned-rock density, excluding the rocks in obvious thermal features, was considerably higher. A total of 786 pieces were counted, for a density of about one burned rock per 5.7 sq m.

In the East Area a total of 6,152 sq m was inventoried, yielding 1,455 artifacts and an artifact density of about one artifact per 4.25 sq m. The 8,771 burned rocks calculate to a density of about 1.5 rocks per square meter, excluding the 324 sq m associated with TF 4.

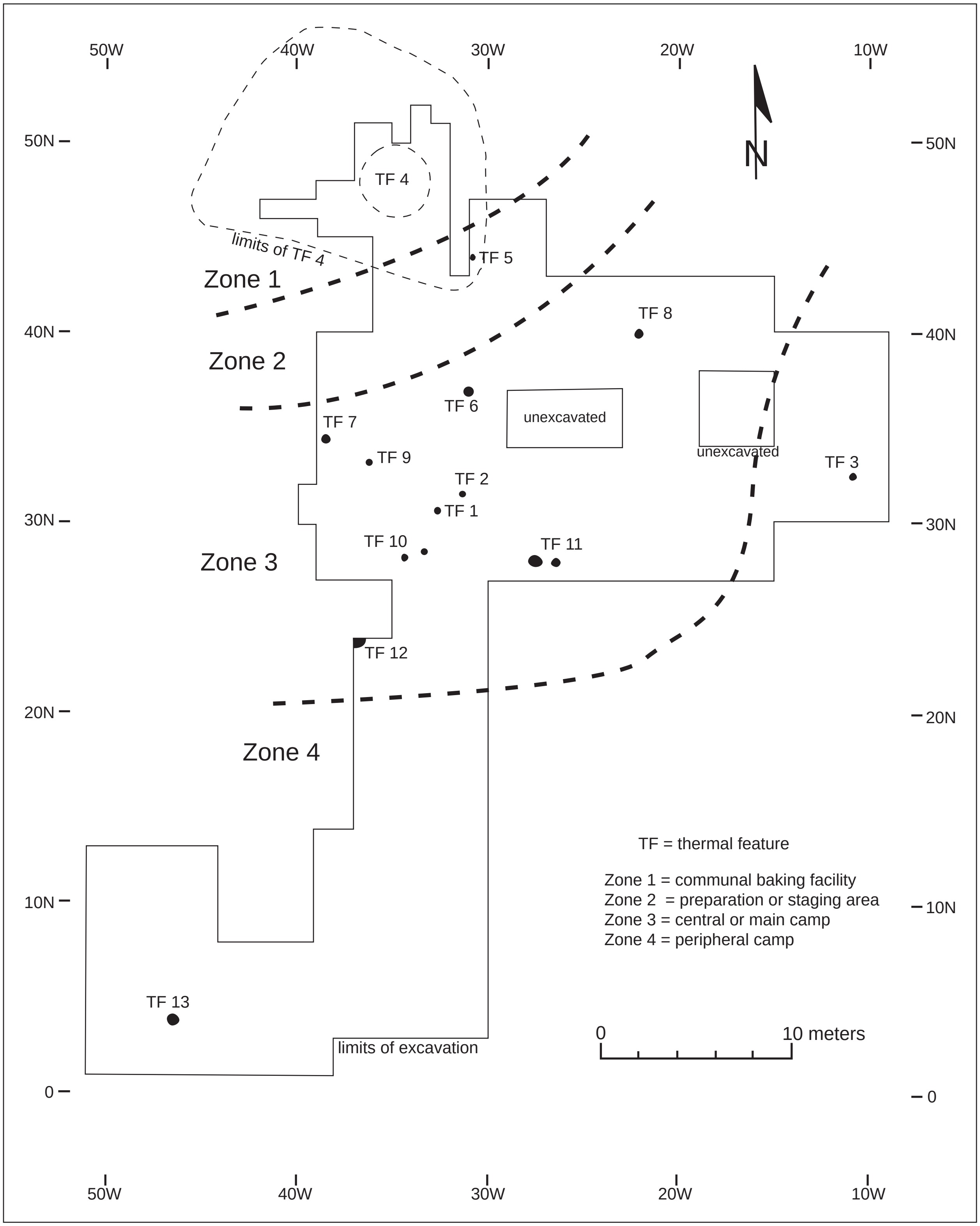


Figure 6.6. Excavated features and activity areas, LA 38264 East.

Figure 6.7. General view of excavations showing surface stripping, LA 38264 East.

Figure 6.8. LA 38264 East, showing relative elevations of terrace top (figures at left) and north slope (figures at right).

Except under dunes, all excavated squares were shovel-scraped to final depths of 5 to 10 cm below the modern surface. Dunes were closely trimmed but not entirely removed because of the desire to open more shallow squares in the time available. It is likely that the dunes overlie prehistoric cultural deposits. A total of 783 1 m squares were excavated.

Features

Thirteen features were excavated in the East Area (Fig. 6.6). Many other features and possible features were noted outside the excavated area but could not be explored in the available time. All but one of the features were thermal features of two types—burned rock and nonrock (Table 6.1). As at Honea's site, only the rock thermal features were observed from surface indications. Four nonrock thermal features were brought to light during the excavations.

TF 8 was a small ring formed of burned rocks (Figs. 6.9 and 6.10). Most of the ring was one rock high, although a few small rocks rested on top of lower ones. Given its position on the modern ground surface, we suspect that it was a twentieth-century campfire. Its charcoal and stained fill had blown out over the years since its use.

What appeared to be at least five different types of features (not including TF 8) were excavated at LA 38264 East. Following Black et al. (1997), we suggest the following functions for these feature types, though the terms are ours. Several of these features were dated by radiocarbon technique and are discussed in a later section of this report.

Small, Nonrock Thermal Features

Small, nonrock thermal features (TFs 1, 3, 5, 7; Figs. 6.11–6.16) were circular to oval pits 25 to 65 cm in the longest dimension and 2.5 to 10 cm deep. Pits were dug into consolidated sediments. Fills were light to medium gray and did not contain charcoal larger than flecks and very small pieces, but in each case, sufficient charcoal was recovered to permit AMS dating (a few small rocks may be present, but rock content is very low compared to that of rock features). These features are thought to be short-term campfires completely or nearly lacking heat-retention elements (rocks). They are believed to have been used by four individuals for light and cooking for a few days at most.

The presence of an obsidian projectile point in the fill of TF 7 should be noted. Although a few

Table 6.1. Thermal features, LA 38264

Feature	Size (m)	C-14 Dates and Comments
		Small, Nonrock Thermal Features
TF 1	0.25 x 0.25 x 0.2	1 date (Beta-122663)
TF 3	0.59 x 0.53 x 0.08	1 burned rock embedded in north edge of basin; 1 date (Beta-122664)
TF 5	0.44 x 0.37+ x 0.03	East half excavated; 1 date (Beta-122665)
TF 7	0.65 x 0.33 x 0.07	16 small fragments of burned rock and obsidian arrow point in fill; 1 date (Beta-118876).
		Small, Rock Thermal Features
TF 2	0.75 x 0.55 x 0.10	Squarish cluster of rocks; not dated
TF 9	0.40 x 0.20 x 0.10	Irregular cluster of rocks; not dated
TF 10	1.25 x 0.75 x 0.10	Irregular cluster of rocks; dimensions do not include square cluster of rocks situated off to one side; not dated
		Small, On-Ground Baking Facilities
TF 11	1.40 x 1.30 x 0.15	Small group of rocks pulled off to east side not included in dimensions; not dated
TF 13	1.15 x 1.10 x 0.10	Very shallow pit below rocks; 1 date (Beta-122874)
		Small, Pit-Baking Facilities
TF 6	1.00 x 0.95 x 0.18	3 dates (Beta-118875, Beta-122666, and Beta-118874)
TF 12	ca. 2.00 x 2.00	1 date (Beta-118877)
		Communal Baking Facility
TF 4	16.0 x 14.0 x 0.50	9 dates; see text for details
		Recent Historic Thermal Feature (?)
TF 8	1.20 x 1.10 x 0.12	Small ring of burned rocks at modern surface; not dated

Figure 6.9. TF 8 after excavation, LA 38264 East.

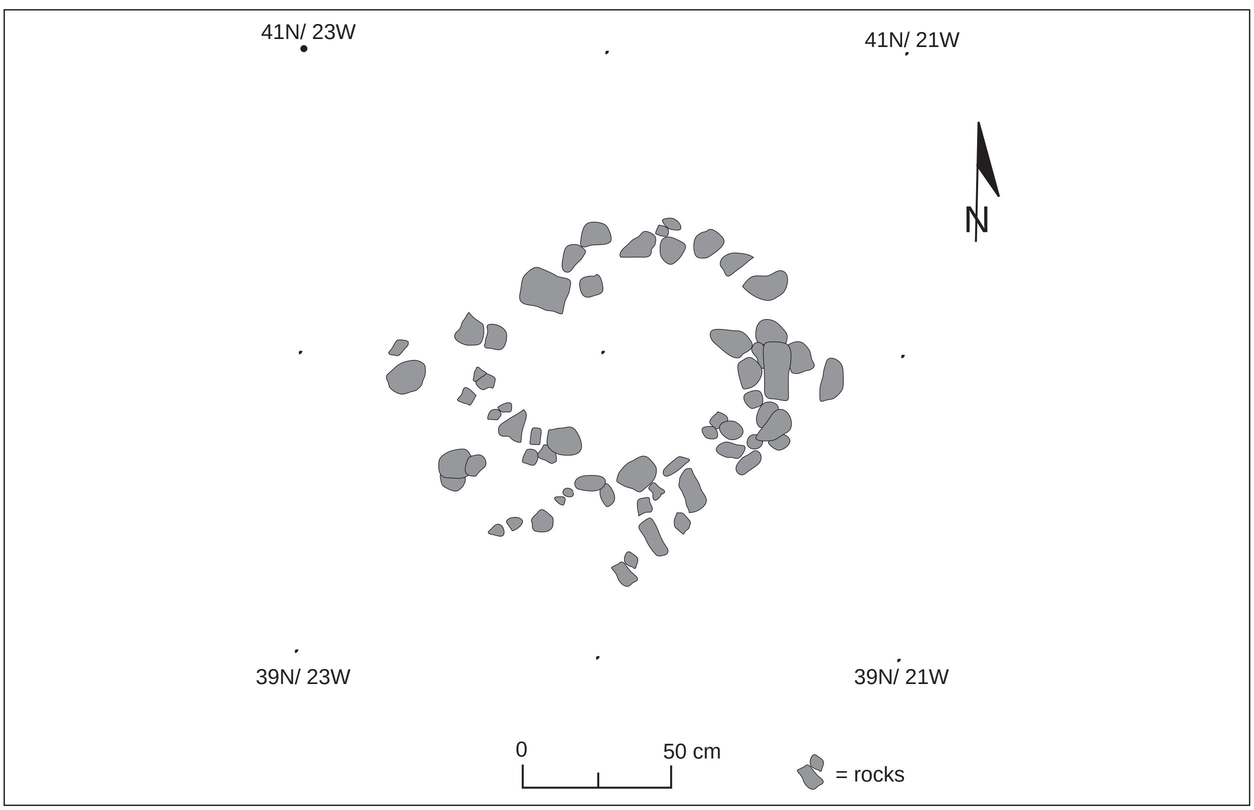


Figure 6.10. Plan of TF 8, LA 38264 East.

Figure 6.11. TF 3 after excavation, LA 38264 East.

Figure 6.12. TF 7 after excavation, LA 38264 East.

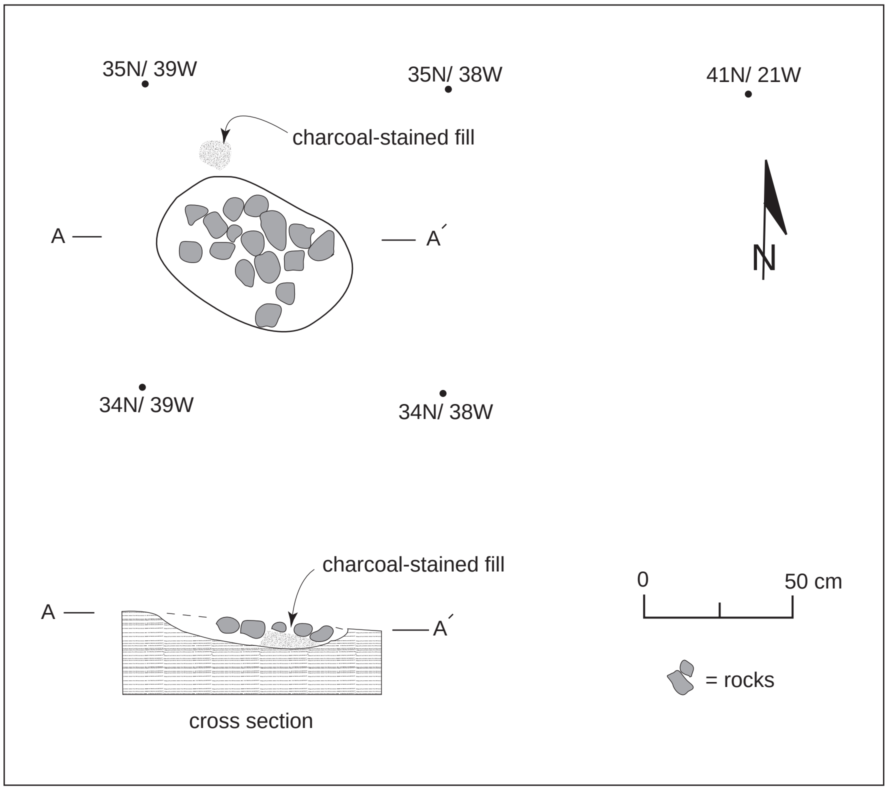


Figure 6.13. Plan and cross section of TF 7, LA 38264 East.

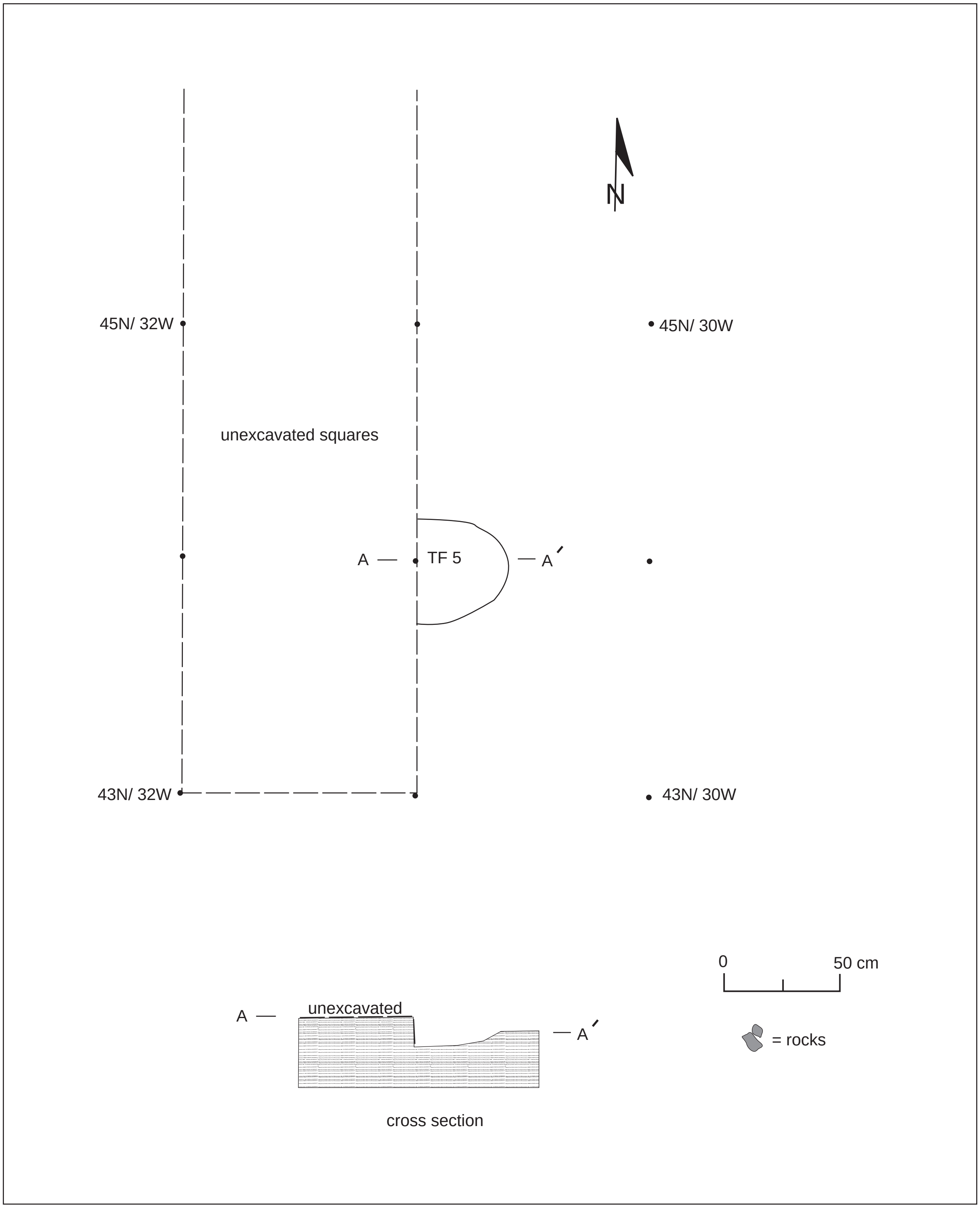


Figure 6.14. Plan and cross section of TF 5, LA 38264 East.

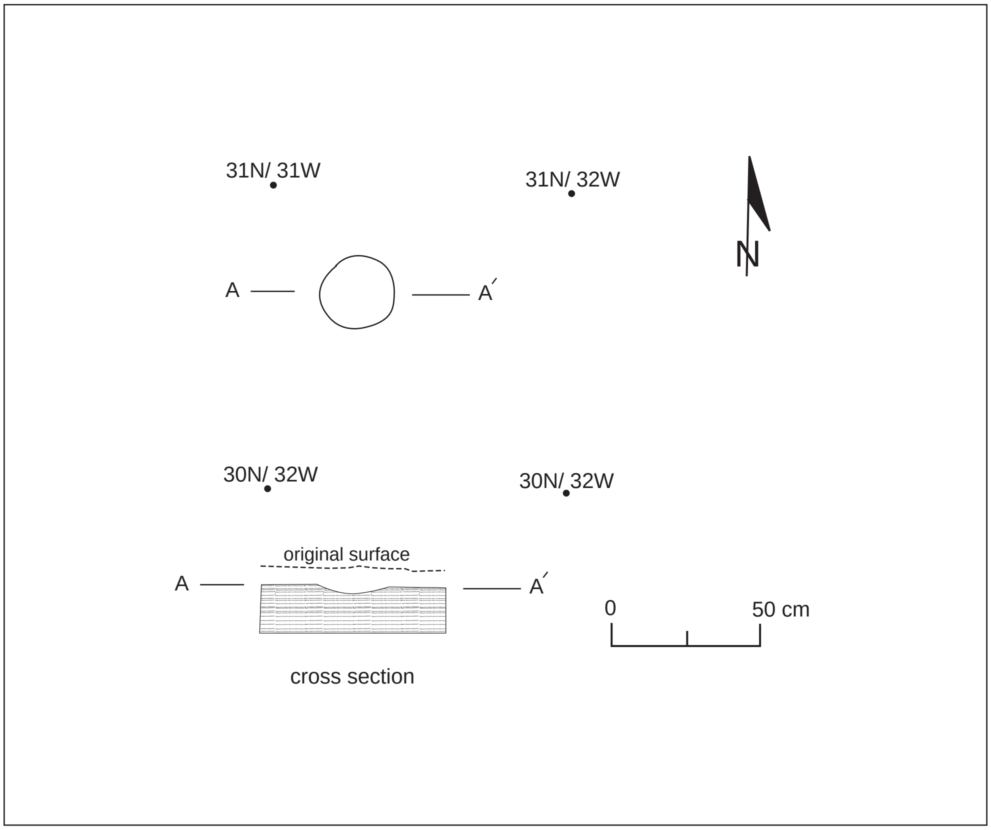


Figure 6.15. Plan and cross section of TF 1, LA 38264 East.

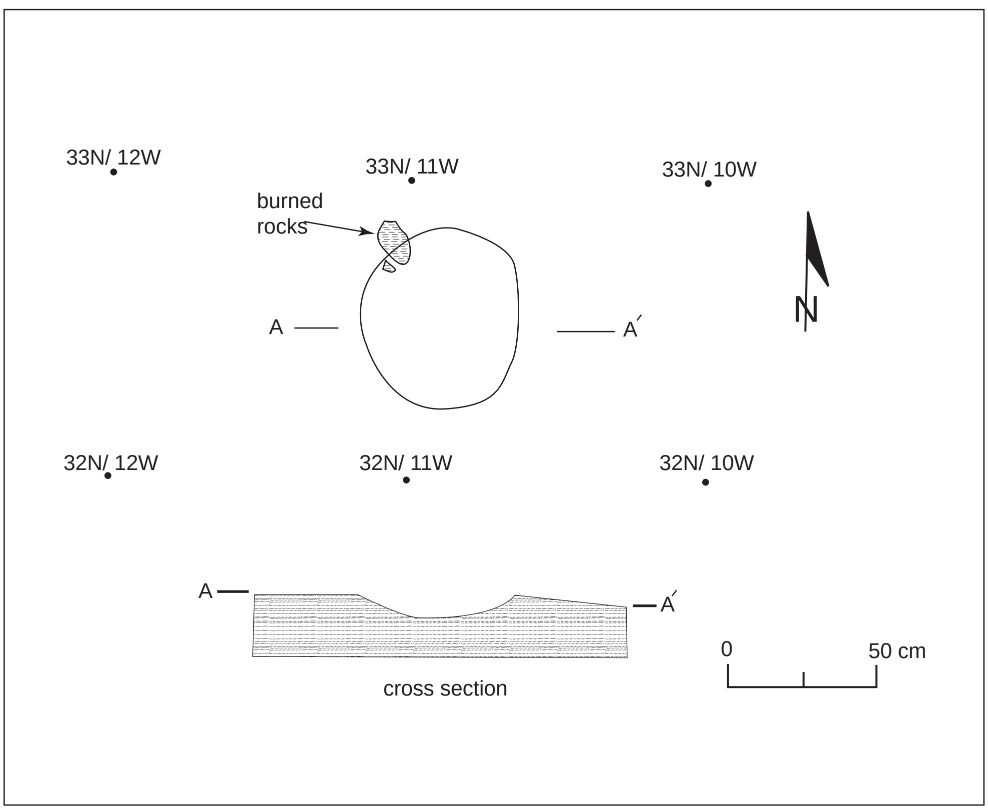


Figure 6.16. Plan and cross section of TF 3, LA 38264 East.

pieces of obsidian debitage were also recovered from this site, this is the only formal obsidian artifact recovered during the project.

Small, Rock Thermal Features

Small, rock thermal features (TFs 2, 9, 10; Figs. 6.17–6.20) were roughly circular concentrations of burned rocks resting on the aboriginal ground surface. They were 55 to 75 cm in diameter, and rocks were piled up to 10 cm high. These features may have been short-term campfires with numerous heat retention elements (rocks). They are believed to have been used by four individuals for light and cooking for a few days at most.

TF 10 was curious in that it was composed of two equal-sized collections of burned rocks, either or both of which could be small rock thermal features in themselves. Conceivably, the two together could have been the remains of a small on-ground baking facility in which the east group of rocks was pulled off the west group to permit extraction of the cooked foodstuffs. Since we have no datable charcoal from either group, we have no way of checking them for contemporaneity.

Small, On-Ground Baking Facilities

Small, on-ground baking facilities (TFs 11, 13; Figs. 6.21–6.23) were roughly circular, burned-rock concentrations resting on the aboriginal ground surface. Rock concentrations measured 1 to 1.5 m in diameter. The rocks were piled 10 to 15 cm high. Some of the features had a small group of burned rocks off to one side that evidently were pulled off to permit extraction of the cooked foodstuffs. They may have served as one-time baking facilities for small groups of individuals (family or extended family?) for a few days or perhaps a week or two.

Small, Pit-Baking Facilities

Small, pit-baking facilities (TFs 6, 12; Figs. 6.24–6.28) were burned-rock concentrations lying within circular or oval pits dug into the aboriginal ground surface. The pits were 1 to 2 m in diameter and 20 to 25 cm deep. They may have served as baking facilities for a small group of individuals (family or extended family?) for a few days or perhaps a week or two, perhaps on two or more occasions.

TF 6 was excavated in its entirety, but only a quarter of TF 12 was excavated. Pit sizes ranged from 1 to 2 m in diameter and 20 to 25 cm deep. The fill of TF 6 was stratified. The upper half was composed of burned cobble fragments in dark sediment, and the lower half was composed almost entirely of dark sediment containing few rock fragments. The fill of TF 12 was mainly broken burned cobbles immersed in darkly stained sediments.

Communal Pit-Baking Facility

Communal pit-baking facilities such as TF 4 (Figs. 6.29 and 6.30) are characteristic of the archaeological landscape and literature of the northern Trans-Pecos (Charles 1994; Gallagher and Bearden 1980; Greer 1965, 1967, 1968; Hines 1994; Katz and Katz 1981, 1985b; Luke 1983; Mallouf 1985; Phippen et al. 2000; Young 1982). They have also been called "midden circles," "midden rings," "ring middens," "agave roasters," "sotol pits," "burned rock rings," and "annular thermal features." Whatever the term used, most archaeologists seem to agree that these large facilities were used for cooking large amounts of foods, probably for groups of people. Hines et al. (1994) provide an ethnographic overview of pit ovens used for baking a variety of xeric plant foods.

TF 4 was one of the less well-developed features of this type. The interior space measured 4 m across and 50 cm deep, and the outside diameter, distorted by downslope drift, measured 8 to 10 m. The interior space was filled to the top (modern ground surface) with black sediment, a number of burned rocks, and even fewer artifacts. The burned-rock ring consisted mostly of fist-size fractured rocks with minimal interstitial blackened sediment and few artifacts. The maximum ring height above aboriginal ground surface was 25 cm.

The profiling trenches excavated through TF 4 (Fig. 6.31) show that it lacked a central, stone-lined pit, but it seems clear that the feature was used more than once. At the time of each use, a new, unlined pit was excavated within the rock ring, the foods were cooked, the fill and rocks were thrown to the periphery, the food was removed, and then the feature fell into disuse

Figure 6.17. TF 2 after excavation, LA 38264 East.

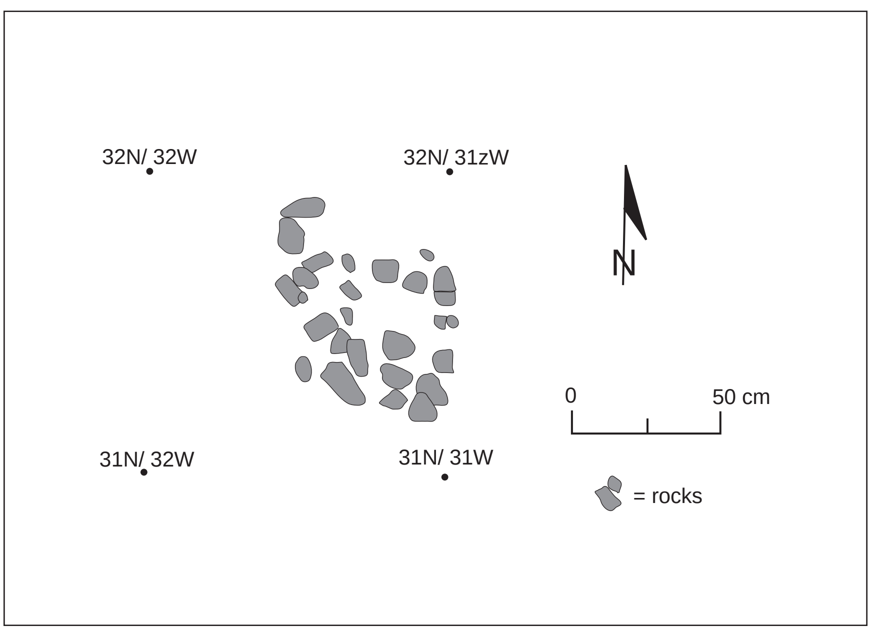


Figure 6.18. Plan of TF 2, LA 38264 East.

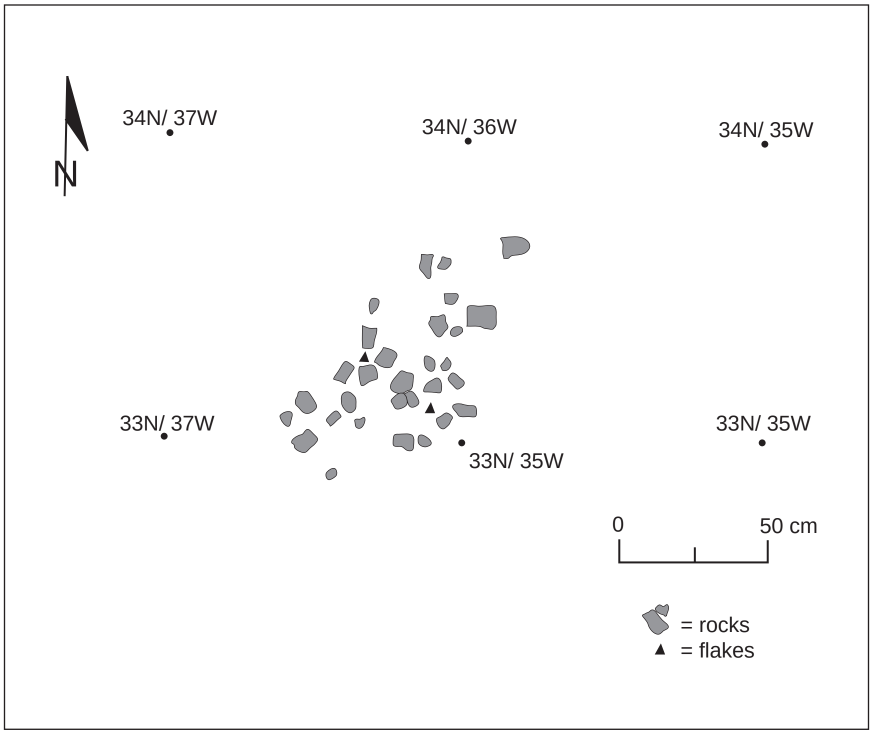


Figure 6.19. Plan of TF 9, LA 38264 East.

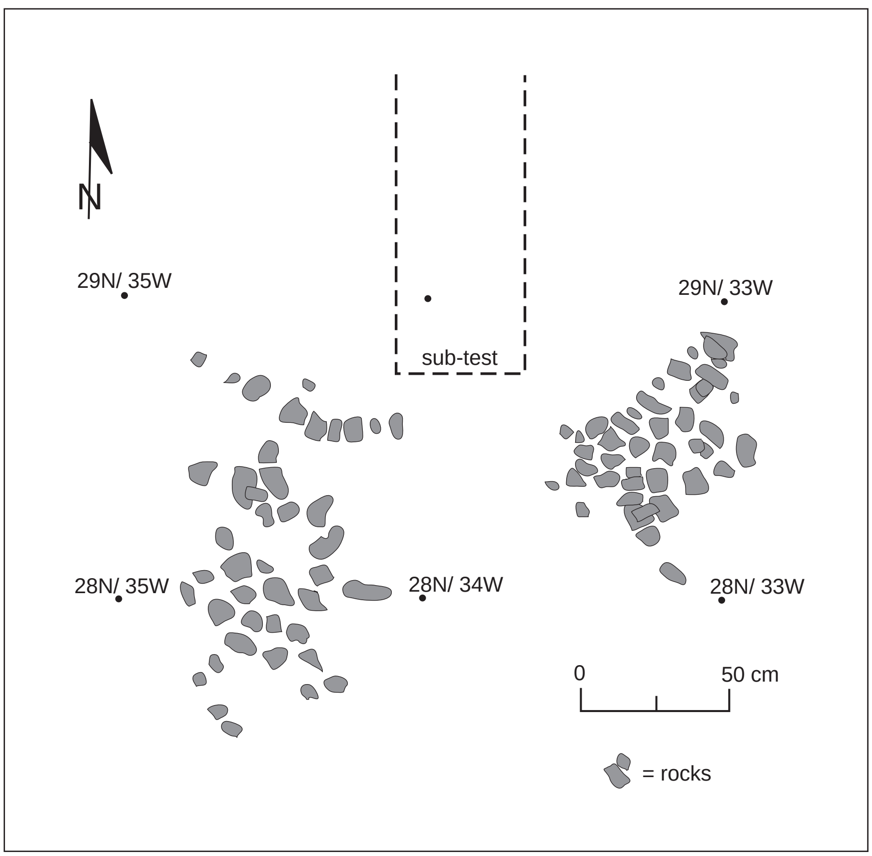


Figure 6.20. Plan of TF 10, LA 38264 East.

Figure 6.21. TF 11 after excavation, LA 38264 East.

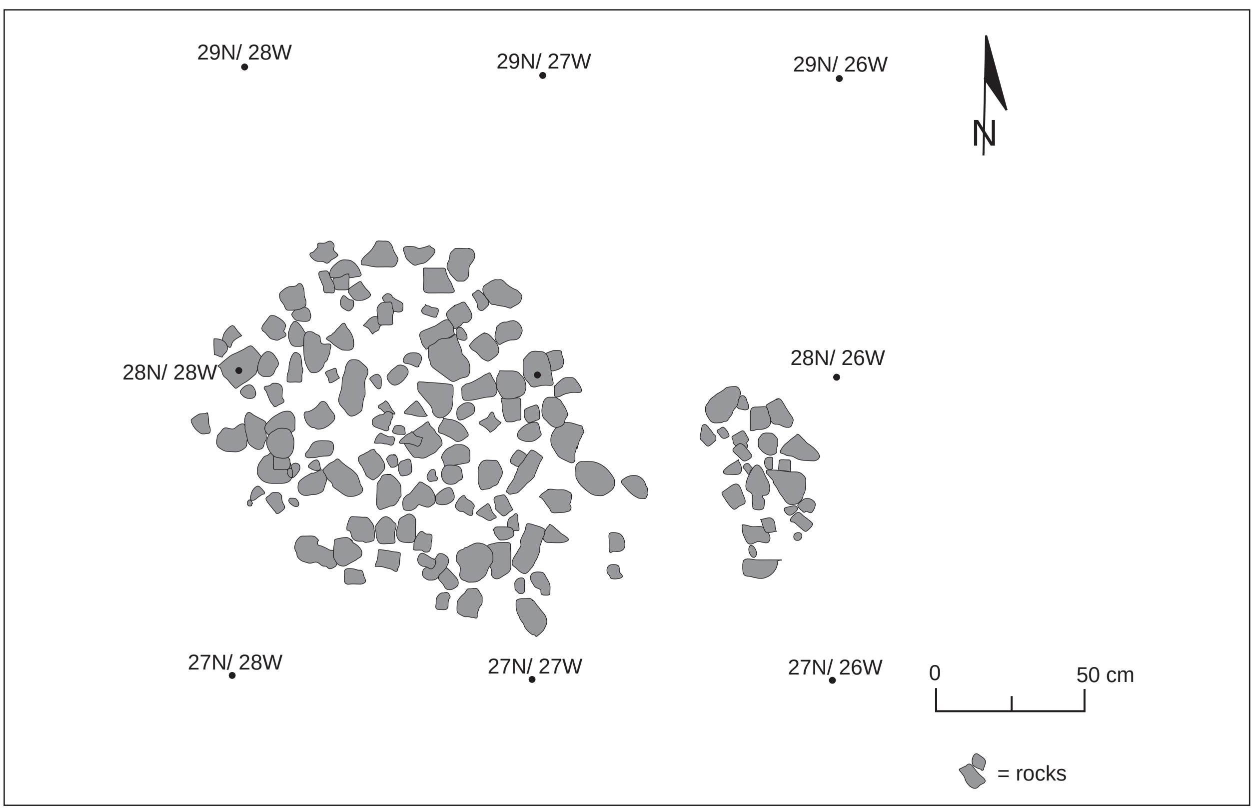


Figure 6.22. Plan of TF 11, LA 38264 East.

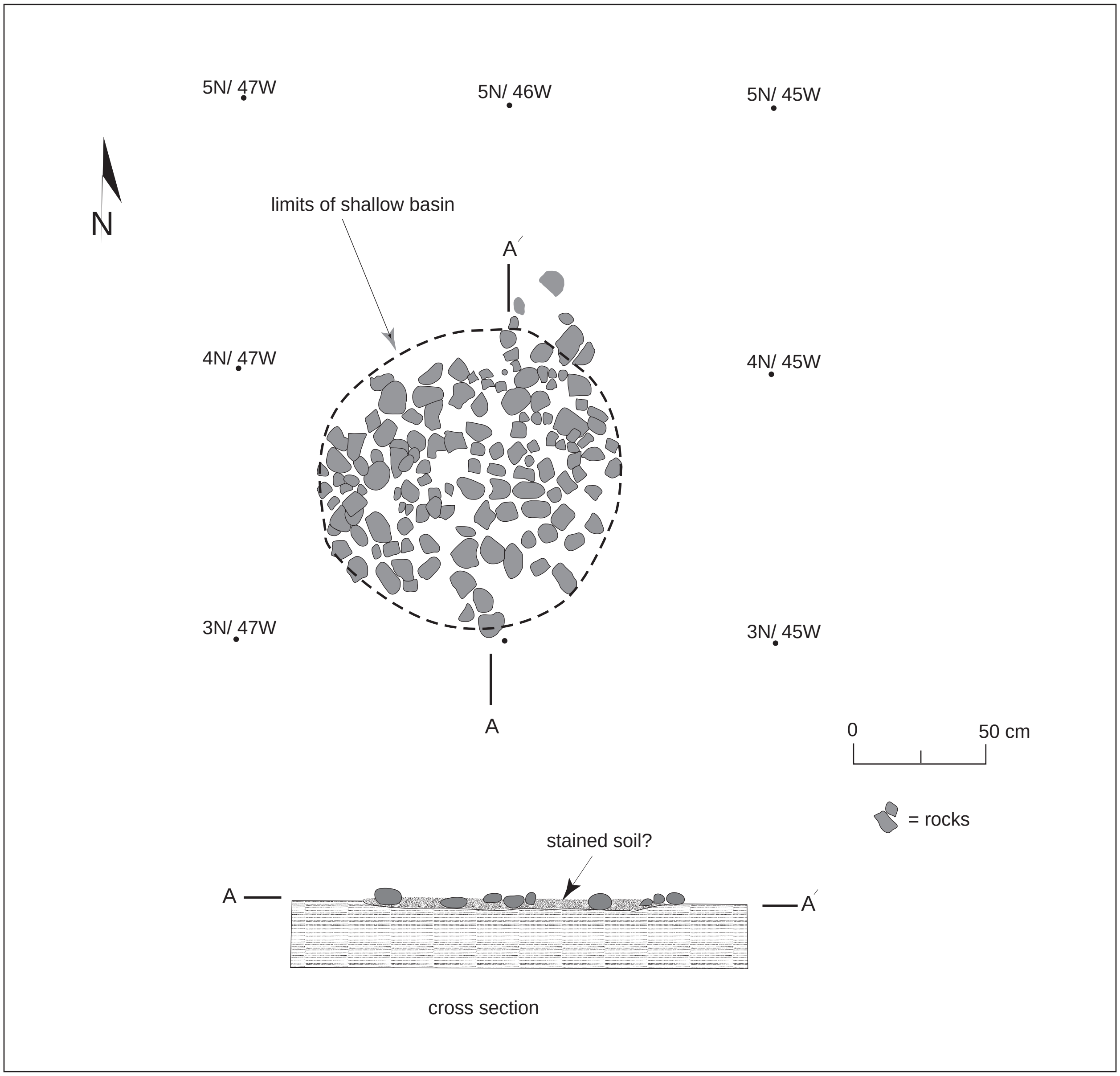


Figure 6.23. Plan and profile of TF 13, LA 38264 East.

Figure 6.24. TF 6 as discovered during surface stripping, LA 38264 East.

Figure 6.25. TF 6 after excavation, LA 38264 East.

Figure 6.26. Randy Rhodes (left) and Byron Hamilton excavating TF 12, LA 38264 East.

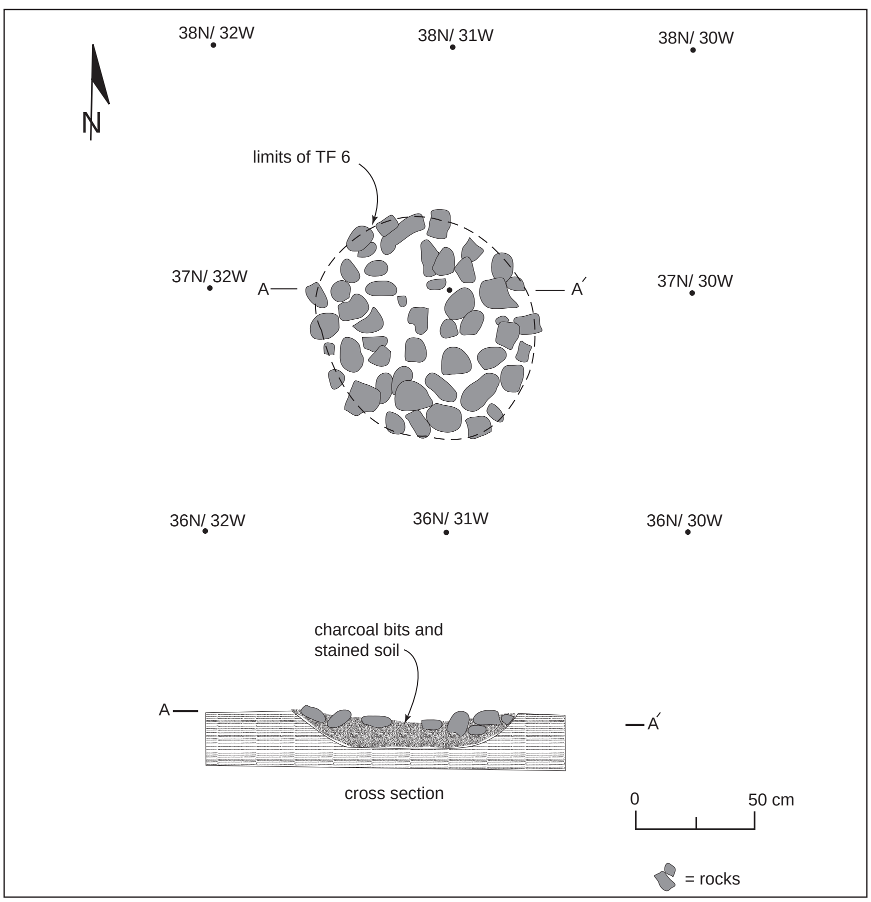


Figure 6.27. Plan and profile of TF 6, LA 38264 East.

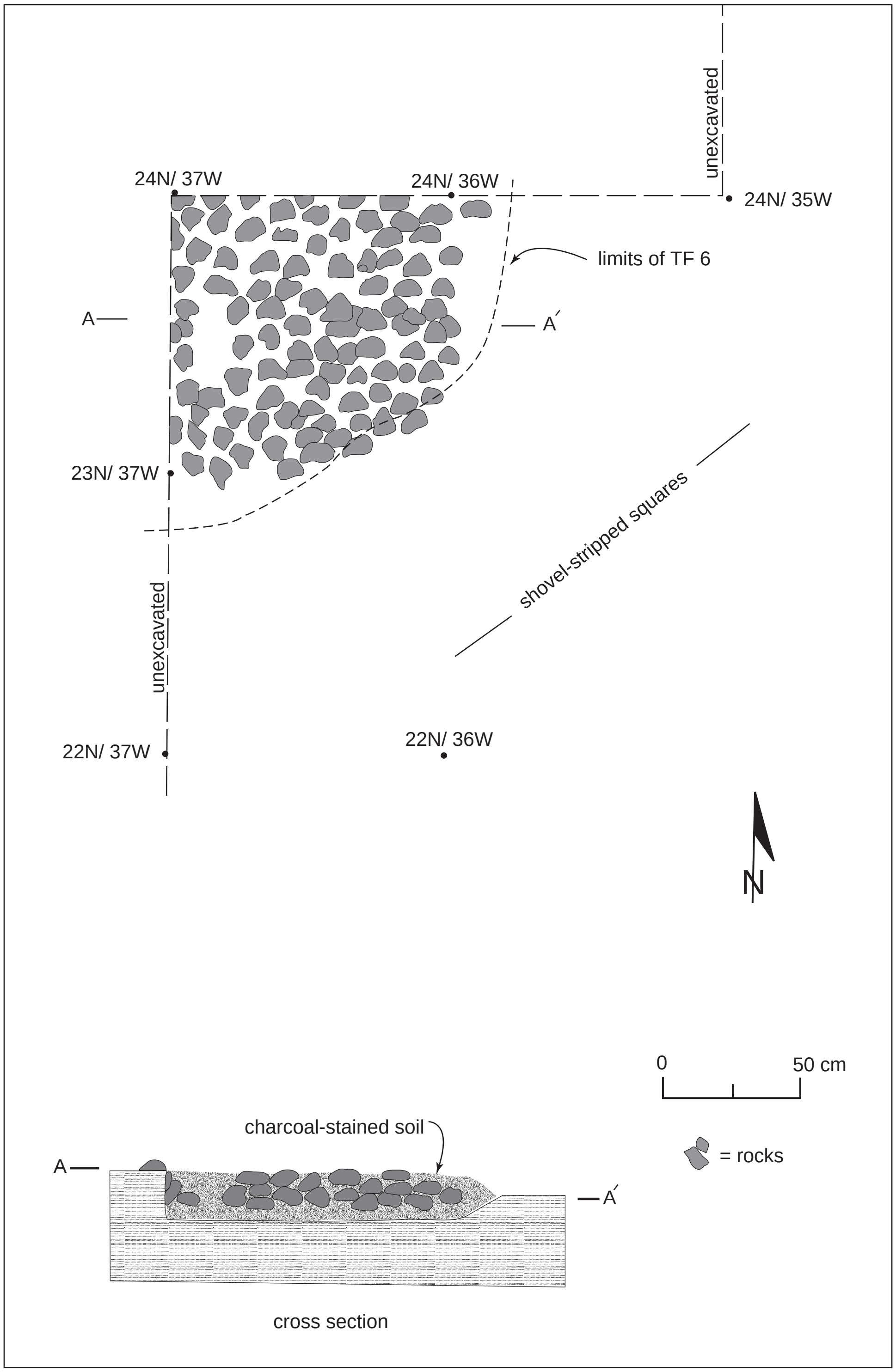


Figure 6.28. Plan and profile of TF 12, LA 38264 East.

Figure 6.29. Phil Alldritt excavating a trench at TF 4, LA 38264 East. Looking north.

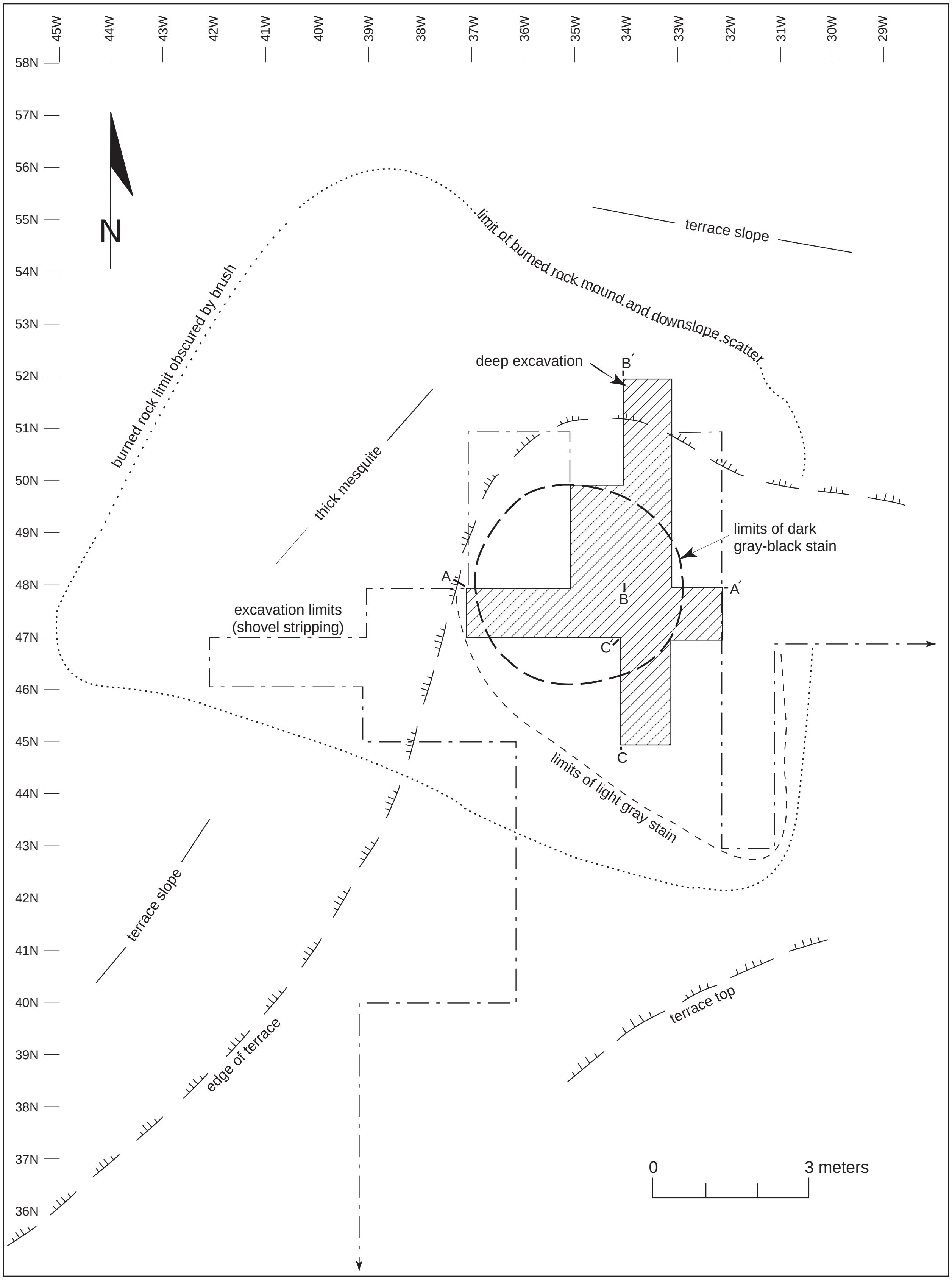


Figure 6.30. Plan of TF 4, LA 38264 East.

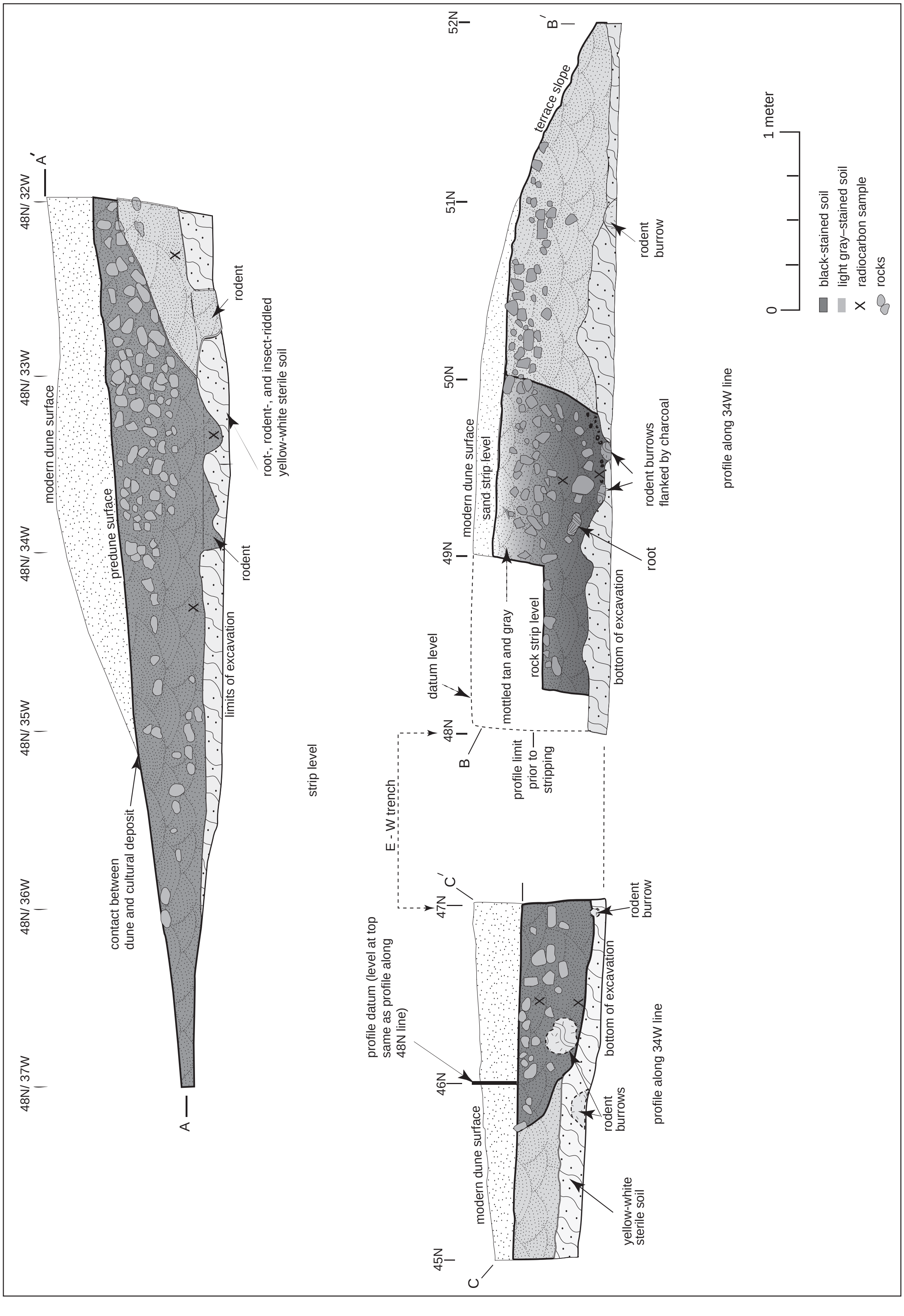


Figure 6.31. Profiles of TF 4, LA 38264 East (see Fig. 6.30). The top profile is along the 48N line.

for an unknown period of time. When the time came to use it again, another pit was dug within the interior space; this new pit probably at least partly intersected the old ones. This resulted in an uneven or undulating bottom across the feature. The profile of the bottom is rendered even more irregular because of subsequent rodent burrowing.

The comparatively massive accumulations of burned rocks and blackened sediments at facilities such as TF 4 indicate that it was used many times. However, we do not know any of the details of ring development. Several questions come to mind. What was the length of time between uses (periodicity)? What was the overall length of time that it took to develop the rock rings (longevity)? Did the features develop simultaneously as rings, or did some sectors develop earlier than others (directionality)? To assess periodicity, longevity, and directionality, we selected nine radiocarbon samples from the four cardinal directions and varying depths in the trench profiles of TF 4. The results of this study are presented in the dating section of this report.

It is important to note that no potsherds were found among the rocks of the ring or within the central fill. The presence of several sherds *on the surface* of the feature, as well as slightly to one side, originally misled us into thinking that TF 4 dated to the Late Prehistoric period. This turned out to be untrue.

Artifacts

Lithic debitage dominates the artifact assemblage from LA 38264. A total of 14,777 items came from the surface and the excavations. The next most abundant class is pottery, with a total of 37 sherds from the surface and the excavations. The 41 formal artifacts include metate and mano fragments, dart and arrow points, end scrapers, a beveled knife fragment, and a large flake-knife. Thirty roughouts or early-stage bifaces and 12 fine or second-stage bifaces are described under lithic manufacture debris.

Plant Processing–Related Artifacts

Metates (n = 8)

Eight metates, all fragmentary (Fig. 6.32), are of the highly portable "travel" type of basin metate. That is, they are made on small, thin rock slabs, the edges of which have been trimmed to produce what is essentially a portable, lightweight grinding surface. FS 1130 appears to be about twice as thick (84+ mm) as the others (range of 23+ to 48+ mm), which made for a much heavier metate than usual. Five have a single, well-developed grinding surface, and three have two grinding surfaces, one on each face. The edges of one were chipped and ground to shape, and three had either minimal or no edge shaping. Four fragments lack edges, precluding assessment of this attribute. Four are of dolomite, three are of limestone, and one is dolomite or limestone. All are small fragments; the largest measures 155 by 94 mm. Measurable grinding-surface depths range from 6 to 36 mm. Four are burned, one is possibly burned, and the rest are not burned. Proveniences are widely scattered (Fig. 6.33).

Manos (n = 6)

All manos appear to be of the one-hand type (Fig. 6.34). Four have two grinding surfaces each, and two have one each. Most grinding surfaces are well developed, but three are only slightly developed (lightly used). Edge shaping varies from lightly ground to well formed by chipping and/or grinding. Materials of four are limestone, including two that are vesicular. A fifth mano is limestone or dolomite, and the sixth is mesocrystalline calcite. Condition includes two complete examples, three end fragments, and one medial fragment. The complete manos range from 113 to 118 mm long, 83 to 85 mm wide, and 47 to 60 mm thick. Three of the fragments are burned. Five specimens came from the general vicinity of TF 6.

Animal-Related Artifacts

Projectile Points (n = 23; also see Appendix 2)

Dart points (n = 20). The dart points recovered from LA 38264 include nine examples that have been provisionally typed using one of the more recent Texas typologies (Turner and Hester 1993; Fig. 6.35a–6.35r; Table 6.2) and one that appears to be a Maljamar point (Smith 1974). All but one (FS 1033) of the total assemblage are fragmentary,

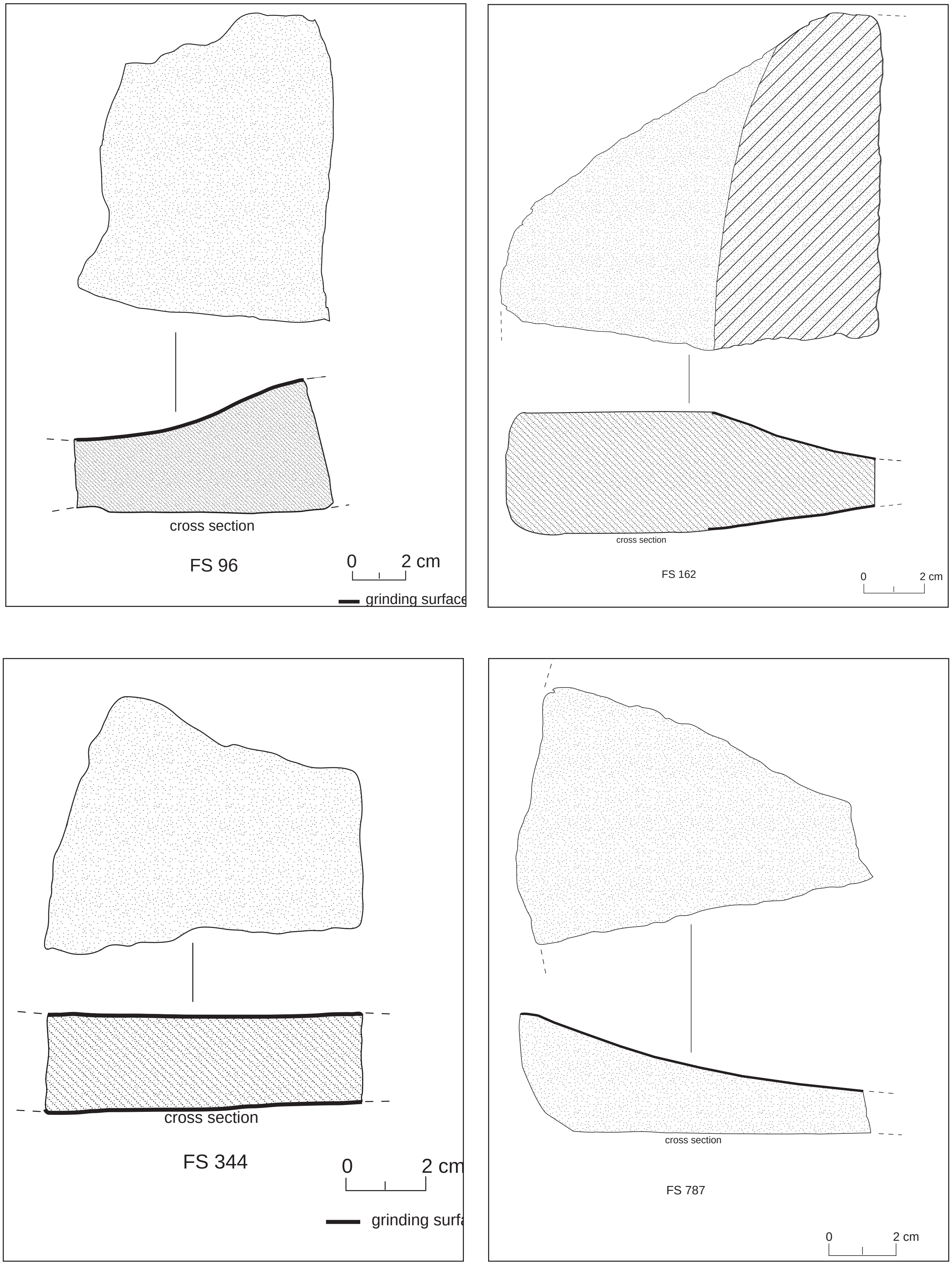


Figure 6.32. Metates, LA 38264 East.

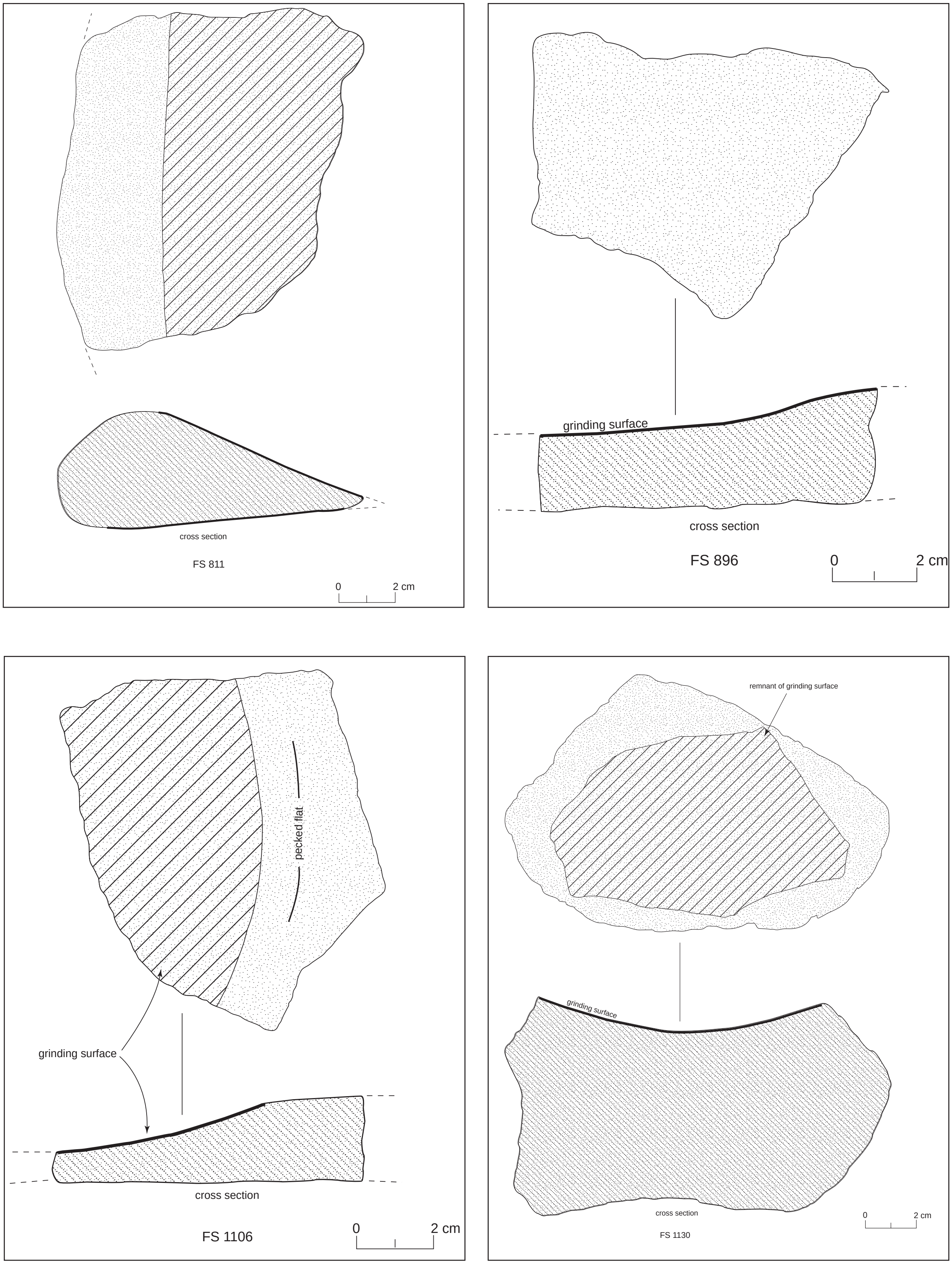


Figure 6.32 (continued). Metates, LA 38264 East.

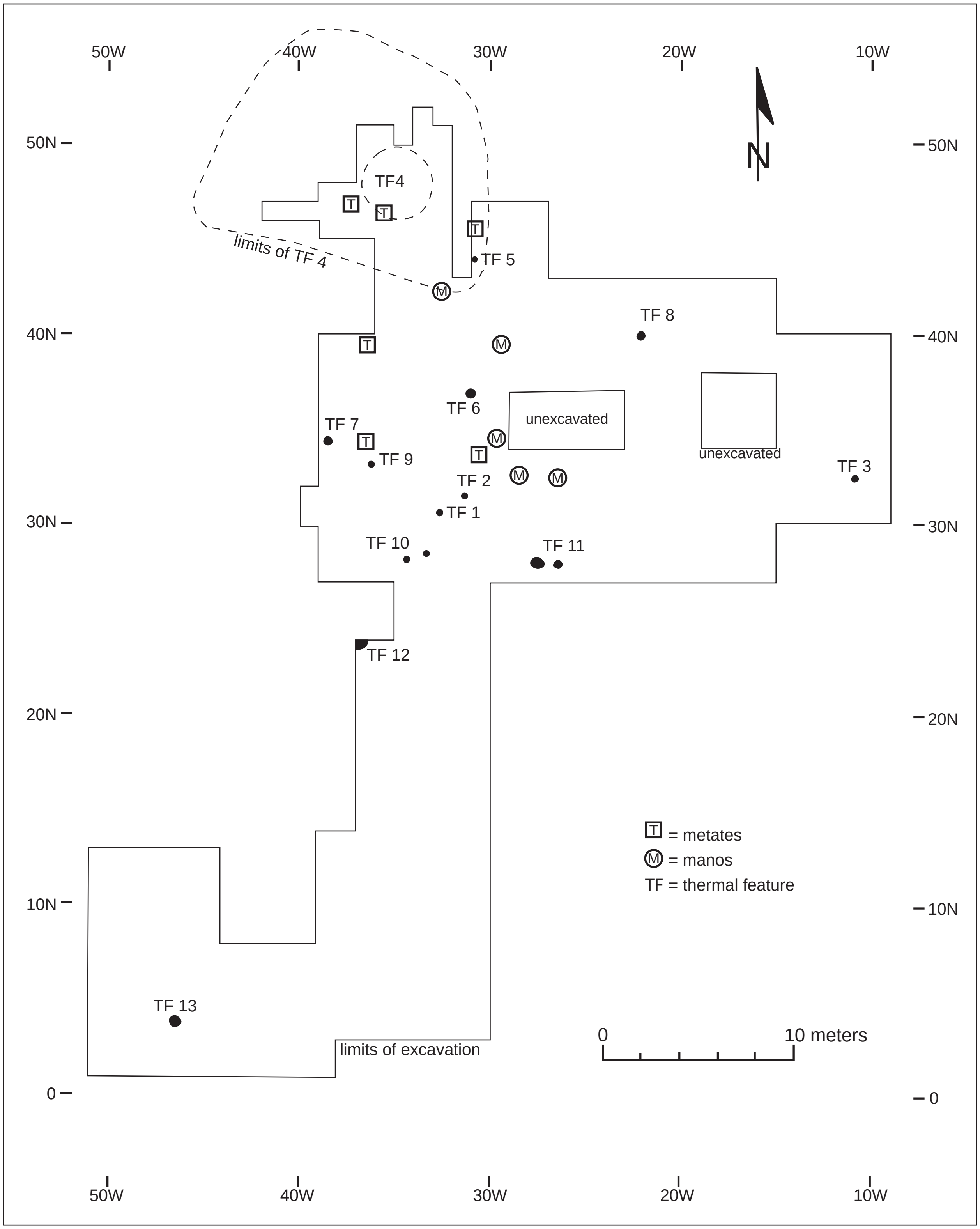


Figure 6.33. Distribution of metates and manos, LA 38264 East.

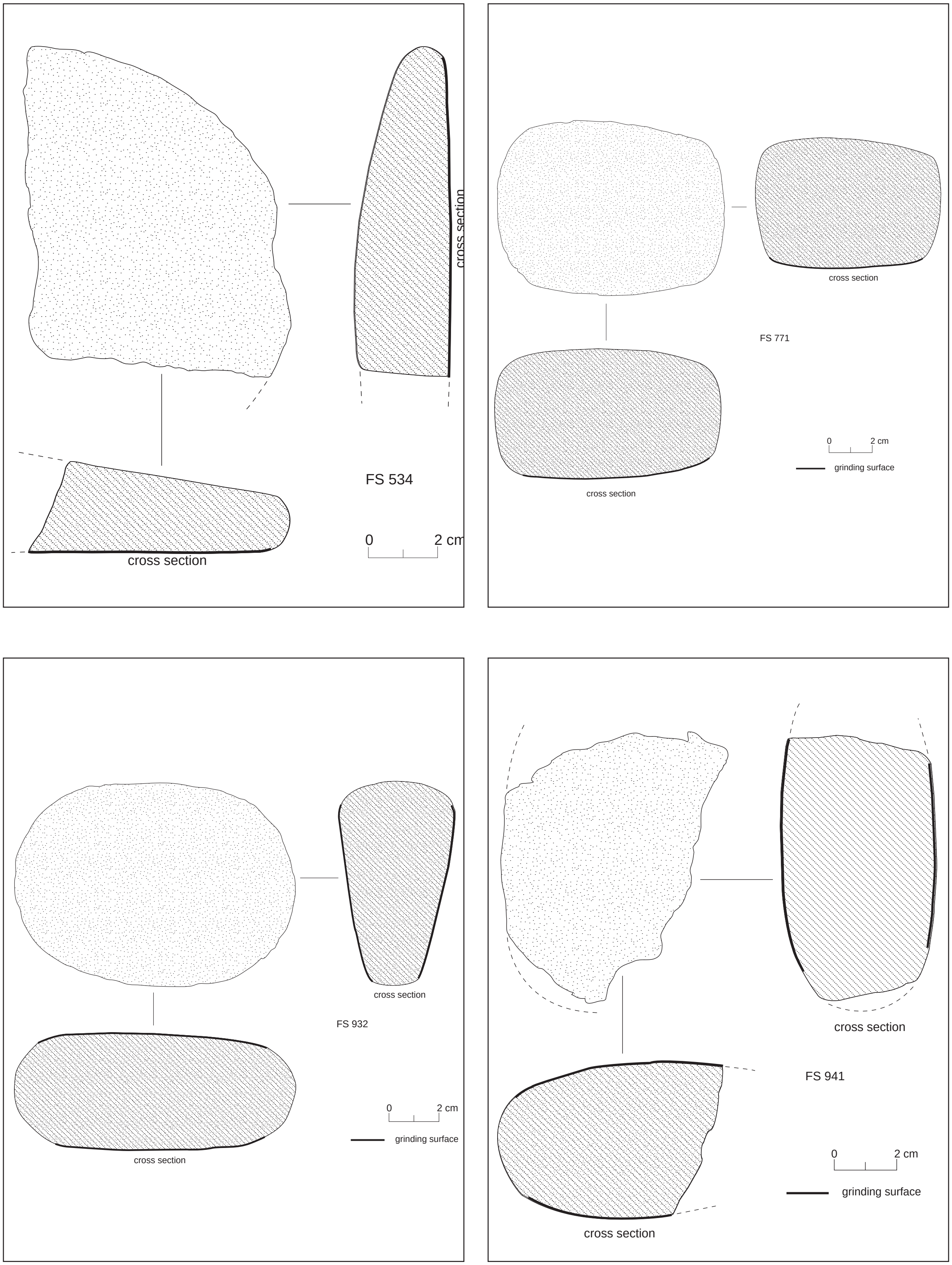
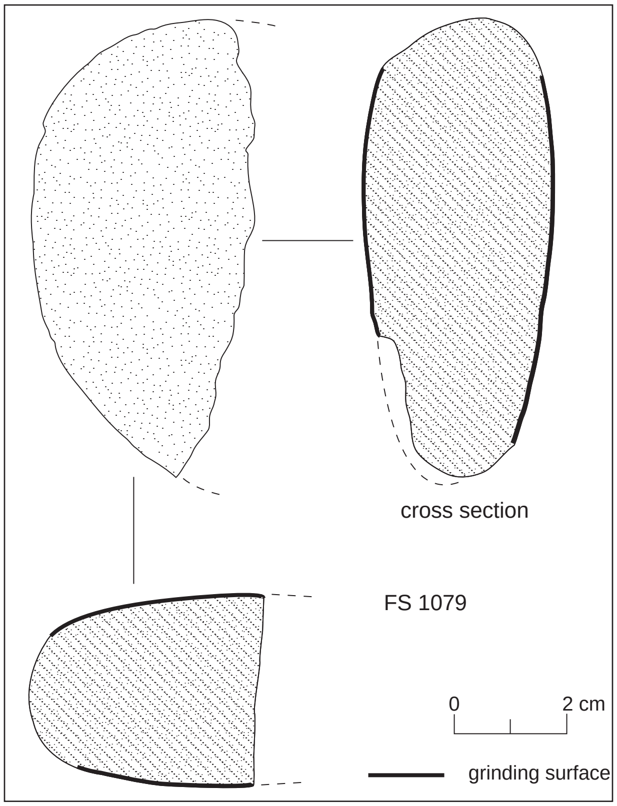


Figure 6.34. Manos, LA 38264 East.



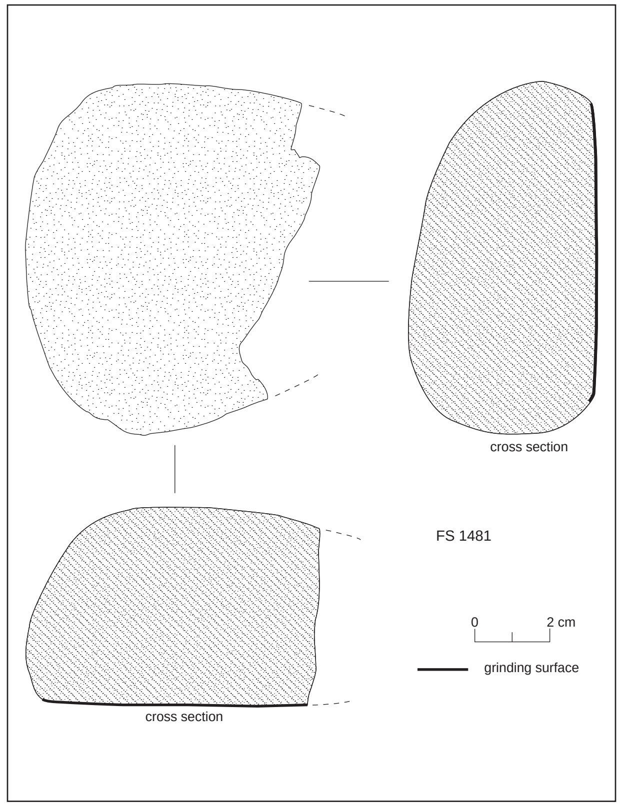


Figure 6.34 (continued). Manos, LA 38264 East.

Table 6.2. Dart points, LA 38264

Type	Number	FS Numbers
Ellis-like	4	611, 1193, 1265, 1532
Gary-like	1	1094
Gary- or Wells-like	1	963
Marcos-like	2	808, 1134/1190 *
Maljamar	1	764
Shumla-like	1	1033
Untyped	4	670, 1017, 1428, 1554
Miscellaneous fragments	6	472, 767, 860, 867, 1440
Total	20	

* Two pieces of the same point that conjoin.

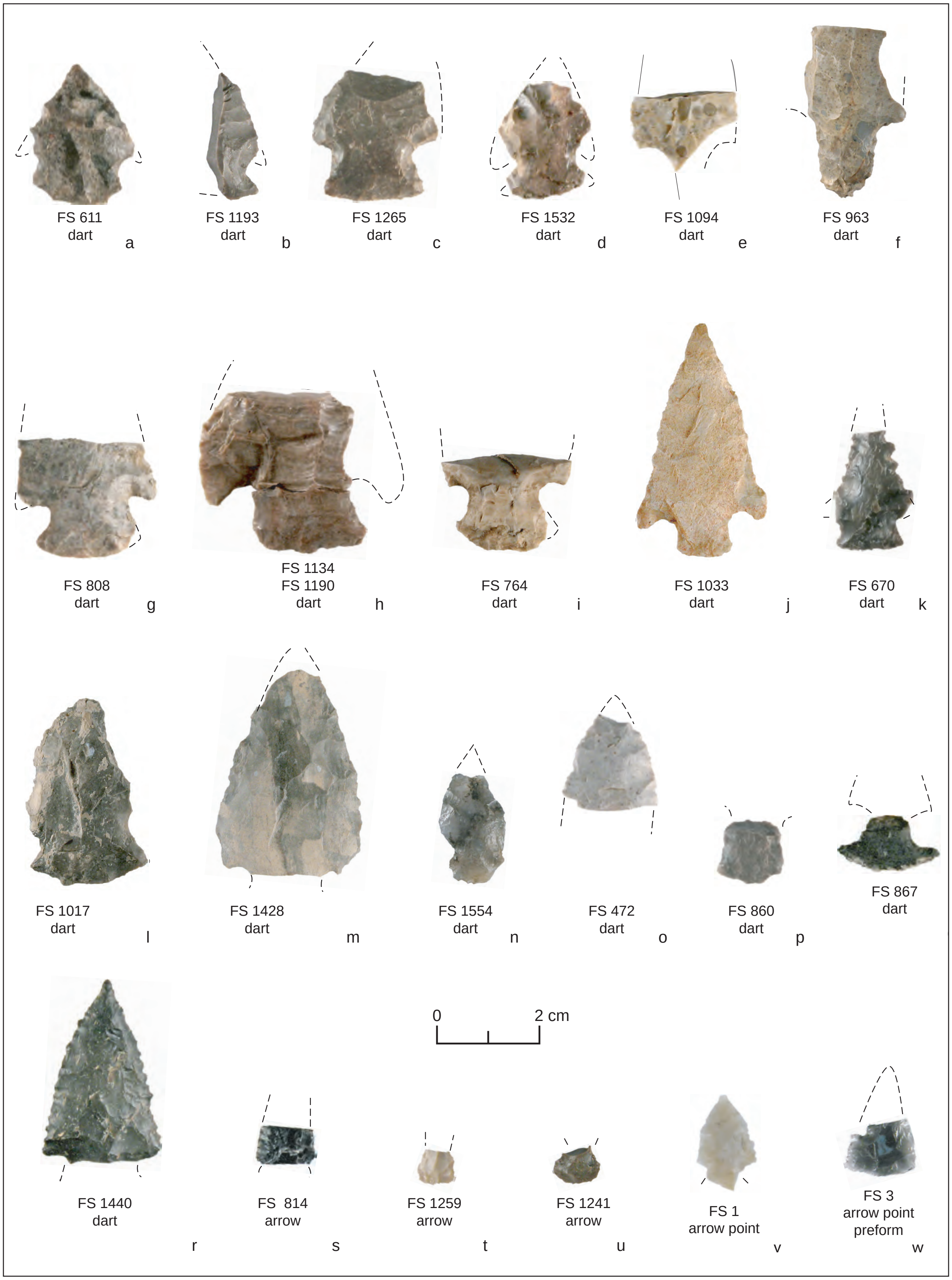


Figure 6.35. Dart points and arrow points, LA 38264 East.

and one point (FS 1134/1190) is represented by two fragments that conjoin. Materials are all local and include 19 of chert and 1 of chalcedony. Seven (FS 670, 808, 1033, 1134/1190, 1193, 1265, 1532) are heat-treated.

Most dart points (15) came from the excavations, generally within a few meters of features (Fig. 6.36). This is not to say that each point in some sense belonged to or was actually associated with its nearest feature, only that the find-spots were not clearly isolated from the presumed major activity areas. No dart points were recovered from west of the highway.

Arrow points (n = 4). The arrow points recovered from LA 38264 are all fragmentary (Figs. 6.35s–6.35v). They include one side-notched example that may be either Washita and/or Harrell in type (Turner and Hester 1993), two that appear to be Neff-style Livermores (Wiseman 1971), and one untyped side-notched point. Materials of two are local chert, and that of another (FS 814) is very dark brown obsidian. None are heat-treated. Those from east of the highway came from the excavations as follows: FS 1259 (probably Neff style) was close to a small baking pit, TF 12. FS 1241 (probably Neff style) was from the vicinity of TFs 10, 11, and 12. The obsidian specimen (FS 814) was from within TF 7, a late-dating nonrock hearth (Fig. 6.36).

Beveled Knife (n = 1)

FS 642 is a tip fragment of a classic, Late Prehistoric Plains bison-hunting beveled knife (Fig. 6.37a). These artifacts are known throughout the Great Plains of the central United States and southern Canada by a variety of names, including Harahey knives, diamond-shaped knives, alternately beveled knives, and the like (Turner and Hester 1993; Sollberger 1971). They have two or four steeply retouched cutting edges.

Beveled knives are often, though not invariably, made from the higher-quality, better-known lithic materials such as Edwards chert and Alibates dolomite. Sollberger (1971) makes a convincing case for the use-life changes in morphology of these implements, starting as lenticular bifaces and gradually ending up as diamond-shaped bifaces through repeated rejuvenation of the four cutting edges. In particular, steep retouching was used to sharpen the cutting edges to conserve material and extend the use-life of the knives. This strategy was necessitated by the hunting-gathering lifestyle in an environment where suitable lithic material was scarce and the skinning of thick bison hides required larger cutting implements.

The LA 38264 East beveled knife tip fragment is made of a presumably local dark gray chert. It measures 24+ mm long, 17+ mm wide, and 4.5+ mm thick, and weighs 1.8+ g. It may have been heat-treated. The tip, which is actually comprised of two fragments that conjoin, is of a size and shape typical of ends snapped from the body of the knife during use, probably during the initial puncture and cutting of the hide. The provenience of both fragments is the fill of 31N/24W.

Scrapers (n = 10)

Eight artifacts from LA 38264 East and two from LA 38264 West have intentionally retouched, unifacial edges that fit the traditional definition of scrapers (Fig. 6.37; Table 6.3; Appendix 3). Most are made on flakes that are rather short and thick for their overall size. One, from LA 38264 East, utilizes an edge of an otherwise natural piece of tabular chert. All other examples from LA 38264 East are unmodified other than the scraping edge. However, both examples from LA 38264 West have one or both lateral edges flaked to shape. Nine are complete, and one from east of the highway is fragmentary.

Six of the artifacts from east of the highway—three end scrapers (FS 840, 854, 873), one side-scraper (FS 532), and two side-end scrapers (FS 332, 1119)—are remarkably similar in length (mean 44 mm; range 40 to 46) but more variable in width (mean 32 mm; range 22 to 44), thickness (mean 13 mm; range 9 to 17); and weight (mean 19 g; range 8.8 to 28.8). These similarities suggest a degree of standardization. Nevertheless, they lack the degree of standardization in size and shape that characterizes classic Plains end scrapers of the Late Prehistoric and early historic bison-hunting cultures.

All of the specimens from east of the highway are made from local cherts. The two from west of the highway are made from a dark silicified wood and dark purple and yellow-brown quartzite. The sources of both materials are unknown.

Two aspects of the scraper proveniences east

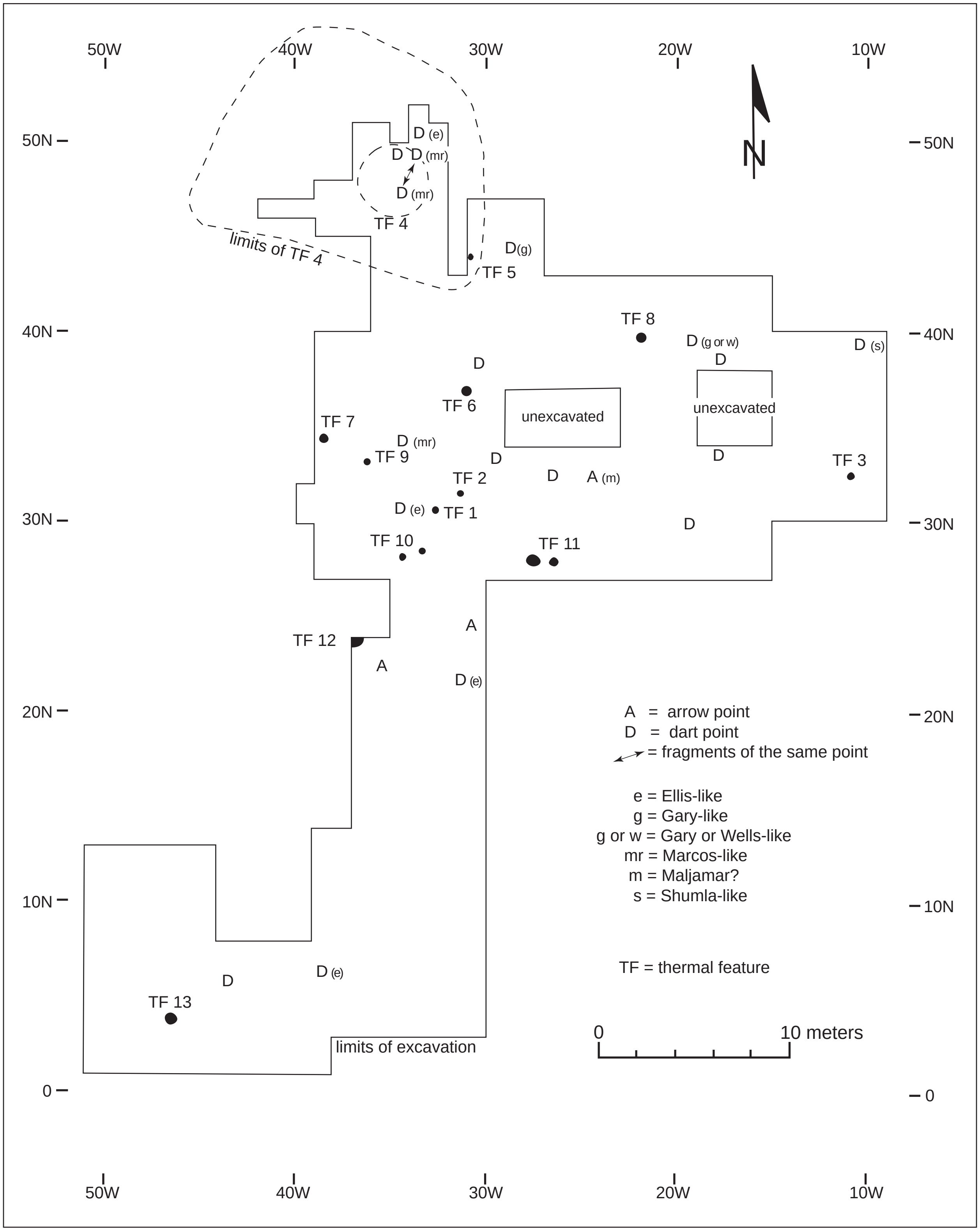


Figure 6.36. Distribution of projectile points, LA 38264 East.

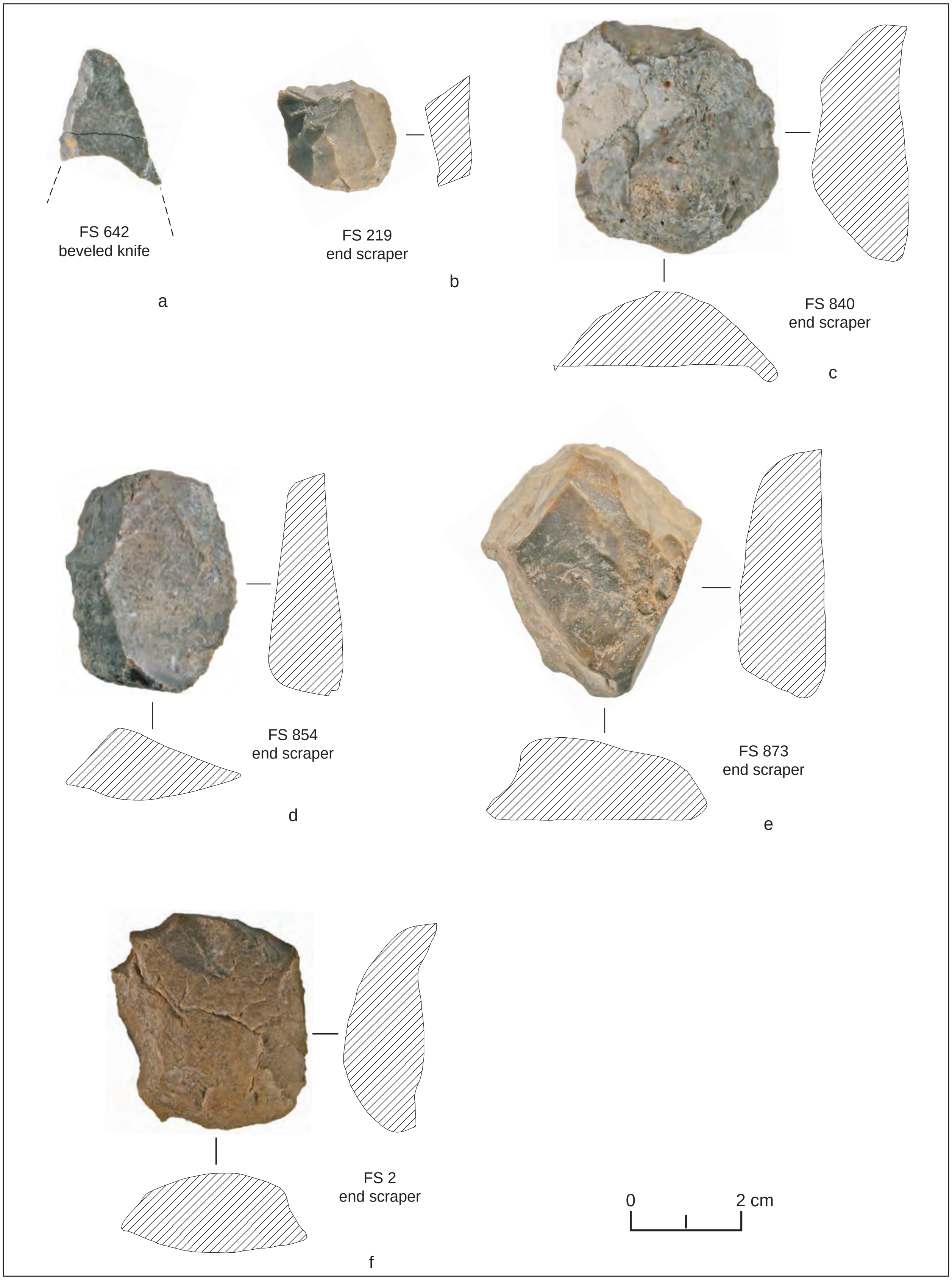


Figure 6.37. Beveled knife and scrapers, LA 38264.

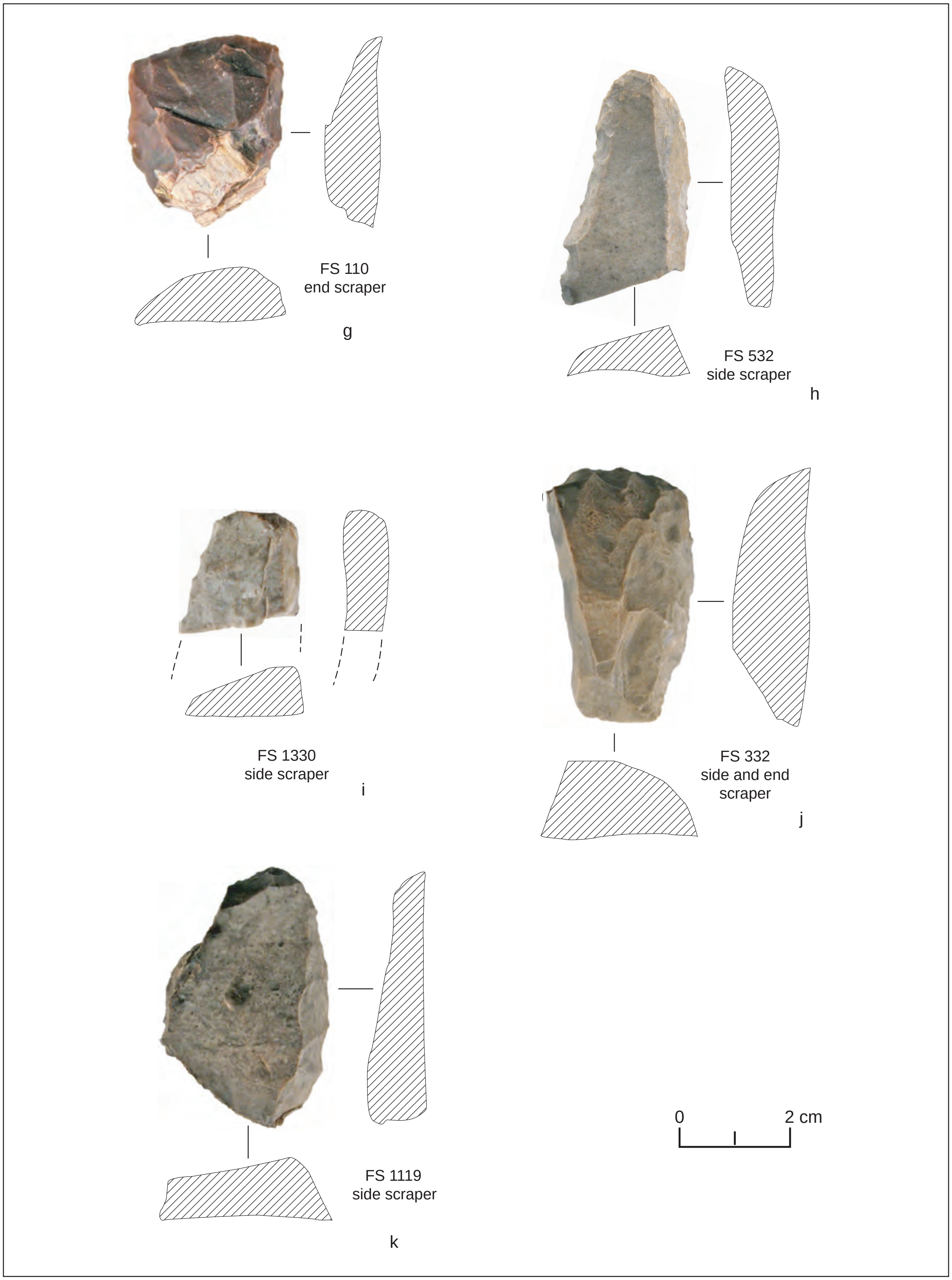


Figure 6.37 (continued). Beveled knife and scrapers, LA 38264.

Table 6.3. Scrapers, LA 38264

Scraper Type	Number	FS Numbers
End	6	East: 219, 840, 854, 873
		West: 2, 110
Side	2	East: 532, 1330
Side-End	2	East: 332, 1119
Total	10	

of the highway are of interest (Fig. 6.38). First, three end scrapers cluster loosely between TF 6 (small baking pit) and TF 7 (early historic hearth). Furthermore, a fourth end scraper was retrieved from the surface about 8 m west of TF 7. Second, the two side-scrapers came from points south of and within a few meters of TF 12, the other small baking pit. The proveniences of the remaining scrapers do not appear to be significant, although no excavation was conducted west of the highway, where two more end scrapers were recovered from the surface.

Miscellaneous Artifacts

Large Flake Knife

A very large flake (FS 1270) from LA 38264 East is intentionally retouched along it longest edge (Fig. 6.39a). Made of coarse-grained fingerprint chert, this triangular flake measures 51 mm long (platform to distal end), 68 mm wide, and 8 mm thick; it weighs 30.6 g. The working edge, which is retouched for its entire length, is 78 mm long.

The entire working edge is intentionally, unifacially retouched, but only the thicker part of it is intentionally, bifacially retouched. The thinner part of the edge displays bifacial use-wear on the side opposite the unifacial retouch. The provenience is the fill of 22N/35W.

Large Flake Tool

A thick flake of dark brown quartzite (FS 81) has intentional retouch and unsuccessful thinning scars along both lateral edges and use-wear along the concave distal edge (Fig. 6.39b). The flake is 30 mm long, 21 mm wide, and 12 mm thick; it weighs 8.1 g. The distal edge is 12 mm across and 2 mm deep. The use-wear covers the entire distal edge and suggests the tool was used as a spokeshave. The provenience is the surface west of the highway.

Informal Tools (Utilized Flakes; n = 124)

One hundred twenty-four flakes have one or more edges displaying use-wear or microscopic intentional retouch (Table 6.4) or notches produced by intentional retouch or a combination of use-wear and intentional retouch. These flakes are smaller than those described in the previous paragraphs and to the unaided eye are not obviously tools. They bear 130 edges and 8 notches.

Cultural edge damage on flakes, as opposed to incidental damage caused by a variety of natural and human agencies, can be characterized in three ways: (1) Use-wear damage develops on an unmodified, sharp edge when it is used for one or more tasks. (2) A sharp edge, intentionally trimmed with a hammerstone or similar instrument, bears microscopic retouch, which is then presumably suitable for conducting tasks. Such action might have been necessary to even the edge prior to use or possibly to dull the edge to control the cutting or scraping quality. (3) A combination of use-wear and intentional retouch can occur on the same edge.

Cultural edge damage results in unifacial edges, bifacial edges, and small notches. The basic assumption employed here is that unifacial wear or retouch generally denotes a scraping edge, and bifacial wear or retouch generally denotes a cutting edge. These simple correlations may or may not be true in all cases, but they are probably generally accurate in most instances. Since few formal artifacts suitable for cutting and scraping activities are recovered from most pottery-period sites in southeastern New Mexico, flake tools appear to have served a vital and common function in the tool kit. Wear and/or retouch and notches are found on straight, convex, concave, and irregularly configured edges.

The informal tools from LA 38264 can be characterized as follows:

- The majority of flakes display only one type of modification (use-wear, intentional retouch, combination of use-wear and intentional retouch, or notch [n = 119]).

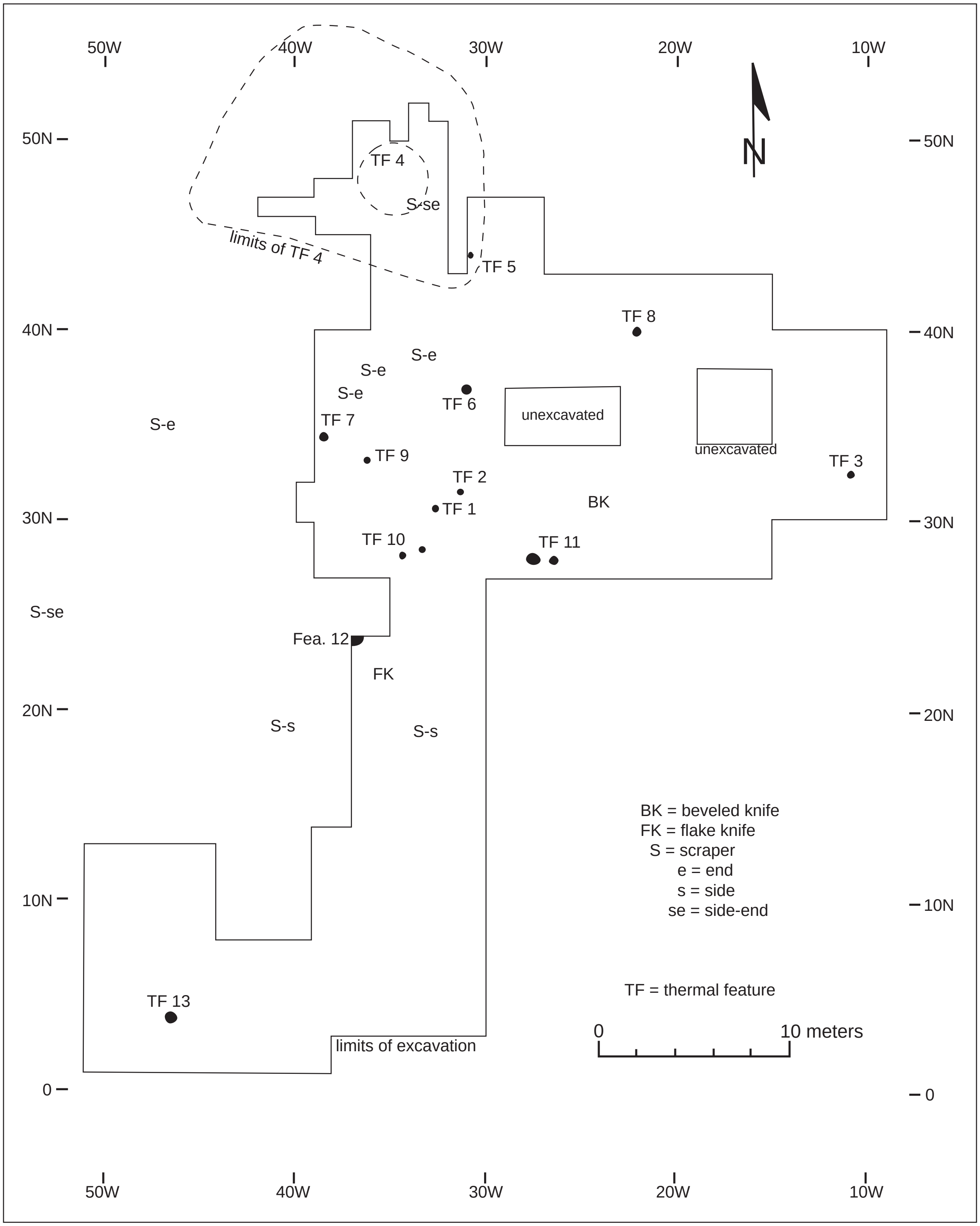


Figure 6.38. Distribution of beveled knife, flake knife, and scrapers, LA 38264 East.

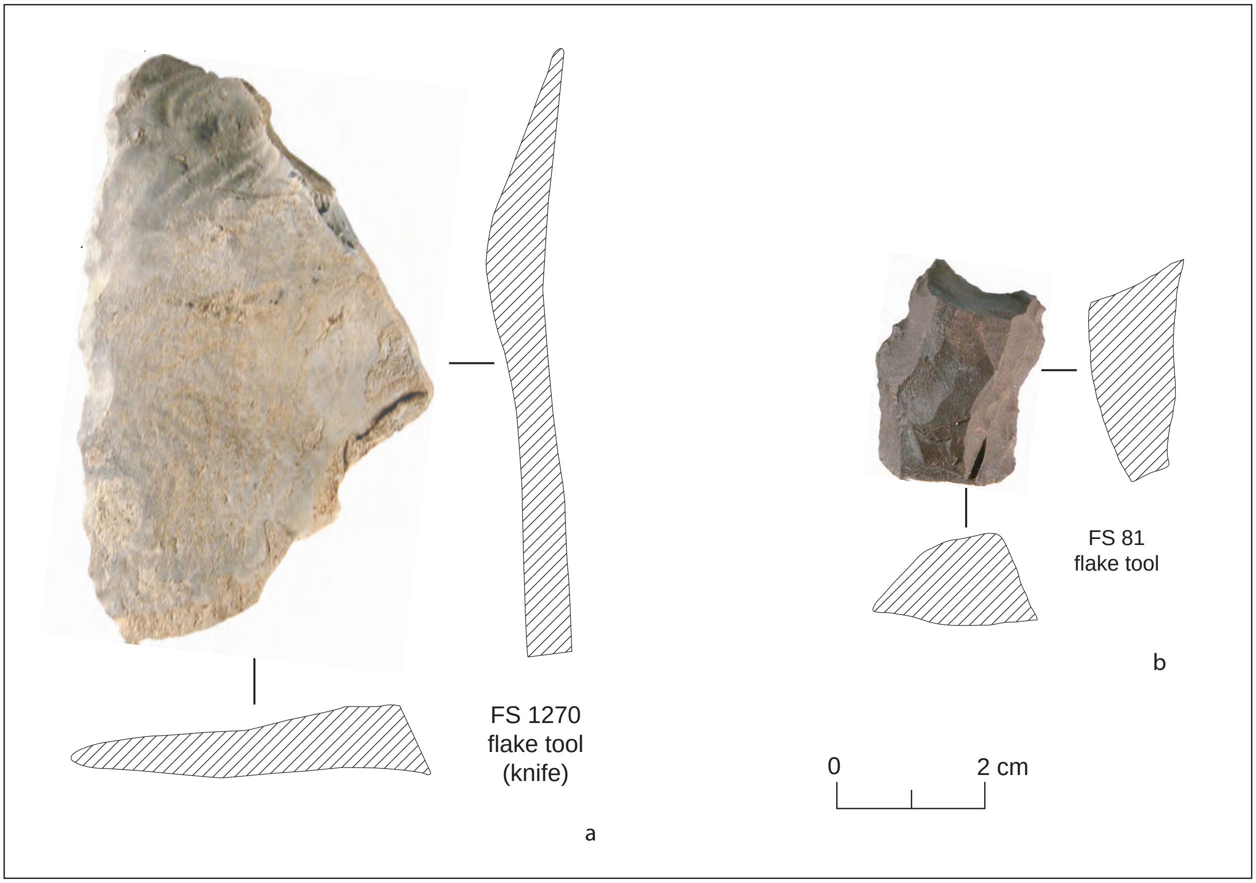


Figure 6.39. Large flake knife (a) and large flake tool (b), LA 38264.

Table 6.4. Informal flake tools by edge type, LA 38264

	Straight	Convex	Concave	Irregular	Total
		Unifacial			
Use-wear	43	25	13	4	85
Intentional retouch	19	9	8	4	40
Use-wear and intentional retouch	2	1	1	-	4
Total unifacial edges	64	35	22	8	129
		Bifacial			
Use-wear	1	1	-	-	2
Intentional-retouch	2	3	-	-	5
Use-wear and intentional retouch	-	-	-	-	-
Total bifacial edges	3	4	-	-	7
		Unifacial and Bifacial			
Total	67	39	22	8	136

Note: The 9 notches are not included in this table.

- Ten flakes each have two modifications.
- Two flakes each have three modifications.
- Unifacial edges bearing use-wear and/or intentional retouch are far common than bifacial edges (129:7).
- Use-wear is twice as common as the total for intentional retouch and use-wear/intentional retouch combined (81:42).
- Straight edges were selected more often than any other edge configuration (67 of 136 edges, or nearly half).
- Only edges bearing unifacial use-wear and unifacial intentional retouch are sufficiently numerous to characterize statistically:
- Length of unifacial use-wear in mm (n = 85): mean 9.6; median 12.5; modes (n = 2) @ 6/7 and 10; range 3–22.
- Length of unifacial intentional retouch in mm (n = 40): mean 15.1; median 19.0; modes (n = 3) @ 9, 12, and 14; range 5–33.
- The nine notches occur singly, are the only form of modification on their respective flakes, and can be created by use-wear (n = 3), intentional retouch (n = 2), or a combination of use-wear and intentional retouch (n = 4). Notches are small, ranging in width from 4 to 8 mm; depths range from 1 to 3 mm. The notches were probably used for smoothing and/or removing burrs and rough spots from linear cylindrical items such as dart and arrow shafts.

Pottery

A total of 37 sherds were recovered from the surface and excavations at the South Seven Rivers site (Table 6.5; also see Appendix 4). These sherds embrace three previously defined types: Jornada Brown, El Paso Brown, and Chupadero Black-on-white. The assemblage is dominated by plain brown pottery; Jornada Brown and El Paso Brown account for 92 percent. However, the estimated minimum number of vessels represented by these types is 2 and 1, respectively.

Table 6.5. Pottery, LA 38264

Type	Number	Percent
Jornada Brown	19	51.4%
El Paso Brown	15	40.5%
Chupadero Black-on-white bowl	3	8.1%
Total	37	100.0%

The three sherds of Chupadero Black-on-white are tempered with crushed potsherd and appear to represent parts of a single bowl.

All pottery was recovered from the surface and excavations east of the highway.

The Jornada Brown sherds came from two general areas, one at TF 5, a nonrock hearth on the southern and southeast edge of TF 4; and the other along the eastern margin of the main camp (Fig. 6.40).

The Chupadero Black-on-white bowl sherds came from the vicinity of the nonrock hearth, TF 3 (Fig. 6.40).

The El Paso Brown sherds came from the surface at the south edge of and partly on top of TF 4 (Fig. 6.41).

Chipped Stone Manufacture Debris

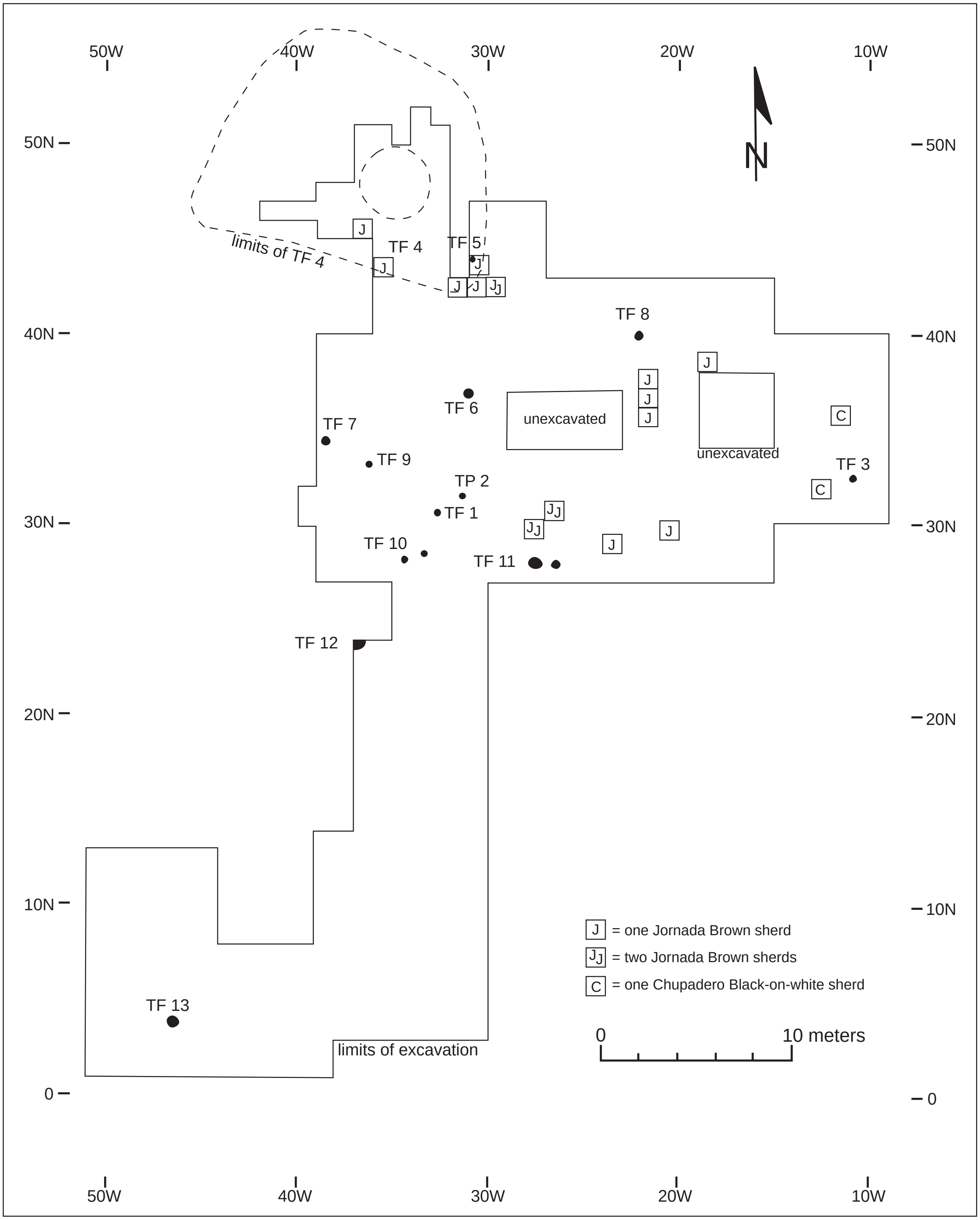
Debris from the manufacture of tools and other cultural items constitutes the majority of cultural materials recovered from LA 38264. The roughout and biface categories are considered to be manufacture breakage and rejects. Descriptions of lithic material types are in Appendix 1, details of individual items are in Appendix 5, and definitions of terms used for various other debris categories (cores, flakes, etc.) are in Appendix 6.

Manufacture Bifaces

Oval/lenticular roughouts, or Class 1, first-stage bifaces (n = 22). The 22 oval/lenticular roughouts from LA 38264 include 5 complete and 17 fragmentary specimens (Fig. 6.42). Materials are mostly local cherts (n = 20), but limestone and a presumably imported igneous chert (828) are represented by one specimen each. Eight (FS 85, 535, 804, 1039, 1066, 1152, 1358, 1426) appear to be heat-treated; 1,426 may have been unintentionally burned in TF 4.

Only two provide evidence of their original parent forms, both bifacially worked flakes (FS 535, 894). None appear to be made from bifacial cores.

The incomplete specimens include one nearly complete specimen (FS 1426, tip missing),



6.40. Distribution of Jornada Brown and Chupadero Black-on-white sherds, LA 38264 East.

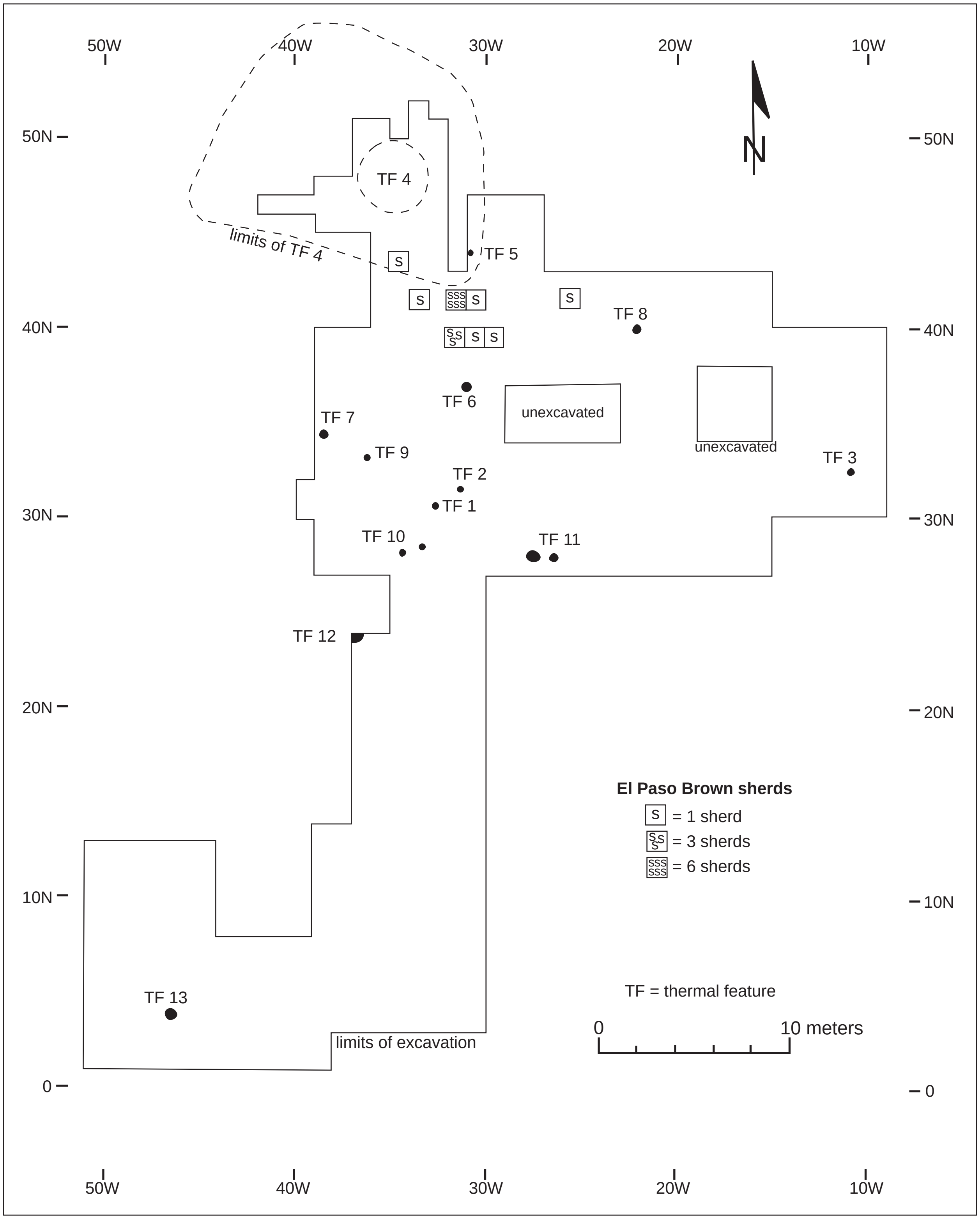


Figure 6.41. Distribution of El Paso Brown sherds, LA 38264 East.

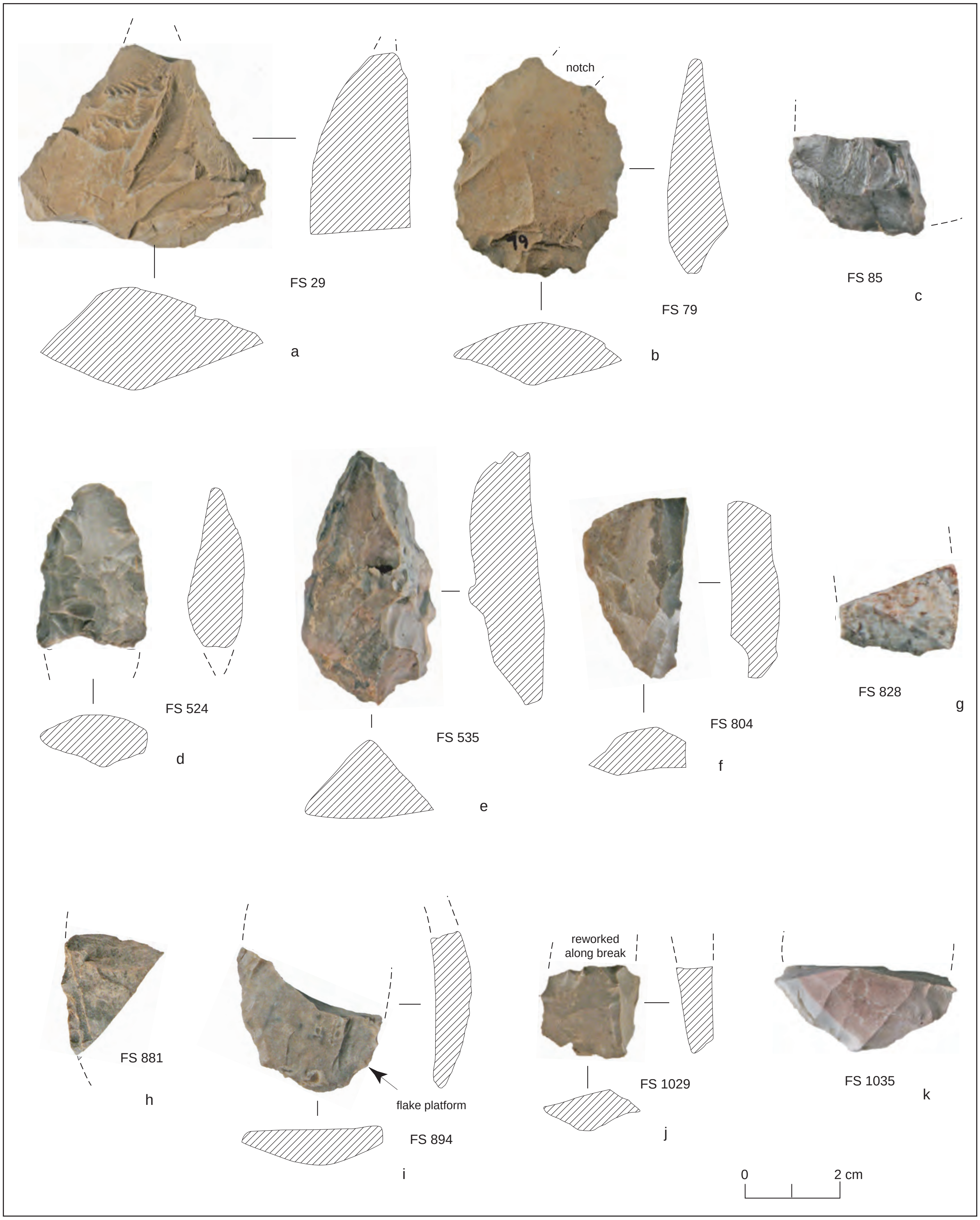


Figure 6.42. Oval/lenticular roughouts (Class 1, first-stage bifaces), LA 38264 East.

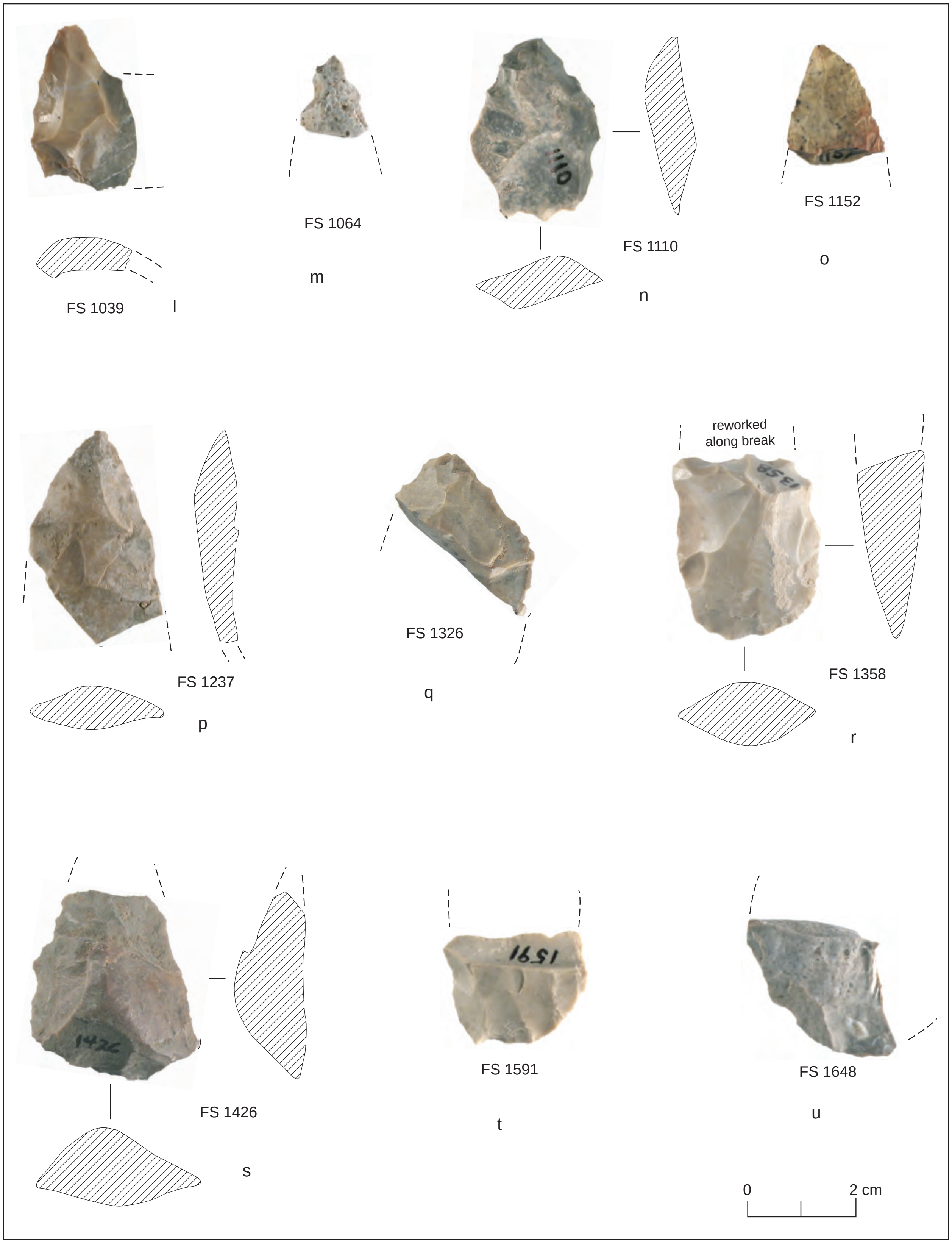


Figure 6.42 (continued). Oval/lenticular roughouts, LA 38264 East.

six bases (FS 85, 828, 894, 1035, 1591, 1648), one lateral segment (FS 881), three tips (FS 1064, 1152, 1326), an overshot flake (FS 1039), and five miscellaneous and/or reworked fragments (FS 524, 804, 1029, 1237, 1358).

Some of the specimens were subsequently used for other purposes. FS 79 has a notch (11 mm wide, 1.5 mm deep) on one lateral edge, and FS 804 has a burin on its broken edge.

The proveniences of the oval/lenticular roughouts seem fairly evenly spread across most of the excavated area east of the highway (Fig. 6.43). However, one group tends to form a linear cluster between the TF 4 and TF 7 in the northwest part of the excavations.

Square/round roughouts, or Class 2, first-stage bifaces (n = 8). All of these items appear to be complete (Fig. 6.44). Of the eight specimens, seven are made of local cherts, and one is siltite. Only one appears to be heat-treated.

Seven appear to be exhausted bifacial cores that presumably were going to be reduced to individual artifacts. The intermediate form (exhausted core or flake) of the eighth specimen is not evident.

None of the specimens were subsequently used for other purposes.

In spite of their small numbers, the square/rectangular roughouts tend to cluster in the northwest part of the excavation of the East Area in the vicinity of TF 6 and TF 7 (Fig. 6.43).

Fine, or second-stage bifaces (n = 12). All but 1 of the 12 fine bifaces from LA 38264 come from east of the highway (Fig. 6.45). The exception was retrieved from west of the highway. All are fragmentary. Nine are of local cherts, two are Edwards chert (FS 268, 1090), and one may be Niobrara/Smoky Hill chert (FS 1064). The possible Edwards chert materials fit well the macroscopic visual criteria for Edwards even though they react in the medium range to ultraviolet light.

The proveniences of the second-stage or fine bifaces are widely spread (Fig. 6.43). However, as with both classes of roughouts, several fine bifaces tend to cluster south of the communal baking facility (TF 4) and in the vicinities of the small baking facility (TF 6) and the nonrock hearth (TF 7).

Miscellaneous biface fragments (n = 8). Eight bifaces are too fragmentary to categorize by stage and class. However, their proveniences are included in Figure 6.43 to complete the picture of manufacture biface distributions and activity areas, discussed in a later section of this report.

Arrow point preform (n = 1). A small, thin, triangular biface fragment, FS 3, was broken during notching (see Fig. 6.35w). Had it been successfully completed, the result would have been a Washita arrow point. It measures 11+ by 9 by 3 mm and weighs 4.2+ g and is made of clear black obsidian. Its provenience is the surface west of the highway.

Lithic Debitage (n = 14,942)

Lithic manufacture debris—cores, flakes, and shatter—constitutes the bulk of the items recovered from LA 38264 East and West (Table 6.6). The analysis of these materials, following the methods I've used in the Roswell region over the past 20 years, focuses on reconstructing the lithic technology and identifying materials and sources. The raw materials and definitions used to classify and analyze chipped stone debris are described in Appendixes 1 and 6. Analysis of these materials is presented and discussed in terms of the four analytical areas defined within the construction project zone.

A total of 14,942 pieces of chipped stone manufacture debris were recovered from the site surface and excavations; all were subjected to full analysis. The cores, core-reduction flakes, biface-thinning flakes, exotic materials, and assemblages from each area are described below. Pieces of debitage bearing use-wear or intentional retouch are described in the section on tools.

Cores. The 343 cores from all areas combined include six subtypes (Table 6.6). Overall, the single-platform core is the most common. The next most abundant core type is the flake core, followed by the two-platforms-adjacent core. Cobble/pebble, three-platform, and two-platforms-parallel cores occur in small numbers and are about equally represented across the site.

Materials are dominated by local gray cherts and, to a lesser extent, limestone (Tables 6.7–6.10). Other cherts, chalcedony, siltite/quartzite, and other materials are spottily represented among the areas.

Overall, heat treatment of material to improve knapping quality was rarely employed on cores at LA 38264 (Tables 6.7–6.10). Percentages of heat-

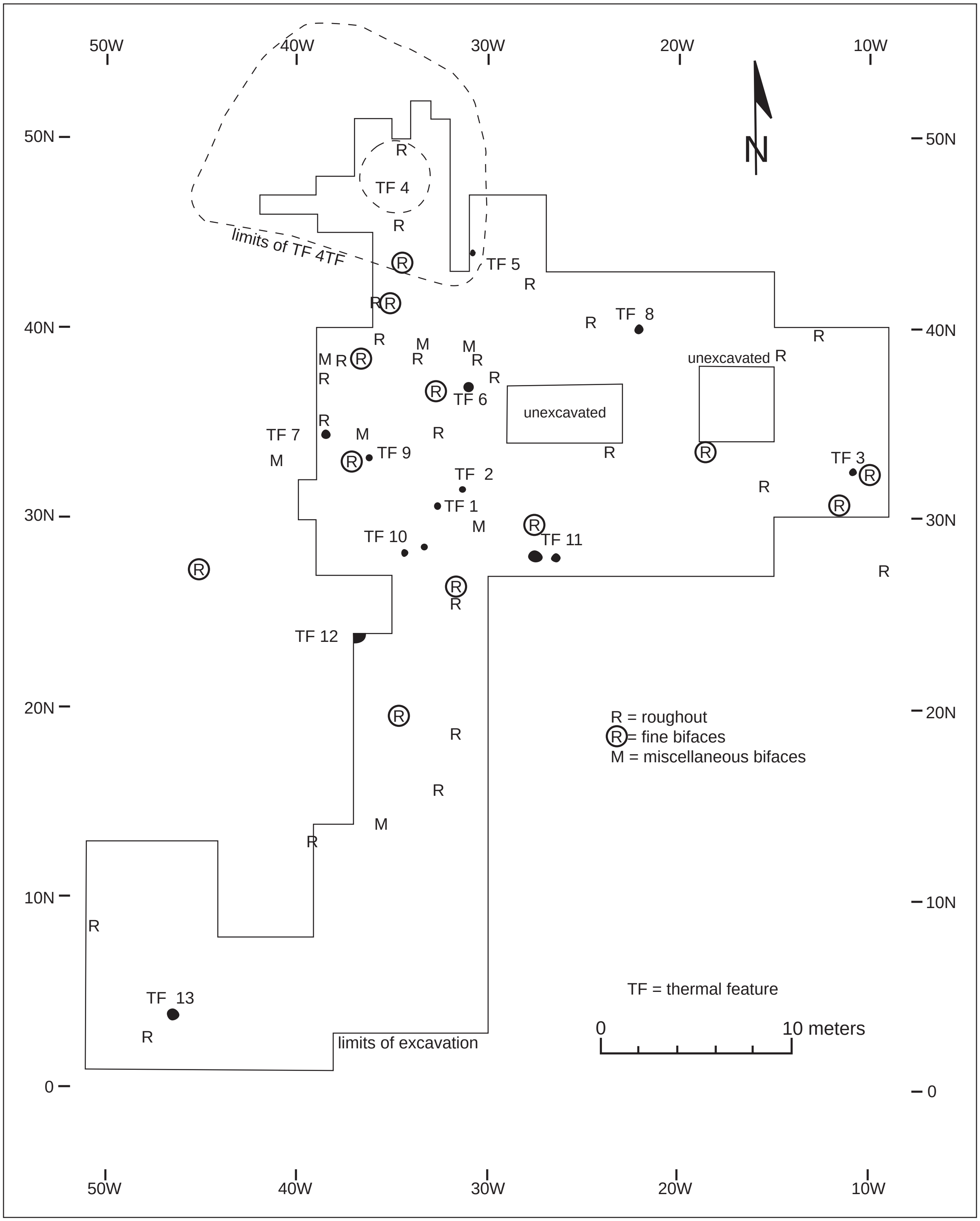


Figure 6.43. Distribution of manufacture bifaces, LA 38264 East.

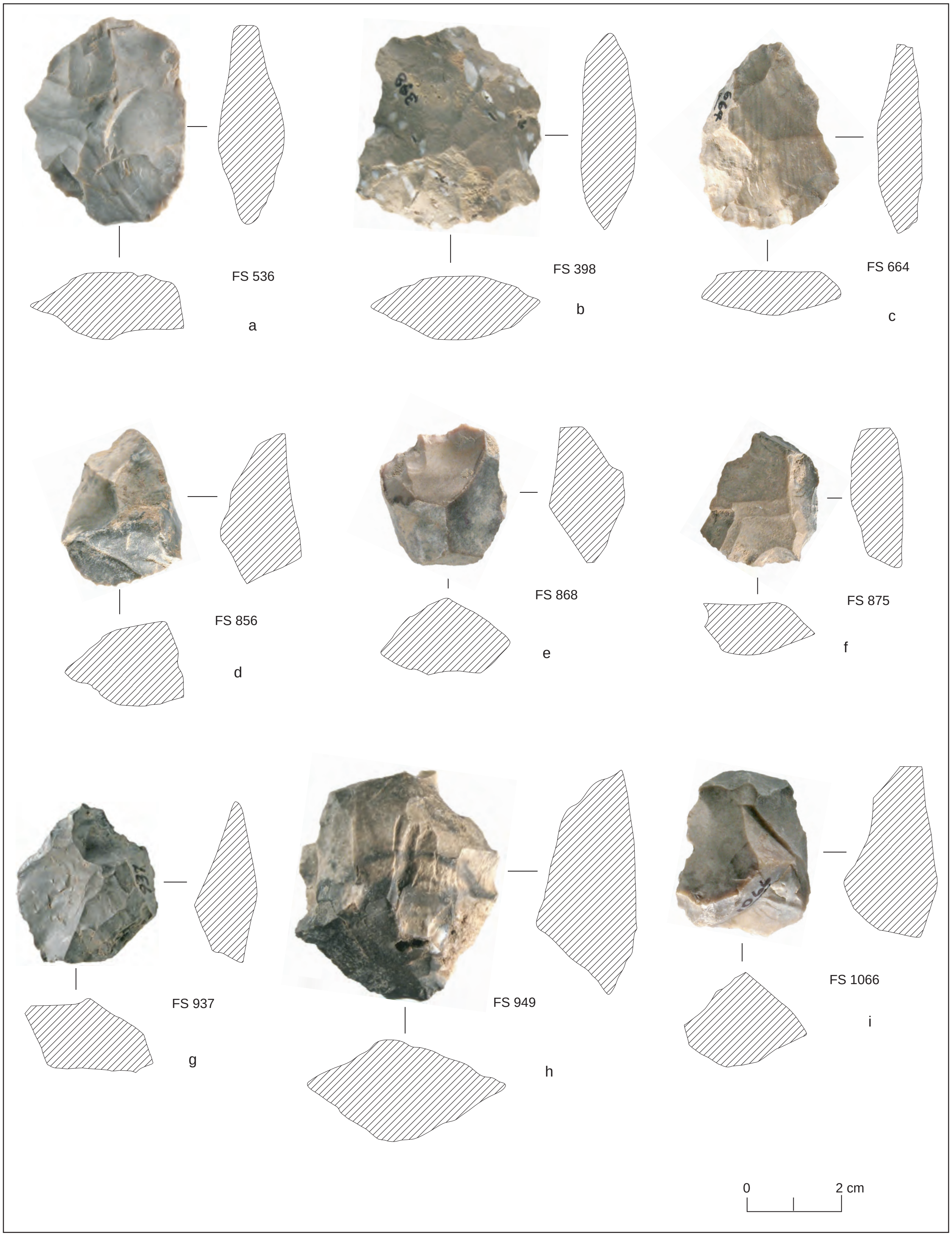


Figure 6.44. Square/round roughouts (Class 2, first-stage bifaces), LA 38264.

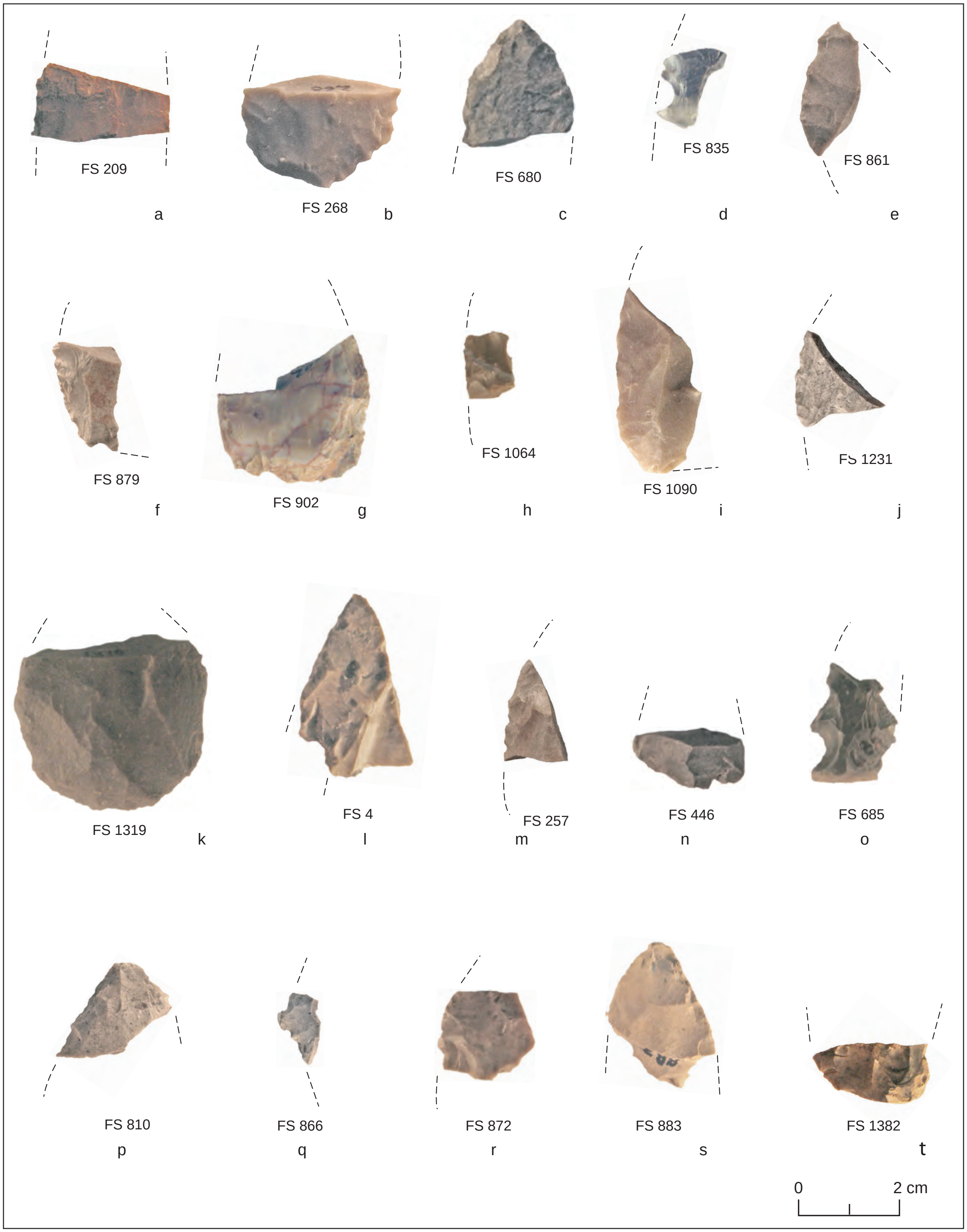


Figure 6.45. (a–l) Second-stage (fine) bifaces, LA 38264; (m–t) miscellaneous biface fragments, LA 38264.

Table 6.6. Lithic manufacture debris, LA 38264

Frequency Column %	LA 38264 East Area 1	 Area 2	 Area 3	LA 38264 West	Total
		Cores			
Single platform	73	36	10	7	126
	34.6%	40.0%	40.0%	41.2%	36.7%
Two platforms adjacent	44	21	3	4	72
	20.9%	23.3%	12.0%	23.5%	21.0%
Two platforms parallel	11	2	2	-	15
	5.2%	2.2%	8.0%	-	4.4%
Three platforms	9	7	1	1	18
	4.3%	7.8%	4.0%	5.9%	5.2%
Cobble/pebble	10	3	4	3	20
	4.7%	3.3%	16.0%	17.6%	5.8%
Flake	64	21	5	2	92
	30.3%	23.3%	20.0%	11.8%	26.8%
Total	211	90	25	17	343
	100.0%	100.0%	100.0%	100.0%	100.0%
		Flakes			
Core	6178	2839	193	129	9339
	78.7%	78.3%	92.3%	96.3%	79.0%
Decortication	61	29	5	-	95
	0.8%	0.8%	2.4%	-	0.8%
Biface	360	179	3	4	546
	4.6%	4.9%	1.4%	3.0%	4.6%
Notching	2	1	-	-	3
	0.0%	0.0%	-	-	0.0%
Rejuvenation	1	2	-	-	3
	0.0%	0.1%	-	-	0.0%
Potlid	77	28	1	-	106
	1.0%	0.8%	0.5%	-	0.9%
Hammer	2	-	-	1	3
	0.0%	-	-	0.7%	0.0%
Possible biface	102	59	-	-	161
	1.3%	1.6%	-	-	1.4%
Indeterminate	1069	489	7	-	1565
	13.6%	13.5%	3.3%	-	13.2%
Total	7852	3626	209	134	11821
	100.0%	100.0%	100.0%	100.0%	100.0%
		Shatter			
	1864	852	48	14	2778
	100.0%	100.0%	100.0%	100.0%	100.0%
Table total	9927	4568	282	165	14942
	100.0%	100.0%	100.0%	100.0%	100.0%

Table 6.7. Lithic debitage classes, Area 1, LA 38264 East

Frequency Column %	Cores	Flakes			Shatter and Pieces of Material	Total
		Core Reduction	Biface Thinning*	Other		
			Material			
Local chert	154	4856	377	1043	1740	8170
	73.0%	78.6%	81.6%	86.1%	93.3%	82.3%
Other chert	14	385	39	81	76	595
	6.6%	6.2%	8.4%	6.7%	4.1%	6.0%
Chalcedony	3	71	19	36	23	152
	1.4%	1.1%	4.1%	3.0%	1.2%	1.5%
Limestone	37	746	1	9	5	798
	17.5%	12.1%	0.2%	0.7%	0.3%	8.0%
Siltite/quartzite	1	99	5	21	20	146
	0.5%	1.6%	1.1%	1.7%	1.1%	1.5%
Other	2	20	21	22	-	65
	0.9%	0.3%	4.5%	1.8%	-	0.7%
Total	211	6177	462	1212	1864	9926
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
			Heat Treatment			
No	174	4975	176	757	1456	7538
	82.5%	80.5%	38.1%	62.5%	78.1%	75.9%
Yes	20	662	193	249	170	1294
	9.5%	10.7%	41.8%	20.5%	9.1%	13.0%
Possibly	1	166	4	101	145	417
	0.5%	2.7%	0.9%	8.3%	7.8%	4.2%
Indeterminate	16	374	89	105	93	677
	7.6%	6.1%	19.3%	8.7%	5.0%	6.8%
Total	211	6177	462	1212	1864	9926
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

* Includes possible biface-thinning flakes.

Table 6.8. Lithic debitage attributes, Area 2, LA 38264 East

Frequency Column %	Cores	Core Reduction	Biface Thinning*	Other Flakes	Shatter	Total
			Material			
Local chert	66	2218	210	484	806	3784
	73.3%	78.2%	88.2%	88.2%	94.7%	82.9%
Other chert	9	180	12	37	27	265
	10.0%	6.3%	5.0%	6.7%	3.2%	5.8%
Chalcedony	-	52	6	11	6	75
	-	1.8%	2.5%	2.0%	0.7%	1.6%
Limestone	15	341	-	4	4	364
	16.7%	12.0%	-	0.7%	0.5%	8.0%
Siltite/quartzite	-	36	1	5	6	48
	-	1.3%	0.4%	0.9%	0.7%	1.1%
Other	-	11	9	8	2	30
	-	0.4%	3.8%	1.5%	0.2%	0.7%
Total	90	2838	238	549	851	4566
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
			Heat Treatment			
No	83	2150	82	296	628	3239
	92.2%	75.8%	34.5%	53.9%	73.8%	70.9%
Yes	2	382	107	151	100	742
	2.2%	13.5%	45.0%	27.5%	11.8%	16.3%
Possibly	2	99	1	46	61	209
	2.2%	3.5%	0.4%	8.4%	7.2%	4.6%
Indeterminate	3	207	48	56	62	376
	3.3%	7.3%	20.2%	10.2%	7.3%	8.2%
Total	90	2838	238	549	851	4566
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

* Includes possible biface-thinning flakes.

Table 6.9. Lithic debitage attributes, Area 3, LA 38264 West

Frequency Column %	Cores	Core Reduction	Biface Thinning*	Other Flakes	Shatter	Total
			Material			
Local chert	21	137	3	12	44	217
	84.0%	71.0%	100.0%	92.3%	91.7%	77.0%
Other chert	3	13	-	1	3	20
	12.0%	6.7%	-	7.7%	6.3%	7.1%
Chalcedony	1	2	-	-	-	3
	4.0%	1.0%	-	-	-	1.1%
Limestone	-	40	-	-	1	41
	-	20.7%	-	-	2.1%	14.5%
Siltite/quartzite	-	1	-	-	-	1
	-	0.5%	-	-	-	0.4%
Other	-	-	-	-	-	-
	-	-	-	-	-	-
Total	25	193	3	13	48	282
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
			Heat Treatment			
No	23	174	2	10	45	254
	92.0%	90.2%	66.7%	76.9%	93.8%	90.1%
Yes	1	7	1	2	2	13
	4.0%	3.6%	33.3%	15.4%	4.2%	4.6%
Possibly	-	4	-	1	-	5
	-	2.1%	-	7.7%	-	1.8%
Indeterminate	1	8	-	-	1	10
	4.0%	4.1%	-	-	2.1%	3.5%
Total	25	193	3	13	48	282
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 6.10. Lithic debitage attributes, LA 38264 West

Frequency Column %	Cores	Core Reduction	Biface Thinning*	Other Flakes	Shatter	Total
			Material			
Local chert	13	62	3	1	12	91
	76.5%	48.1%	75.0%	100.0%	85.7%	55.2%
Other chert	-	1	-	-	1	2
	-	0.8%	-	-	7.1%	1.2%
Chalcedony	-	3	-	-	1	4
	-	2.3%	-	-	7.1%	2.4%
Limestone	4	63	-	-	-	67
	23.5%	48.8%	-	-	-	40.6%
Siltite/quartzite	-	-	-	-	-	-
	-	-	-	-	-	-
Other	-	-	1	-	-	1
	-	-	25.0%	-	-	0.6%
Total	17	129	4	1	14	165
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
			Heat Treatment			
No	16	117	1	-	10	144
	94.1%	90.7%	25.0%	-	71.4%	87.3%
Yes	-	6	2	-	1	9
	-	4.7%	50.0%	-	7.1%	5.5%
Possibly	-	3	-	1	3	7
	-	2.3%	-	100.0%	21.4%	4.2%
Indeterminate	1	3	1	-	-	5
	5.9%	2.3%	25.0%	-	-	3.0%
Total	17	129	4	1	14	165
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

treated cores range from 0 to 9 percent. Possibly heat-treated specimens account for another 0 to 2 percent of the assemblages, for maximum totals of up to 11 percent per analytical area. These figures are definitely lower than those for the core-reduction flakes.

Overall core samples are comparatively large for each area. However, not all material types are equally well represented, precluding analysis by this criterion. Thus, two types of statistical characterizations are presented here, one based on all cores from all areas combined, and the other by core type by area within the site (Tables 6.11–6.15).

Interestingly, all cores from all areas are generally small. They are similar in average length (41.00 to 43.18 mm), width (29.64 to 34.12 mm), and thickness (21.04 to 24.35 mm), but much less so in weight (37.84 to 69.33 g).

Correlation statistics of core size and weight (Table 6.12) suggest moderate to high standardization of dimensions of cores in all areas. However, given the probability that standardizations of dimensions may in part be imposed by the natural geometry of the pieces of material used as cores, we consider only correlation coefficients of 0.80 or greater to be significant from a cultural standpoint. Correlations of less than 0.80 are considered less significant or even insignificant in spite of the fact that the notations in the tables suggest otherwise. We should also not overlook the probability that the knappers were selecting for the blockier (as opposed to more tabular and tubular) pieces of material in the first place. Given the overall small sizes of the cores, it is also possible that they seem to reflect standardization in size because they were no longer usable.

Core-reduction flakes. Less than one-fifth (n = 1,712) of the 9,339 core-reduction flakes are complete. Summary statistics (Tables 6.16–6.20) indicate that, on average, they are small (average 17 to nearly 30 mm long), somewhat longer than wide, and lightweight (average 5 to over

Table 6.11. Descriptive statistics, complete core-reduction flakes by area, LA 38264

	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
		Area 1		
Mean	42.99	33.59	21.77	57.00
SD	17.10	13.71	10.95	91.07
Range	93.90	72.00	62.00	553.40
Number	208	208	208	208
		Area 2		
Mean	42.60	33.49	23.01	63.62
SD	17.25	14.46	12.69	103.61
Range	82.00	69.00	62.00	531.40
Number	89	89	89	89
		Area 3		
Mean	41.00	29.64	21.04	37.84
SD	10.81	9.26	9.54	46.53
Range	51.00	33.00	34.00	165.70
Number	25	25	25	25
		West Area		
Mean	43.18	34.12	24.35	69.33
SD	19.31	14.51	10.74	101.82
Range	70.00	54.00	41.00	321.80
Number	17	17	17	17

Table 6.12. Correlation matrix of core dimensions by area, LA 38264

	Length	Width	Thickness	Weight
		Area 1 (N = 208)		
Length	1.0000			
Width	.8664	1.0000		
Thickness	.7548	.8296	1.0000	
Weight	.8357	.8633	.8625	1.0000
		Area 2 (N = 89)		
Length	1.0000			
Width	.9036	1.0000		
Thickness	.8143	.8581	1.0000	
Weight	.8279	.8481	.8942	
		Area 3 (N = 25)		
Length	1.0000			
Width	.7392	1.0000		
Thickness	.7580	.9127	1.0000	
Weight	.8396	.8581	.9170	1.0000
		West Area (N = 17)		
Length	1.0000			
Width	.9037	1.0000		
Thickness	.6565*	.7654	1.0000	
Weight	.9292	.9412	.8395	1.0000

Pearson's r, 2-tailed test; significant at the .001 level unless otherwise specified.
* Significant at .01 level.

Table 6.13. Complete core dimensions by type, Area 1, LA 38264

	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
		One Platform		
Mean	45.40	35.85	24.73	79.75
SD	18.68	15.73	12.27	121.83
Range	79.00	72.00	62.00	953.40
Number	73	73	73	73
		Two Platforms Adjacent		
Mean	43.75	37.02	26.02	70.82
SD	17.57	14.08	12.09	98.15
Range	85.90	55.00	49.00	407.90
Number	42	42	42	42
		Two Platforms Parallel		
Mean	43.82	34.73	23.18	54.64
SD	16.15	14.99	7.63	59.45
Range	47.00	46.00	25.00	186.20
Number	11	11	11	11
		Three Platforms		
Mean	39.44	32.89	23.56	48.52
SD	14.30	13.71	10.86	64.29
Range	42.00	37.00	34.00	198.90
Number				
		Cobble/Pebble		
Mean	45.50	31.80	22.40	44.31
SD	13.57	7.15	7.62	40.95
Range	42.00	22.00	21.00	128.10
Number	10	10	10	10
		Flake Cores		
Mean	39.73	28.87	14.92	25.06
SD	15.85	10.18	4.91	30.43
Range	69.00	46.00	25.00	167.80
Number	63	63	63	63

Table 6.14. Correlation matrix of complete core dimensions by type, Area 1, LA 38264

	Length	Width	Thickness	Weight
		One Platform		
Length	1.000			
Width	.9313	1.000		
Thickness	.7847	.8281	1.000	
Weight	.8427	.8903	.8763	1.000
		Two Platforms Adjacent		
Length	1.000			
Width	.8456	1.000		
Thickness	.8915	.8818	1.000	
Weight	.8682	.8941	.8903	1.000
		Two Platforms Parallel		
Length	1.000			
Width	.9162	1.000		
Thickness	.7538*	.8435*	1.000	
Weight	.8741	.9572	.8268*	1.000
		Three Platforms		
Length	1.000			
Width	.9351	1.000		
Thickness	.8993	.9583	1.000	
Weight	.7994*	.8879*	.9448	1.000
		Cobble/Pebble		
Length	1.000			
Width	.8424*	1.000		
Thickness	.8578*	.9221	1.000	
Weight	.9438	.9143	.8789	1.000
		Flake Cores		
Length	1.000			
Width	.7899	1.000		
Thickness	.7594	.7769	1.000	
Weight	.8414	.8804	.8501	1.000

Pearson's r, 2-tailed test; significant at the .001 level unless otherwise specified.
* Significant at the .01 level.

Table 6.15. Correlation matrix of core dimensions by type, Area 2, LA 38264

	Length	Width	Thickness	Weight
One Platform (N = 35)				
Length	1.000			
Width	.8582	1.000		
Thickness	.8296	.9466	1.000	
Weight	.8082	.8776	.9306	1.000
Two Platforms Adjacent (N = 21)				
Length	1.000			
Width	.9656	1.000		
Thickness	.8825	.8504	1.000	
Weight				1.000
Two Platforms Parallel (N = 2)				
Length	1.000			
Width	-	1.000		
Thickness	-	-	1.000	
Weight	-	-	-	1.000
Three Platforms (N = 7)				
Length	1.000			
Width	.9185*	1.000		
Thickness	.6647**	.8447**	1.000	
Weight	.9683	.8944*	.7208**	1.000
Cobble/Pebble (N = 3)				
Length	1.000			
Width	-	1.000		
Thickness	-	-	1.000	
Weight	-	-	-	1.000
Flake Cores (N = 20)				
Length	1.000			
Width	.8360	1.000		
Thickness	.8476	.7900	1.000	
Weight	.9012	.8255	.8720	1.000

Pearson's r, 2-tailed test; significant at the .001 level unless otherwise specified.
* Significant at the .01 level.
** Not significant.

Table 6.16. Complete core-reduction flakes, Area 1, LA 38264

	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Dimensions				
Mean	17.12	16.25	5.09	3.92
SD	11.49	10.07	4.05	11.59
Range	80.00	77.00	29.00	146.60
Number	1712	1712	1712	1712

Correlation Matrix

	Length	Width	Thickness	Weight
Length	1.0000			
Width	.8374	1.0000		
Thickness	.8653	.8670	1.0000	
Weight	.7361	.7694	.7723	1.0000

Pearson's r, 2-tailed test; significant at the .001 level.

Table 6.17. Complete core-reduction flakes, Area 1, LA 38264

	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Dimensions				
Mean	17.12	16.25	5.09	3.92
SD	11.49	10.07	4.05	11.59
Range	80.00	77.00	29.00	146.60
Number	1712	1712	1712	1712

Correlation Matrix

	Length	Width	Thickness	Weight
Length	1.0000			
Width	.8374	1.0000		
Thickness	.8653	.8670	1.0000	
Weight	.7361	.7694	.7723	1.0000

Pearson's r, 2-tailed test; significant at the .001 level.

Table 6.18. Complete core-reduction flakes, Area 3, LA 38264

	Dimensions			
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	26.21	21.76	7.77	5.90
SD	13.33	11.34	4.42	11.77
Range	66.00	46.00	19.00	51.30
Number	58	58	58	58

Correlation Matrix

	Length	Width	Thickness	Weight
Length	1.0000			
Width	.7027	1.0000		
Thickness	.7558	.759	1.0000	
Weight	.8259	.7836	.7106	1.0000

Pearson's r, 2-tailed test; significant at the .001 level.

Table 6.19. Complete core-reduction flakes, West Area, LA 38264

	Dimensions			
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	29.35	24.00	8.95	10.24
SD	13.54	10.56	4.94	11.43
Range	53.00	38.00	24.00	40.00
Number	66	66	66	66

Correlation Matrix

	Length	Width	Thickness	Weight
Length	1.0000			
Width	.6971	1.0000		
Thickness	.7658	.7591	1.0000	
Weight	.8416	.8475	.8477	1.0000

Pearson's r, 2-tailed test; significant at the .001 level.

Table 6.20. Attributes of core-reduction flakes by area, LA 38264

Frequency Column %	Area 1	Area 2	Area 3	West Area
	Platform Types			
Cortex	263	104	14	13
	15.2%	12.9%	24.1%	19.4%
Single flake scar	701	369	23	36
	40.6%	45.7%	39.7%	53.7%
Multiple flake	199	74	7	2
	11.5%	9.2%	12.1%	3.0%
Pseudodihedral	29	22	1	1
	1.7%	2.7%	1.7%	1.5%
Edge/ridge remnant	394	167	10	9
	22.8%	20.7%	17.2%	13.4%
Pointed	41	18	2	1
	2.4%	2.2%	3.4%	1.5%
Destroyed	92	53	1	5
	5.3%	6.6%	1.7%	7.5%
Indeterminate	7	1	-	-
	0.4%	0.1%	-	-
Total	1726	808	58	67
	100.0%	100.0%	100.0%	100.0%
	Distal Termination			
Feathered	941	394	43	17
	54.5%	48.7%	74.1%	25.4%
Modified feathered	179	97	12	29
	10.4%	12.0%	20.7%	43.3%
Hinged/stepped	482	266	2	16
	27.9%	32.9%	3.4%	23.9%
Broken during detachment	111	49	1	4
	6.4%	6.1%	1.7%	6.0%
Overshot	-	-	-	-
	-	-	-	-
Indeterminate	13	3	-	1
	0.8%	0.4%	-	1.5%
Total	1726	809	58	67
	100.0%	100.0%	100.0%	100.0%
	Dorsal Cortex			
0%	1101	544	26	29
	63.8%	67.2%	44.8%	43.3%
1-10%	150	61	6	9
	8.7%	7.5%	10.3%	13.4%
11-25%	163	78	8	9
	9.4%	9.6%	13.8%	13.4%
26-50%	123	41	7	11
	7.1%	5.1%	12.1%	16.4%
51-75%	70	29	9	5
	4.1%	3.6%	15.5%	7.5%
76-90%	47	20	-	1
	2.7%	2.5%	-	1.5%
91-99%	31	16	-	2
	1.8%	2.0%	-	3.0%
100%	12	8	2	-
	0.7%	1.0%	3.4%	-
Missing	29	12	-	1
	1.7%	1.5%	-	1.5%
Total	1726	809	58	67
	100.0%	100.0%	100.0%	100.0%

10 g). Pearson correlation matrixes (Tables 6.16–6.19) indicate that the flake dimensions are not strongly correlated. We feel that this indicates a general lack of standardization of flake shapes, even though the actual statistics assign a two-tailed significance of .001 to most correlations. Our judgment is based on the fact that, in studies of other assemblages from the region, the values of these other assemblages have been higher overall.

Other characteristics of the core-reduction flakes include the following (Tables 6.7–6.10 and 6.20). The primary materials are local cherts, with limestone running a slow second in all but the West Area. There, limestone is as common as the local cherts, but the strength of the contrast among areas may be due in part, or wholly, to the small sample size (n = 169) from the West Area. Heat treatment was observed in 4 to 14 percent of the flakes, and the combined total of positive cases plus "possible" cases ranges from 6 to 17 percent. The Areas 1 and 2 assemblages have the largest percentages of heat treatment, probably because larger numbers of smaller flakes were retrieved through excavation.

In all areas, single-flake-scar platforms are the dominant type (40 to 54 percent of assemblage) and are two to three times more common than the next most common type. Cortex and edge-remnant platforms are about equally represented, followed by multiple-flake-scar platforms. Interestingly, multiple-flake-scar platforms range from 9 to 12 percent in all areas except the West Area, where they make a poor showing at 3 percent.

Given the number of edge-remnant/destroyed platforms, it is therefore surprising that 49 to 74 percent of the distal edge terminations are feathered (except the West Area, where they are only 25 percent). If we combine the modified-feathered with the feathered categories, then the flake-detachment success rate in Areas 1, 2, and W runs between 61 and 68 percent. The combined total for Area 3 is 95 percent, but here again, small sample size (n = 58) may be affecting these results because of the absence of smaller flakes garnered from excavation. Nonetheless, in my experience, these are high figures for southeastern New Mexico assemblages.

In the classic core-reduction sequence, when starting with a chunk of natural lithic material and removing all usable flakes until the parent rock is no longer useful (i.e., exhausted), one should end up with flakes of various sizes and percentages of cortex material on their dorsal surfaces. Those flakes removed from the outer surfaces should have more cortex, and those from the more inward portions of the core should have less cortex. Flakes from the inner most portions of the core would have no dorsal cortex. Ideally, in flake assemblages containing examples of all of these kinds of flakes, flakes lacking cortex would be the most numerous, followed successively by flakes bearing more and more cortex. The flakes with the most cortex should be the fewest in number since they would have been the ones initially removed from the core.

The presence or absence of a complete core-reduction sequence at a site can be investigated by graphing the percentages of cortex on the dorsal surfaces of complete core-reduction flakes (Fig. 6.46; Table 6.20). This exercise with the LA 38264 assemblage illustrates that the full reduction sequence is present in Areas 1 and 2 and probably in Area 3 and the West Area as well. The difference may well be the smaller sample sizes from Area 3 and the West Area, as well as the fact that the smaller flakes are undoubtedly underrepresented because no excavation or screening was done in these areas. It is also possible that the peaks in Category 3, 4, and 5 flakes (Fig. 6.46) reflect the selection of these somewhat large flakes possessing less cortex from other locations and their introduction into the site as usable flakes. Such flakes, on average, have usable sharp edges, and since they are larger, they would be easier to hold than Category 1 and 2 flakes.

Biface-thinning flakes. Like the other debitage categories, the majority (75 to 100 percent, depending on area) of biface-thinning flakes are of local cherts (Tables 6.7–6.10). Indications of heat-treatment and possible heat-treatment are present on 43 to 50 percent of the flakes, indicating that this technique for improving the knappability of materials was conducted late in the manufacture sequence. That is, heat-treating was conducted mainly on bifaces prior to their reduction into finished artifacts.

Overall, biface-thinning flakes comprise small percentages of the debitage assemblage in each area (Table 6.6). However, differences do exist. Not surprisingly, biface-thinning flakes are more common numerically and as percentages in the

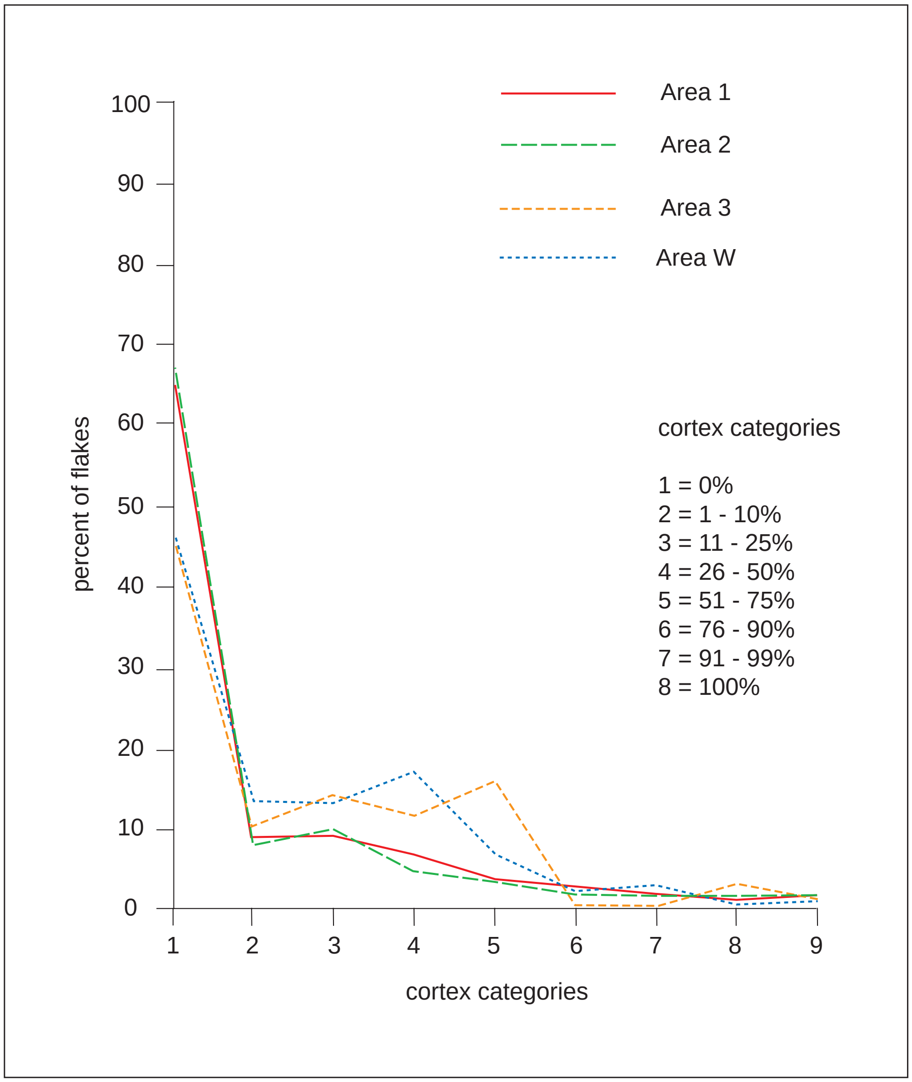


Figure 6.46. Percentage of dorsal cortex on complete core-reduction flakes, LA 38264.

assemblages from Areas 1 and 2, where excavation was undertaken and the fill was screened.

Shatter. For the most part, shatter represents knapping failure incurred during initial working of the cores and can be used as a referendum on the overall quality of the available raw material units (Table 6.6). In Areas 1, 2, and 3, shatter constitutes 17 to nearly 19 percent of the assemblages. In the West Area, shatter is inexplicably low— 8.5 percent.

Exotic lithic materials. Seventy-one pieces of debitage, manufacture debris, and formal artifacts are made from materials that are not local to southeastern New Mexico. These materials include Edwards chert, obsidian, Alibates material, Tecovas (?) chert, igneous (?) chert, and possibly Niobrara/Smoky Hill chert.

Fifty-one pieces of gray chert debitage and two fine or second-stage bifaces (FS 268, 1090) display macro and ultraviolet characteristics suggesting that they are Edwards chert from central or western-central Texas. That is, they are exceptionally fine examples of chert that fluoresce medium (n = 42, including both bifaces) to bright (n = 6) under stimulation from ultraviolet light. Significantly, 29 are biface-thinning flakes, suggesting either the manufacture or the refinishing of Edwards artifacts at the site. These items were recovered from throughout the excavations, especially the main camp area (Fig. 6.47).

Eight small flakes and flake fragments and one

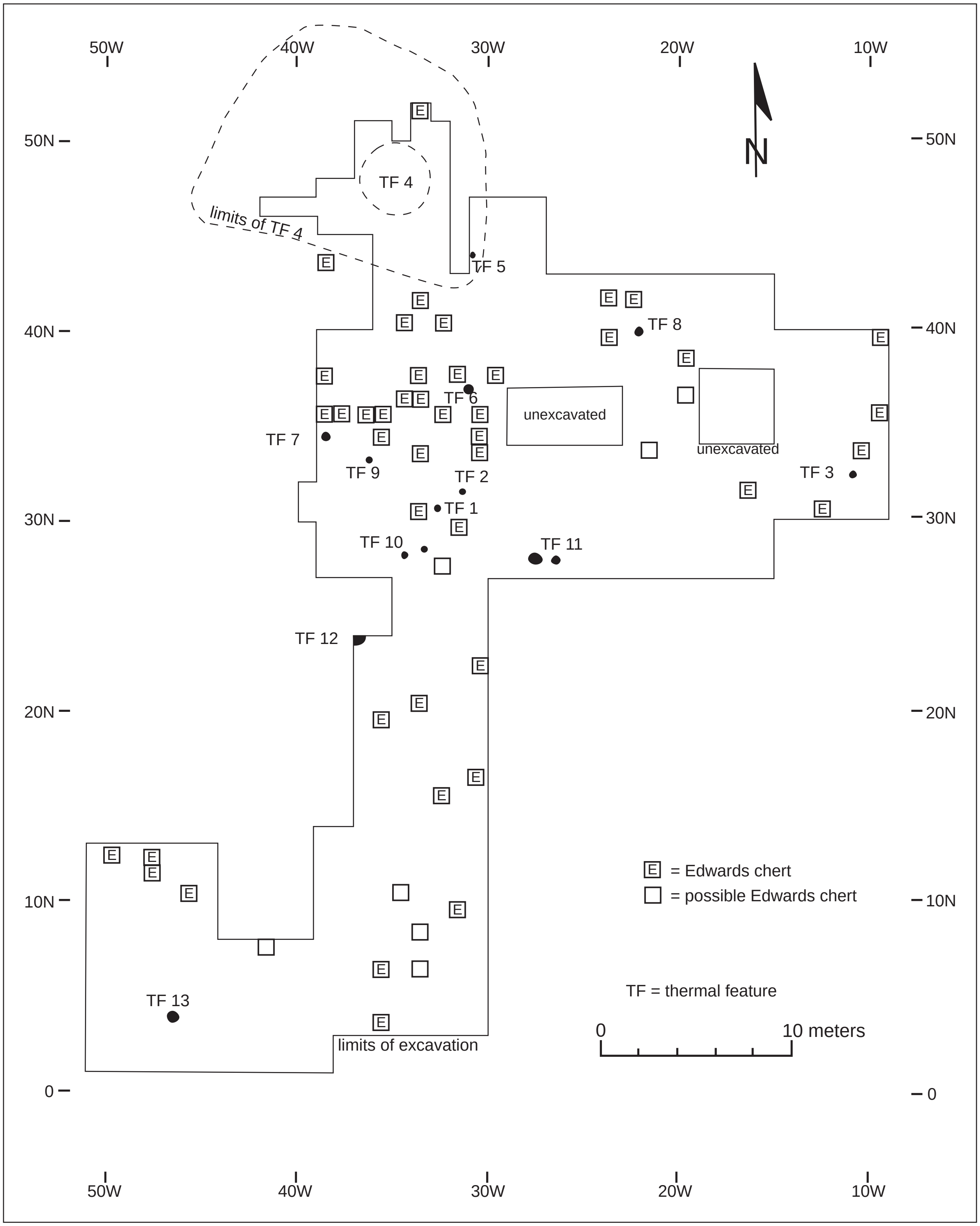


Figure 6.47. Distribution of Edwards and possible Edwards debitage, LA 38264 East.

arrow point (FS 814) of obsidian were recovered from east of the highway. Five of the flakes are biface-thinning flakes, and the remainder are tiny core flakes. Amazingly, one of the biface-thinning flakes is complete and measures 22.5 by 8 by 2.5 mm and weighs 0.25 g. Five of the flakes are of clear black obsidian, and the other three are of slightly hazy black obsidian. The projectile point is of dark brown obsidian. All could have come from the Jemez Mountains of north-central New Mexico or from gravels derived from that source. Unfortunately, all are too small for sourcing analysis. The proveniences are as follows: clear black, 36N/9W, 38N/13W, 38N/36W, 39N/32W, and 20N/30W; hazy black, 33N/26W, 43N/31W, and 50N/33W (Fig. 6.48).

Alibates silicified dolomite is represented by five flakes and one possible flake. Alibates material derives mainly from the massive quarries exemplified by Alibates Quarries National Monument along the Canadian River in the Texas Panhandle. Although several look-alike materials are known from sources in east-central New Mexico (Yeso, Salado, Ragland, Tucumcari) and northeastern New Mexico (Baldy Hill), I believe that five flakes from LA 38264 are almost certainly from the main quarries. The possible Alibates example could be either true Alibates or one of the look-alike materials. All are from the central and northern parts of the excavations east of the highway (Fig. 6.49).

A single piece of black and red chert from 35N/31E excavations may or may not be an example of an uncommon variety of Tecovas material from the Texas Panhandle. This or similar material is common at the Harrison-Greenbelt site (41DY17), an Antelope Creek phase settlement on the Salt Fork of the Red River east of Amarillo (Wiseman 1996b). Since the LA 38264 specimen is listed on the data sheets as a piece of shatter (9 by 8 by 1 mm; 0.7 g), it may not be an example of this type of Tecovas material. The assumption here, of course, is that it is unlikely that a useless piece of material would be imported such a great distance, particularly given the fact that no other examples are present in the assemblage.

One of the more intriguing possibilities in the LA 38264 artifact assemblage is a fine or second-stage biface (FS 1064; Appendix 5) from 42N/35W excavations that may be made of Tecovas chert or Niobrara/Smoky Hill chert. The latter material is found in southwestern Nebraska and northwestern Kansas, reflecting the two names applied to this material. Although several colors are to be found within this chert, the burnt orange to brown colors are some of the more characteristic ones. The LA 38264 example is a rich yellow-brown and has a thin vein of quartz running through it. This vein of quartz raises the possibility that the material is burned, regular-variety Tecovas chert, rather than Niobrara/Smoky Hill chert. We currently know of no way of deciding between these two alternatives.

And finally, one item may be one of the more unusual materials imported into southeastern New Mexico. An oval/lenticular roughout fragment (FS 828; Appendix 5) from 36N/38W excavations appears to be a detrital igneous chert that is sometimes seen in Archaic points in southeastern New Mexico. I do not know the source of this material, although southwestern New Mexico is a possibility because of the intensive and widespread igneous geology in that region.

Local gray chert study. The rationale for and method of this study are described in Wiseman (2002:77–82). Earlier applications of this approach have found that most presumed local gray cherts give little (warm) to no response to ultraviolet light and that very small numbers of flakes give a medium to bright response. However, several (but not all) sites in the vicinity of the city of Roswell have produced much larger numbers of flakes that respond in the medium and bright categories, thereby distinguishing these assemblages from all others analyzed to date. While the meaning of this difference is still being evaluated, the method holds promise for detecting intraregional differences in cultural relationships among sites.

The gray chert assemblage from LA 38264 falls within the main grouping of sites defined thus far (see Fig. 7.11). Accordingly, the assemblage for this site is normal for the region in this regard.

Discussion and Summary

The formal artifacts generally appear to be scattered about the site without any particular clustering. The distribution of manufacture bifaces (first and second stages and miscellaneous) recovered from the vicinity of TFs 6, 7, and 9 (Fig. 6.43) and northward forms a circular arrangement that lacks

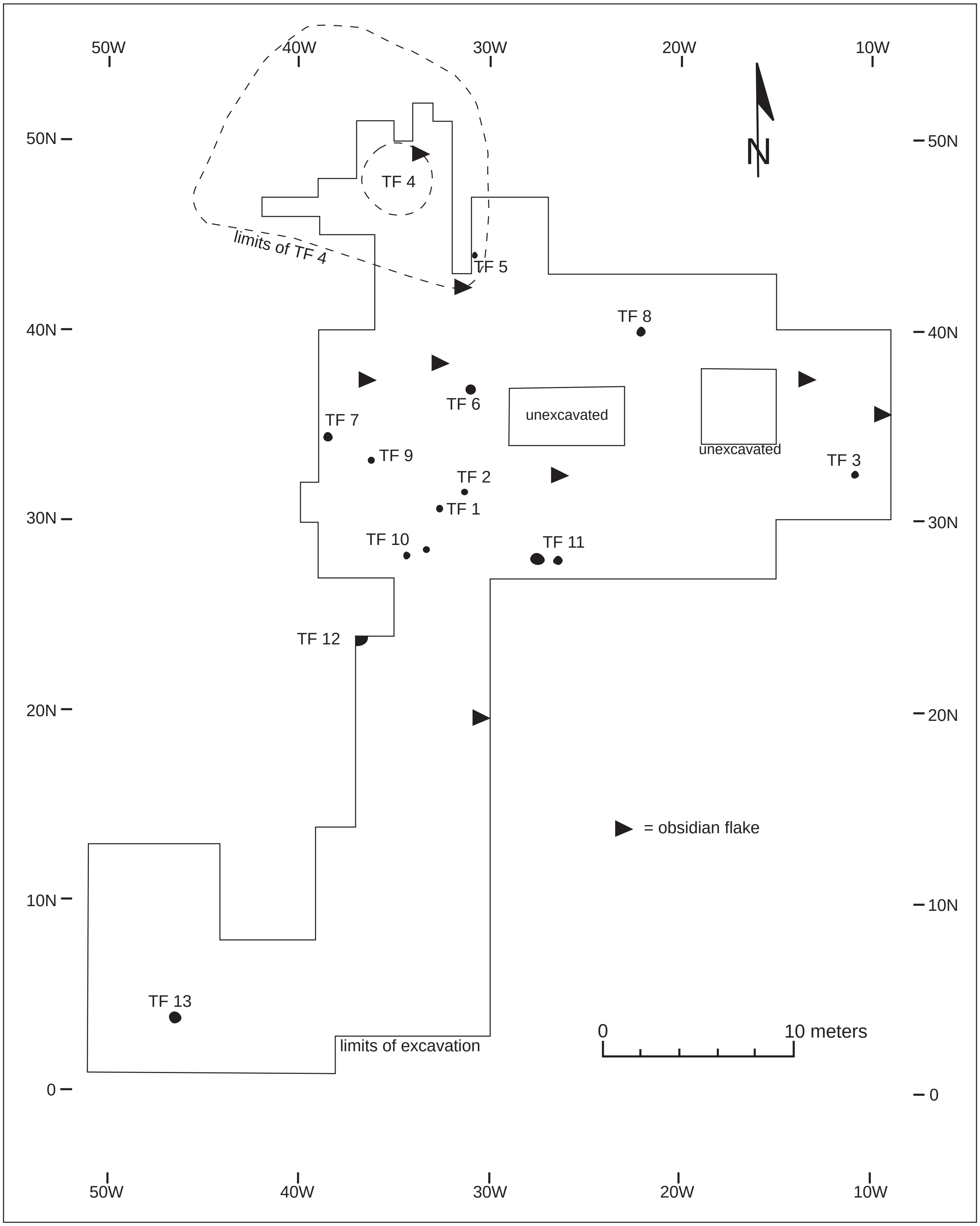


Figure 6.48. Distribution of obsidian debitage, LA 38264 East.

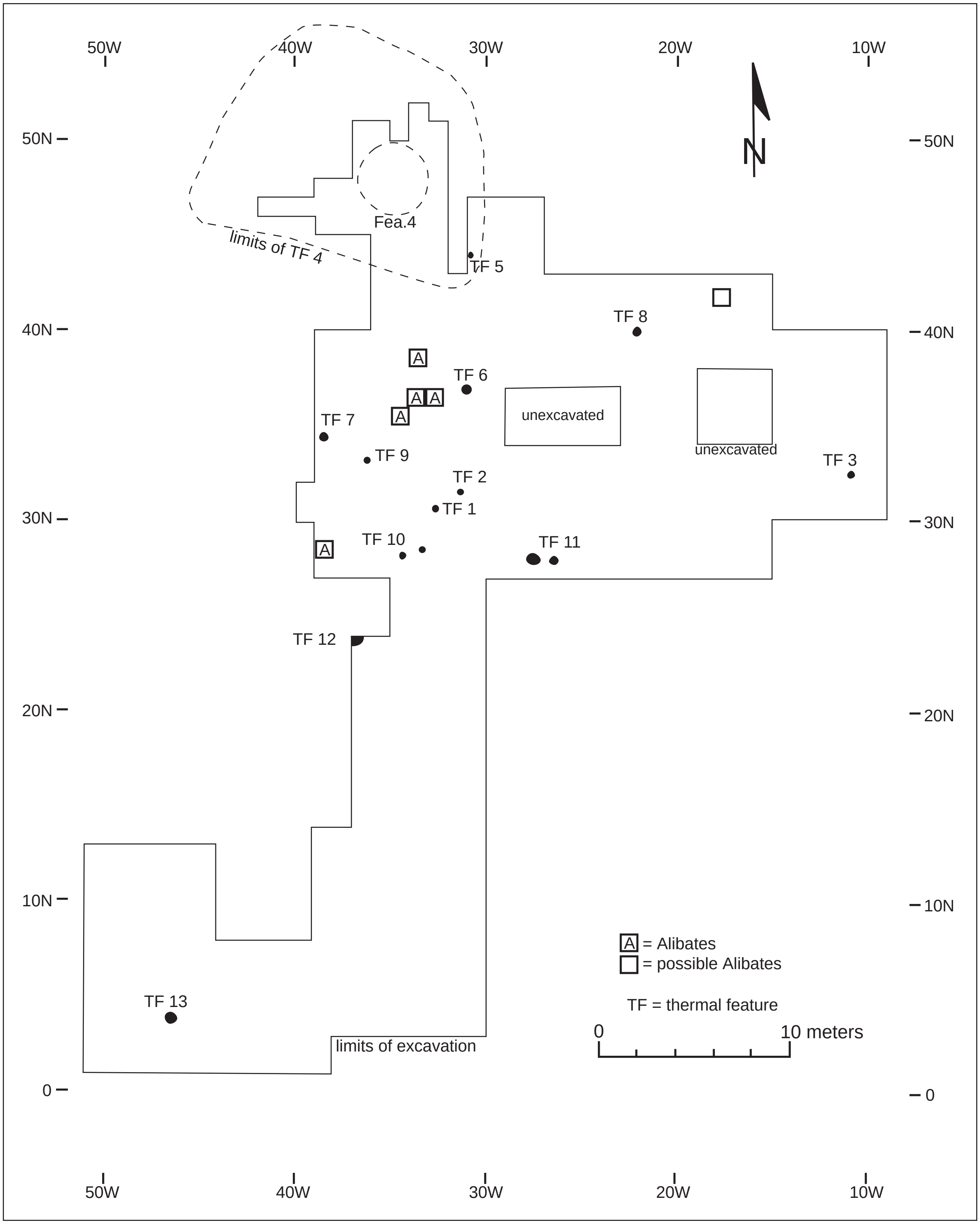


Figure 6.49. Distribution of Alibates and possible Alibates debitage, LA 38264 East.

bifaces in the center. This general area, including the center of the biface circle, is also the primary concentration of other chipping debris (core, core flakes). Interestingly, the primary pattern of biface thinning and possible biface-thinning flakes in this area overlaps to a degree, but is partly offset to the northeast of, the biface circle (Fig. 6.50). The circularity of the biface distribution, which is quite regular and 5 m in diameter, suggests that it represents a chipping location used by several knappers working together (Fig 6.43).

In addition, while biface thinning and possible biface-thinning flakes, Edwards and possible Edwards flakes, and Alibates flakes were recovered in small numbers from throughout the site, the single largest concentration of these items centered on this same locus. Interestingly, the projectile points, both complete and fragmentary, do not conform to this pattern. This suggests that the final stage of weapons refurbishment or discard was not performed at this location; evidently, removing broken points and affixing new points to the dart shafts was done elsewhere, perhaps individually and not in a work circle.

Chipped Stone Manufacturing Technology: The Site as a Whole

Materials

Most materials are local to the region. Local gray cherts comprise the overwhelming majority of materials in each area except for the West Area. Limestone is the second most common material in all areas except for the West Area, where it is the codominant with local gray cherts.

Heat Treatment

The incidence of heat treatment is generally low and is found most commonly among the biface-thinning flakes.

Cores

The usual varieties of core types are present. Single-platform cores are the most common, followed by flake cores.

Core-Reduction Flakes

These items tend to be slightly longer than they are wide. The percentage of successful flake removals as gauged by feathered and modified feathered (i.e., nonhinged and nonstepped) distal terminations is rather high for a southeastern New Mexico assemblage. However, the percentage of complete flakes is low overall, suggesting a high breakage rate at the time of detachment from the core or a high usage rate (i.e., when used as flake tools and/or to manufacture into formal tools).

Biface-Thinning Flakes

These items are present in low numbers throughout the site. Since they display the highest percentages of heat treatment, this technique for improving knappability evidently was employed more often at the biface stage than on cores and core-reduction flakes.

Broken Flakes and Shatter

The occurrence of shatter varied from about one-sixth to one-fifth of the total assemblages in all areas but the West Area, where the rate of less than 10 percent of the assemblage is notably lower.

Imported Materials

A total of 71 items, including debitage (n = 68), biface fragments (n = 2), and one projectile point represent five or possibly six different imported materials. These include Edwards chert (53 items, from central or west-central Texas); Alibates silicified dolomite (6 items) and Tecovas chert (1 item), both from the Texas Panhandle; obsidian (9 items), probably from north-central or south-central New Mexico); igneous chert (1 item, probably from southwestern New Mexico); and possibly Niobrara/Smoky Hill chert (1 item), from northwestern Kansas or southwestern Nebraska.

Local Gray Chert Ultraviolet Profile

The entire local gray chert assemblage, as well as that from each area, falls within the normal signature for southeastern New Mexico as currently known. Thus, it differs significantly

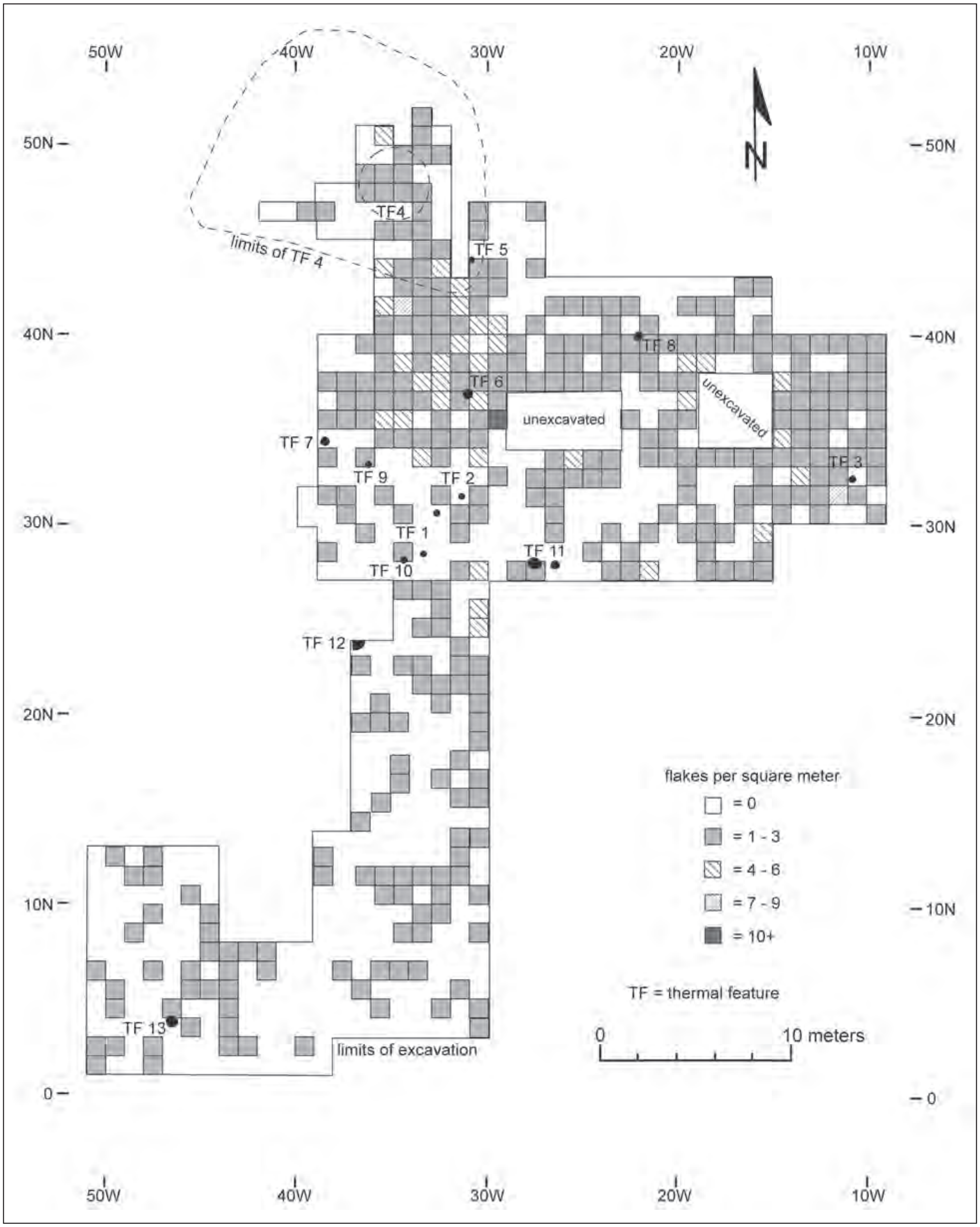


Figure 6.50. Distribution of biface-thinning and possible biface-thinning flakes, LA 38264 East.

from the signatures for farming sites like the Fox Place and Rocky Arroyo Village and the one large open camp, the Bob Crosby Draw site. These three sites are all near Roswell—two west of the Pecos River (Fox Place, Rocky Arroyo Village) and one east of the river (Bob Crosby Draw).

Differences in Chipped Stone Manufacturing Technology between Site Areas

As with the Honea's site assemblage (this report), the salient aspects of the lithic assemblage from LA 38264 permit comparison and evaluation of differences among the areas analyzed. These aspects, presented here in Table 6.21, actually show greater similarities among the areas of LA 38264 than is the case for Honea's site. For instance, all aspects of the cores are very similar across the four areas. This is only slightly less true of core-flake sizes via the proxy measure of average weights. But here, as well as in the relative abundances of biface-thinning flakes and possible biface-thinning flakes, sample-size problems are probably affecting the results. Areas 1 and 2 have large samples because of combined excavation and surface collections, and Area 3 and the West Area have small samples because they are represented by only surface samples. Thus, the lower number of core-reduction flakes, to say nothing of the generally lower number of biface-thinning flakes, are underrepresented in all nonexcavated contexts.

In summary, then, a general absence of significant differences in lithic technology as measured by these criteria suggests a degree of cultural uniformity across LA 38264. This is not to say that no differences exist through time and across space at the site. Rather, we have not been able to discover or demonstrate differences using the collection and/or analytical strategies employed. Other strategies may be able to discern differences, if they exist. However, our results may have some utility in light of the fact that some differences appear to have been discovered for the nearby Honea's site assemblage.

Floral Remains

Flotation samples recovered and analyzed from seven features—TFs 1, 3, 4, 5, 6, 7, and 12—revealed numerous species of plants (see McBride, this volume). But the remains of only eight species or genera—portulaca, amaranth, hedgehog cactus, cholla, saltbush/greasewood, mesquite, rose family, and piñon—are charred, suggesting that they were introduced into the sites by the prehistoric occupants. All species/genera but the rose family example were probably eaten by prehistoric peoples. Although the presence of these species/genera in thermal features may ultimately have related to their use as fuel, this does not automatically rule out the possibility/probability of their initial introduction into the site as food items.

Table 6.21. Debitage categories by area, LA 38264

Category	Area 1	Area 2	Area 3	West Area
Cores				
Dominant type	1 platform	1 platform	1 platform	1 platform
Weight[1]	1.5x	1.7x	1.0x	1.8x
Control of geometry	moderate	moderate	not computed	not computed
Heat treatment	some	some	some	none
Core-Reduction Flakes[2]				
Average weight	38%	41%	57%	100%
Biface-Thinning Flakes (% of assemblage)				
Biface-thinning flakes only	3.6%	3.9%	1.1%	2.4%
BTFs and possible BTFs	3.7%	5.2%	1.1%	2.4%

[1] Average weight of Area 3 multiplied by these factors; for example, the Area 1 core weight averages 1.5 times that of Area 3.
[2] Excavated and surface-collected flakes; percentage of average weight, West Area; for example, Area 1 flakes are 38% as heavy as those from West Area.

Faunal Remains

Eight species and families and five other categories of faunal remains were recovered from LA 38264 (see Moga, this volume). The recognizable species and families include woodrats, cottontails, jackrabbits, two species of mussels, hawk family, quail family, and turtle/tortoise family. The other categories include unknown mammal, small mammal, small to medium mammal, carnivore, and eggshell.

The thickness of the numerous bird eggshell fragments is comparable to that of the medium to large birds (ducks and larger). Their presence at LA 38264, however, is perplexing. The question is whether they are archaeological or natural. The problem is exacerbated by the fact that a wildlife refuge area and the Pecos River and its associated wetlands lie immediately east of LA 38264. It is likely that waterfowl have nested in these areas and therefore possible that their discarded eggshells were dropped at LA 38264 as the birds removed them from the nesting sites. The fact that the eggshell distribution at LA 38264 is virtually distinct from all faunal materials other than mussel shell tends to support a recent origin for the eggshell (though we have no doubt that the mussel fragments are prehistoric) (Fig. 6.51).

The mussel shell fragments are quite numerous, though mostly small, and were found throughout the eastern part of the site (Fig. 6.52). Two species are recognized from hinge fragments: Pecos pearly mussel and Texas hornshell. These two species were also recovered from the Fox Place (LA 68188), near Roswell (Wiseman 2002). There, valves of Pecos pearly mussel were systematically modified in various ways to make tools and ornaments. It is suspected, but currently not proven, that the meats were also eaten. Conversely, the far fewer valves of Texas hornshell were too thin and brittle for use as tools and ornaments; consequently, their presence at the Fox Place is attributed to their use as food. We generally suspect that the same can be said for the examples of both species recovered from LA 38264.

One other site, LA 26363, or Macho Dunes (Zamora 2000), also produced bird eggshell. However, this site is at Carlsbad, and while it and LA 38264 are both situated about the same distance (3 km) from the river, Macho Dunes is many kilometers from the current wildlife refuge. Is the Macho Dunes eggshell natural and of recent origin? We cannot say for certain, but it seems less likely at Macho Dunes than at LA 38264. Thus, for the time being, we must leave open the possibility that the bird eggshell from both sites belongs to the prehistoric occupations.

Summary of Prehistoric Components

The surface artifacts at LA 38264 were collected in 2 by 2 m squares. These collections, when plotted, defined one major surface artifact concentration. The burned rocks on the surface were counted, also in 2 by 2 m squares, and they, too, defined a single, major concentration. The major concentrations of artifacts and burned rocks lay adjacent to one another in the north-central part of the TCP construction area. While these concentrations served as the initial focal point of the excavations, broadscale stripping in 1 by 1 m squares was directed towards investigating the peripheral areas as well.

Several rock thermal features, including a possible communal baking facility, were noted on the surface prior to excavation, but four nonrock thermal features and one important small pit-baking facility were unexpected discoveries made only because of the widespread nature of the excavations. In fact, it is precisely this aspect, the discovery of hidden features and the elucidation of intrasite patterning among features and artifact distributions, that drove the approach used at this site.

Within time constraints, broadscale stripping excavations conducted in 1 by 1 m squares led to a detailed examination of a large area of the site lying within the project zone. This approach permitted us to define the site content and layout more thoroughly than if we had merely excavated the features observable from the surface. Nine rock thermal features and four nonrock thermal features were excavated. Several more, especially those to the south and east of the excavations, were left unexcavated. For the most part, they appear to have escaped serious damage from construction activities, in spite of the fact that a large quantity of earth was piled over them to a depth of up to 40 cm by a heavy equipment operator at the end of the construction project.

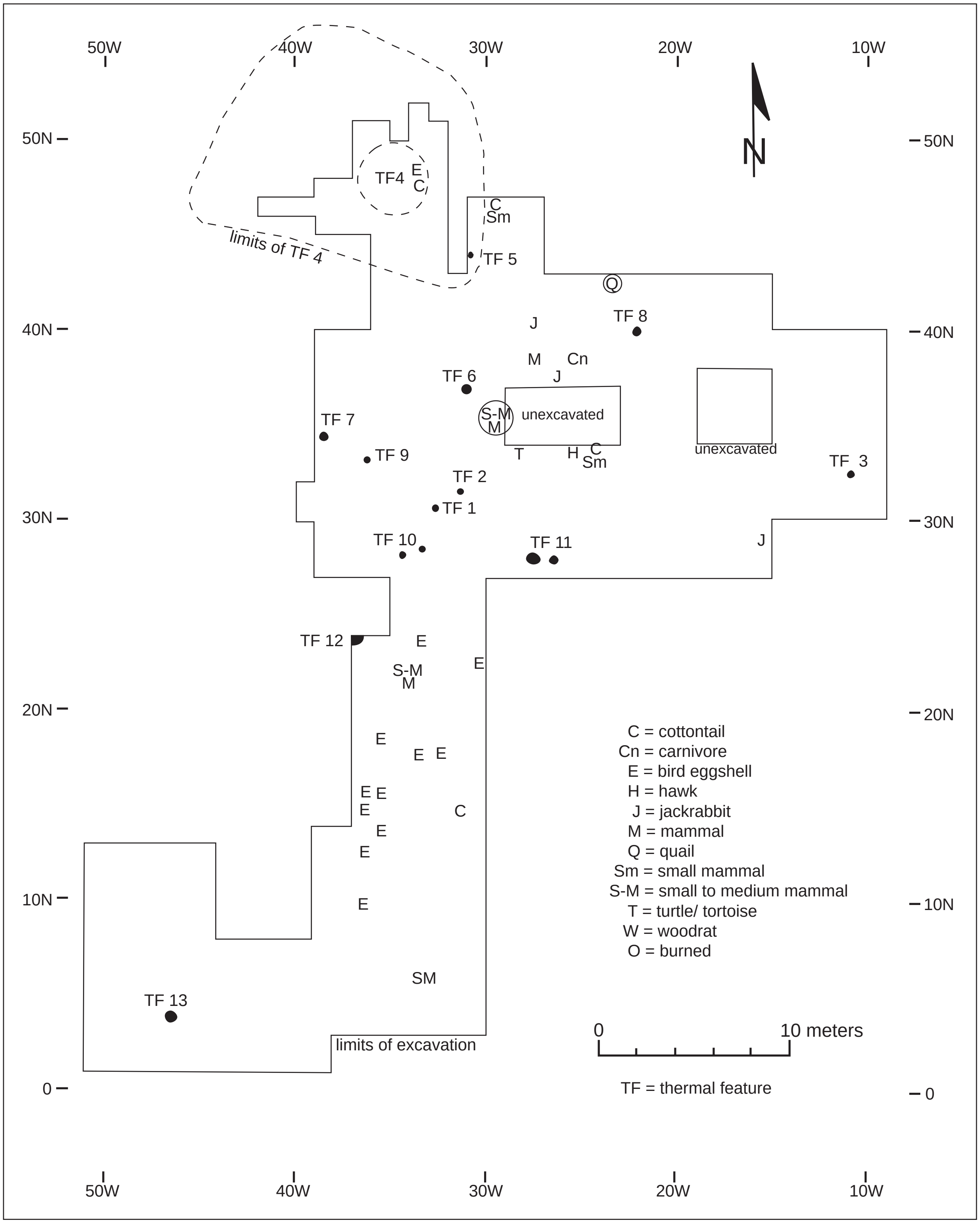


Figure 6.51. Distribution of egg shell and animal bone, LA 38264 East.

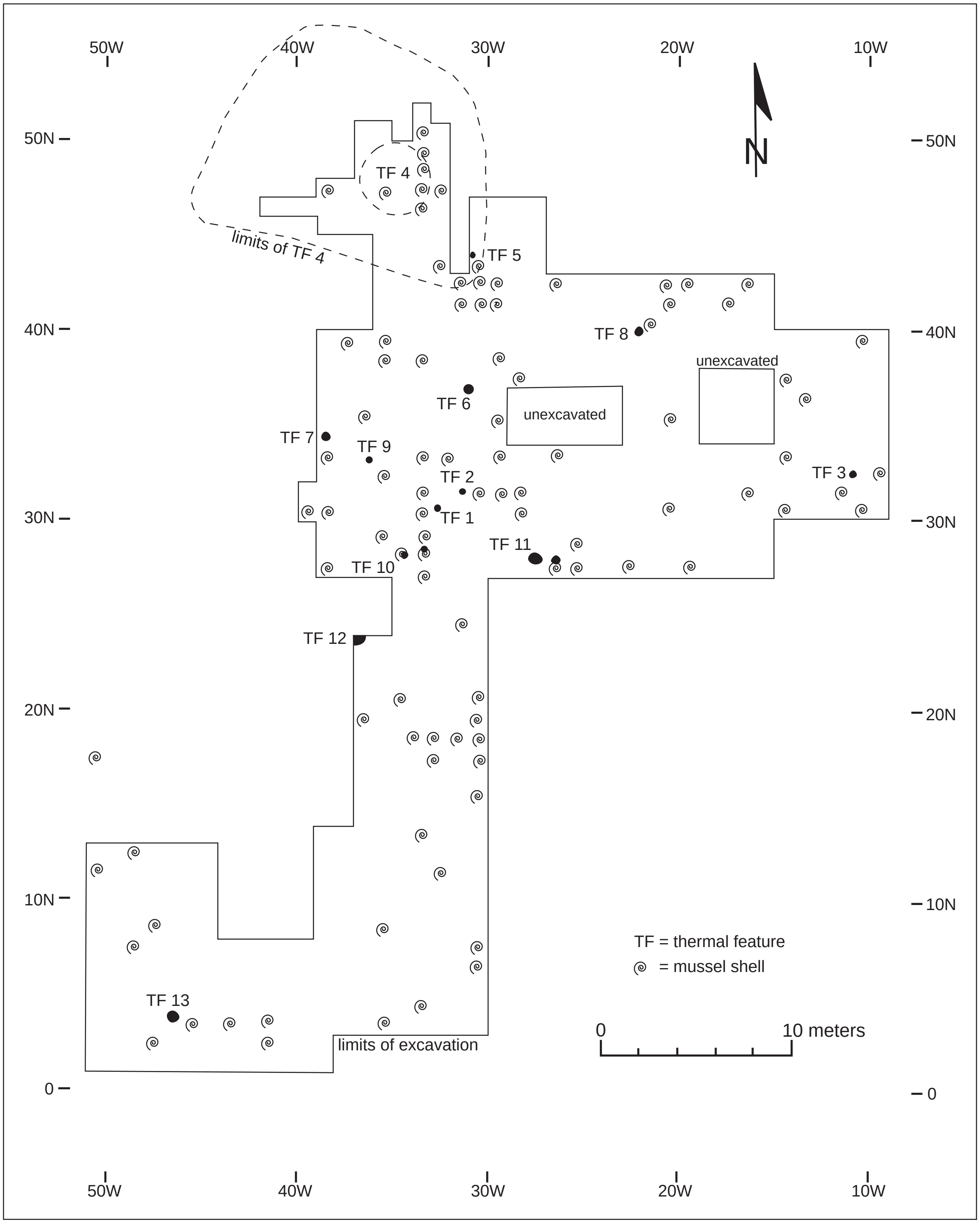


Figure 6.52. Distribution of mussel shell fragments, LA 38264 East.

The surface artifact density plots also provided the rationale for further subdividing the site into four analytical areas during the lithic debitage analysis: Areas 1, 2, 3, and the West Area. These subdivisions were analyzed separately to search for differences among the areas and to discover whether meaningful patterns exist.

Lithic debitage dominates the artifact assemblage. Artifacts include 8 metate fragments, 6 mano fragments, 20 dart points, 4 arrow points, 1 beveled knife fragment, 6 end scrapers, 2 side scrapers, 2 end-side scrapers, 1 large flake knife, 1 large flake tool, 124 informal flake tools, 37 pottery sherds, 22 oval/lenticular and 8 square/round roughouts (first-stage bifaces), and 12 second-stage bifaces. Our study of the chipped stone manufacture debris, including manufacture bifaces, proved the most useful of the artifact distribution studies. The patterning of the manufacture bifaces in the vicinity of TFs 6, 7, 9, and northward permitted delineation of a major work circle where several knappers may have gathered to reduce cores and flakes to bifaces.

Interestingly, the fragmentary projectile points recovered from LA 38264 were found scattered about the site with no place of concentration. This suggests one of two things with respect to refurbishing weaponry. If the refurbishment took place at the knapping circle, either the broken points were thrown at some distance and in all directions when removed from the hafts, or else the replacement activity took place as an individual activity rather than at the knapping circle.

The lithic debitage of cores, flakes, and pieces of shatter consists mainly of locally available materials. In an assessment of differences within lithic reduction, the debitage from this site was divided among the four site areas. The results suggest that lithic reduction across the site was fairly uniform. Overall the cores are dominated by those with single platforms, followed by flake cores. As a group, the cores from this site display moderate to good control in their geometry and reduction. The core-reduction flakes are small, lightweight, and somewhat longer than they are wide. About 41 percent of the biface-thinning flakes were heat-treated, indicating that this technique was used primarily at the biface stage of reduction. The ultraviolet profile of the local gray cherts in the LA 8053 assemblage falls within the very low reactivity category of the majority of the assemblages within the region.

Several dozen examples of exotic tool stones were found, including, in order of abundance, Edwards chert from Texas, obsidian from the Jemez Mountains of New Mexico (?), Alibates and possible Alibates material from the Texas Panhandle, one piece of Tecovas (?) chert, and one example of either Tecovas chert (Texas) or Smoky Hill/Niobrara chert (Kansas/Nebraska).

Eighteen flotation samples representing the fills of eight thermal features (five rock, three nonrock) were scanned for economic plant remains. The carbonized remains of eight species or families were noted, including portulaca, amaranth, piñon, cholla and hedgehog cacti, mesquite, saltbush/greasewood, and Rosaceae family. Some may represent fuelwood, but that does not rule out the use of other parts of these plants for food as well. Samples of mesquite, saltbush/greasewood, and unknown monocot were radiocarbon dated.

Faunal remains are not numerous, but they are varied. Freshwater mussel (Pecos pearly mussel and Texas hornshell) and eggshell fragments dominate the assemblage. The eggshell appears to be from one of the larger birds such as duck or turkey. While we feel fairly certain that the mussel shell fragments are the result of collection and (probably) consumption by the prehistoric inhabitants of the site, we believe the eggshell fragments could be postoccupational intrusives. Other species and categories identified in small numbers include jackrabbit, cottontail, woodrat, hawk/harrier, quail, turtle/tortoise, carnivore, small mammal, small to medium mammal, and mammal of unknown size.

Eighteen radiocarbon dates were obtained from eight thermal features. Through examination by means of the OxCal routine, at least six and possibly as many as eight separate periods of occupation can be discerned as follows: two occupations during the middle Avalon phase (Middle Archaic period, 2150–1600 BC); the late Avalon phase (1300–1000 BC); the Avalon/McMillan transition (late Middle Archaic to Late Archaic, 1100–800 BC); the early Brantley phase (questionable; Terminal Archaic period, or AD 1–300+); the middle Globe phase (AD 850–1150); the late Globe phase (AD 1000–1200); and the late Seven Rivers phase (AD 1750–1950).

The broadscale excavation technique employed at this site, combined with the feature distributions, open spaces (devoid of features), radiocarbon results, and lithic debris concentrations, have permitted us to evaluate the internal site structure. Initial inspection of the placement of the features suggested a well-patterned use of that part of the site space excavated by this project.

However, reconsideration of this patterning in light of dated features suggests that the supposed zonation of the site, particularly that part initially termed the "main camp," came about for reasons other than a focus on the communal pit-baking facility (TF 4, the annular midden). The grouping of thermal features from several time periods in this part of LA 38264 appears to be incidental to TF 4, since that feature was evidently used only during the early part of the occupation of the site. The "main camp" area saw several small occupations over a period of 3,500 years, indicating that their grouping at that locus was determined by criteria other than those initially presumed and do not necessarily reflect an aboriginal concept of proper site structure. Most, or perhaps all, of those small occupations may have involved only one thermal feature per occupation, some of which reused previously existing features, and some of which built new ones.

7. River Crossing Site (LA 112349)

LA 112349 has at least two components, one prehistoric and the other historic. The site is situated on an indentation in the north terrace of the South Seven Rivers drainage (Appendix 10). The slope is so gentle that late nineteenth- and early twentieth-century wagons could pull out of the stream bed and up onto the terrace top (Wiseman 2001a).

A thin mantle of clayey silty sand covers the site. The slightly undulating ground surface slopes gently to the south. Today, many of these undulations are due to the numerous old road tracks, all of which are shallow, grass-filled swales with arroyo-cut lower (southern) ends at the river. The vegetation consists mainly of creosote bush, with scattered bunch grass, Christmas cholla, prickly pear cactus, mesquite, and other plants of the northern Chihuahuan Desert. The elevation of the site is 1,003–1,006 m (3,290 to 3,300 ft) above mean sea level.

The prehistoric component was recorded first by Southern Methodist University in the 1970s (Henderson 1976) and more recently by NMDOT archaeologists for the current construction project. Henderson recorded the site as a small artifact/burned-rock scatter and assigned it the provisional name X29ED44. He also tested the site, but no evidence of the one test pit was found during our investigation. Total site size (prehistoric and historic) is 260 m north-south and 220 m east-west. The prehistoric component, in the south-central part of the site, measures 70 m north-south and 75 m east-west.

The prehistoric features at this site consist of two burned-rock thermal features, one of which was excavated and radiocarbon dated to 1315925 BC. The second thermal feature lay outside the project zone and was not excavated. The cultural depth of the site varies from surficial to 15 cm.

A single grid was established over that part of the site lying within the construction project zone. The main datum was placed at the northwest corner of the grid, which lay several meters outside the construction project limits. At the end of the fieldwork, a 2 ft section of rebar at the main datum (0N/0E) was driven below the ground surface and surrounded with a concrete collar to protect it. It was then covered with a few centimeters of sediment to conceal its location.

The prehistoric artifacts on the surface were piece-plot mapped (bearing and distance) with a Sunto compass and tape, and collected (Fig. 7.1). The occasional burned rocks noted away from the two features were not counted or mapped.

Using the procedures described earlier, a 10 by 11 m area was excavated around one of the small baking pits (TF 1; Fig. 7.2). The other burned-rock feature (TF 2) lay outside the construction project zone and was not excavated.

Recovered surface artifacts included 1 end scraper fragment, 1 possible end scraper fragment, 1 roughout biface fragment, 1 mano fragment (oval, one-hand), 2 pottery sherds (1 South Pecos Brown and 1 possible South Pecos Brown), and 62 pieces of chipping debris (flakes, etc.). The prehistoric site area measured 70 by 75 m (5,250 sq m), and the surface artifact density was one artifact per 77 sq m.

Excavated Squares

TF 1 (a small, Archaic period baking pit) and 95 1 m squares surrounding the feature were excavated (Fig. 7.2). Recovered artifacts consisted of 101 pieces of chipping debris (flakes, etc.).

All squares were excavated down to consolidated sediments; most final depths were 5 to 8 cm. Tests in 5S/56E and 5S/66E were excavated to 20 cm, revealing that consolidation of the sediments increased with depth.

Few artifacts were recovered from the excavations, and even fewer surface artifacts came from the immediate surroundings. This suggests that the use of the site was short and nonintensive.

Very few artifacts, all of them chipping debris, were recovered from the excavations. All of these items came from only 38 squares, or 40 percent of the excavated squares. Nonetheless, their distribution is interesting. If we look at the

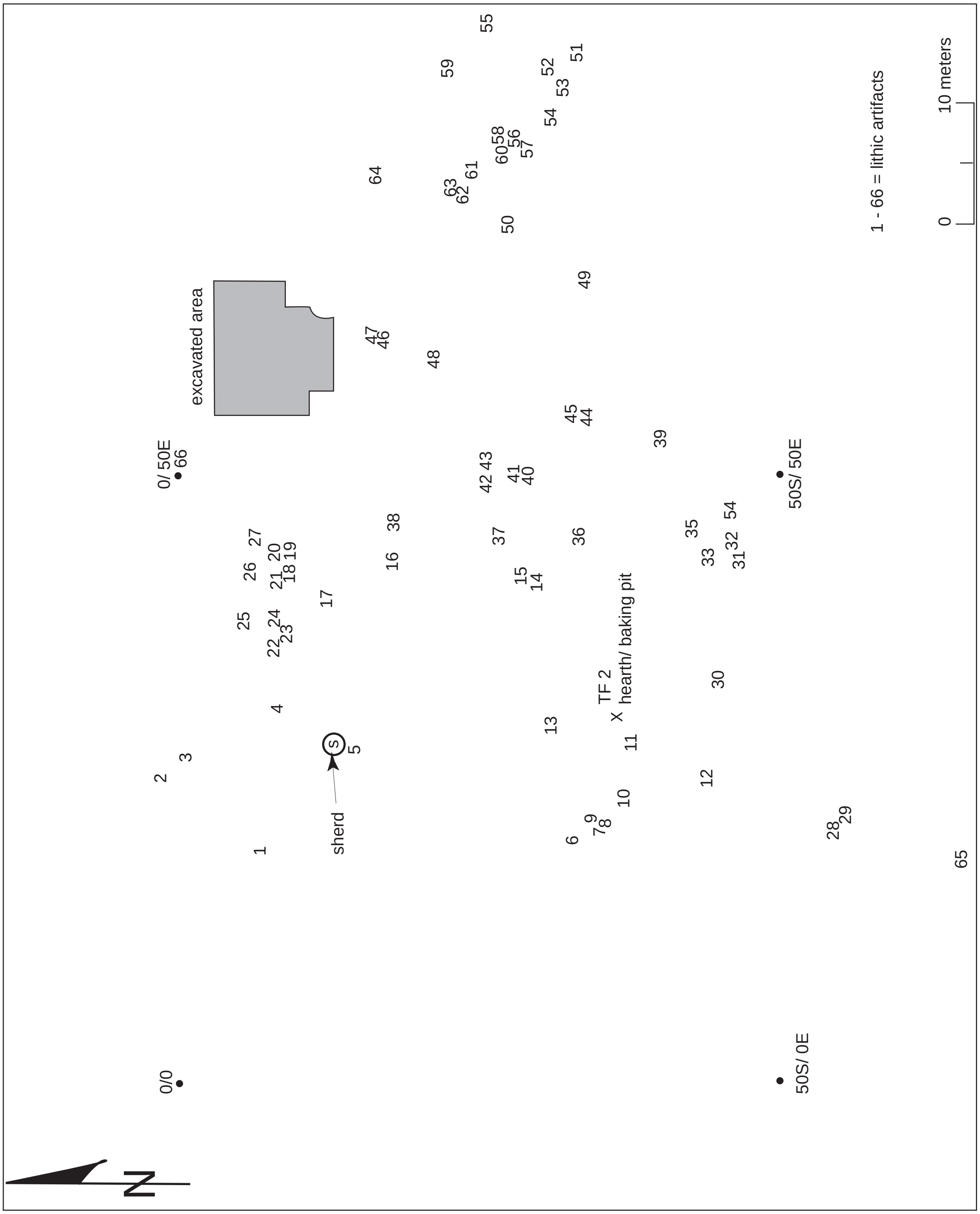


Figure 7.1. Surface artifacts (by artifact number) and TF 2, LA 112349.

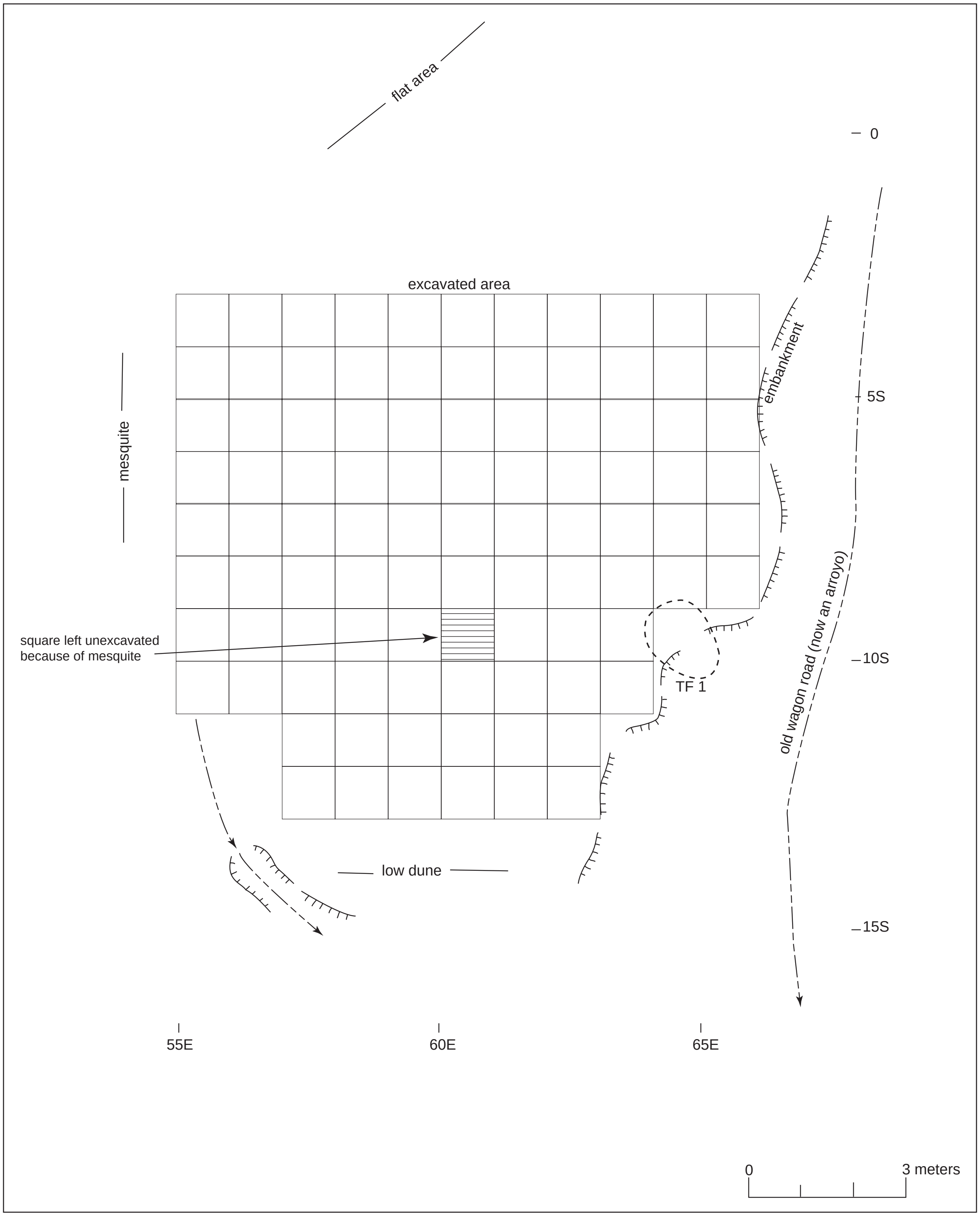


Figure 7.2. Excavated squares around small baking pit (TF 1), LA 112349.

excavated squares in terms of concentric tiers from TF 1, we observe the following (Table 7.1; Figs. 7.3 and 7.4): (1) The first tier of squares, those within 1 m of the baking feature, lack artifacts altogether. (2) Tiers 2 through 4 (the space between 1 and 4 m from the feature) present a low density of artifacts, averaging 0.25 to 0.36 items per square meter. (3) Tiers 5 through 7 (the space between 5 and 8 m from the feature) present a somewhat higher density, averaging 0.53 to 0.60 items per square meter. (4) Starting at a point about 8 m from the feature and continuing outward, the average artifact density increases with each successive 1 m wide tier.

Table 7.1. Artifact recovery by tier of squares, Feature 1, LA 112349

Tier No.	No. of Excavated Squares in Tier	No. of Squares with Artifacts	Total Artifacts from Tier	Artifact Density per Square
1	5	0	0	0
2	8	1	2	0.25
3	11	3	4	0.36
4	12	3	4	0.25
5	15	6	8	0.53
6	17	9	10	0.59
7	10	5	6	0.6
8	8	4	7	0.88
9	8	7	10	1.25
Total	94	38	51	

Furthermore, if we look at a square-by-square distribution within the excavated area, we see that the squares yielding artifacts are unevenly distributed (Fig. 7.3). More artifact-producing squares are grouped west of the feature than anywhere else within the excavated area (i.e., to the north). Plus, a blank area exists immediately northwest of the feature. This area, extending through Tier 5, measures approximately 3 to 4 m wide and 5 to 6 m long. We believe that this blank area represents the feature access point or the place where the individual or group using the feature actually sat and worked. The artifact distribution conforms to Binford's (1978) toss-zone model, which, in addition to the vacant space surrounding the thermal feature, suggests that this feature and the artifacts derive from the same occupation.

Features

TF 1

TF 1, a small baking pit (Figs. 7.5–7.8), was first observed during the NMDOT survey, when the burned rocks that comprised part of its fill were noted eroding out of the side of an old road scar. The oval pit was incomplete because of the erosion, but the remaining part measured 120 by 80 cm. The depth from the top of the pit outline to the bottom was 15 cm. The bottom lay 20 cm below the modern surface. The pit had been dug into sterile soil, but neither the sides nor the bottom were plastered.

The fill was mottled in color with medium to dark gray concentrations scattered throughout lighter gray sediments. The burned rocks were mostly at or near the top of the fill; very few were towards the bottom. Although small concentrations and individual rocks in the vicinity of TF 1 may well have come from its use, only those rocks within the pit or scattered directly downslope are counted as belonging to the feature. These rocks (n = 167) measured from 1 by 1 cm to 10 by 10 by 5 cm. At least 10 liters of the darker fill were collected for flotation and dating analysis. Two radiocarbon dates were obtained for TF 1: cal. 1045 BC (Beta-122667) and 1170 BC (Beta-122668).

TF 2

Although TF 2, a possible small baking pit, lay outside the construction project zone and was not excavated, the burned rocks associated with it were mapped (Fig. 7.8). No pit outline or stain was noted during this activity, although this is not surprising since the ground surface within and around the feature is stable and coated with the fine sediments characteristic of the area. The original size of the feature appears to have been about 1 by 1 m, but the scatter of associated burned rocks now covers an area of 3.5 by 4.5 m. In all, 216 rocks larger than 1 by 1 cm were mapped. The largest burned rocks measured 10 by 10 cm.

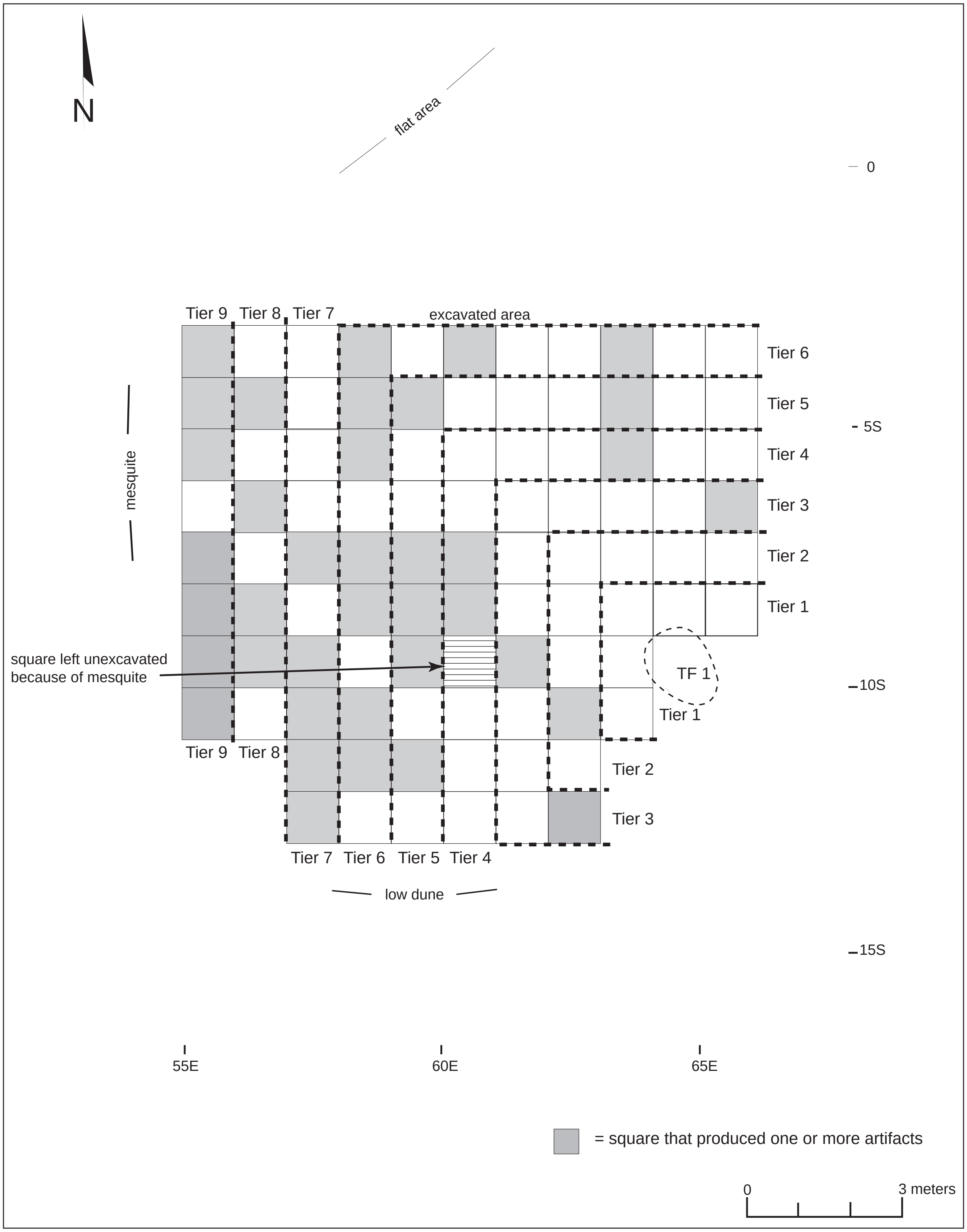


Figure 7.3. Concentric tiers of squares surrounding small baking pit (TF 1) and distribution of excavated squares that produced artifacts, LA 112349.

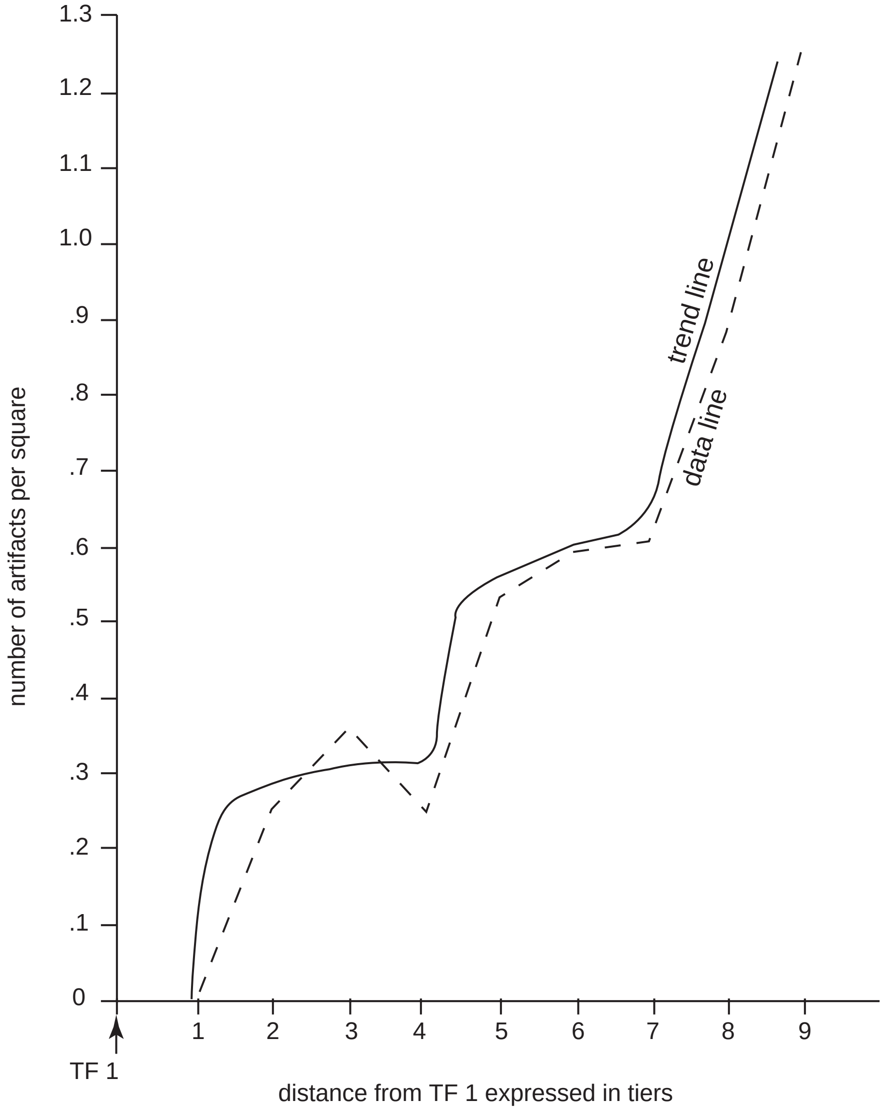


Figure 7.4. Artifact densities by concentric tiers of excavated squares, LA 112349.

Figure 7.5. TF 1 prior to excavation, LA 112349.

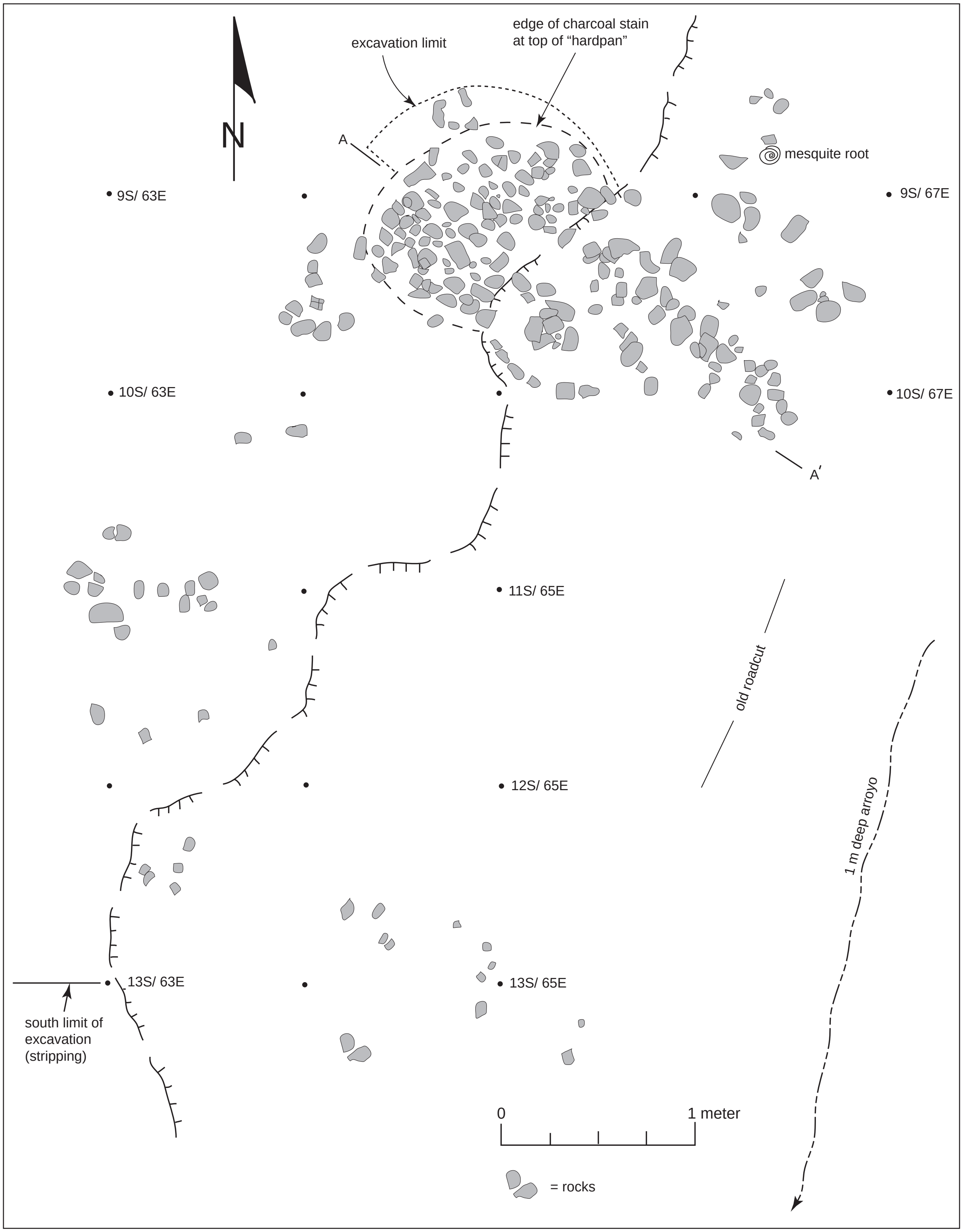


Figure 7.6. Plan of TF 1, LA 112349.

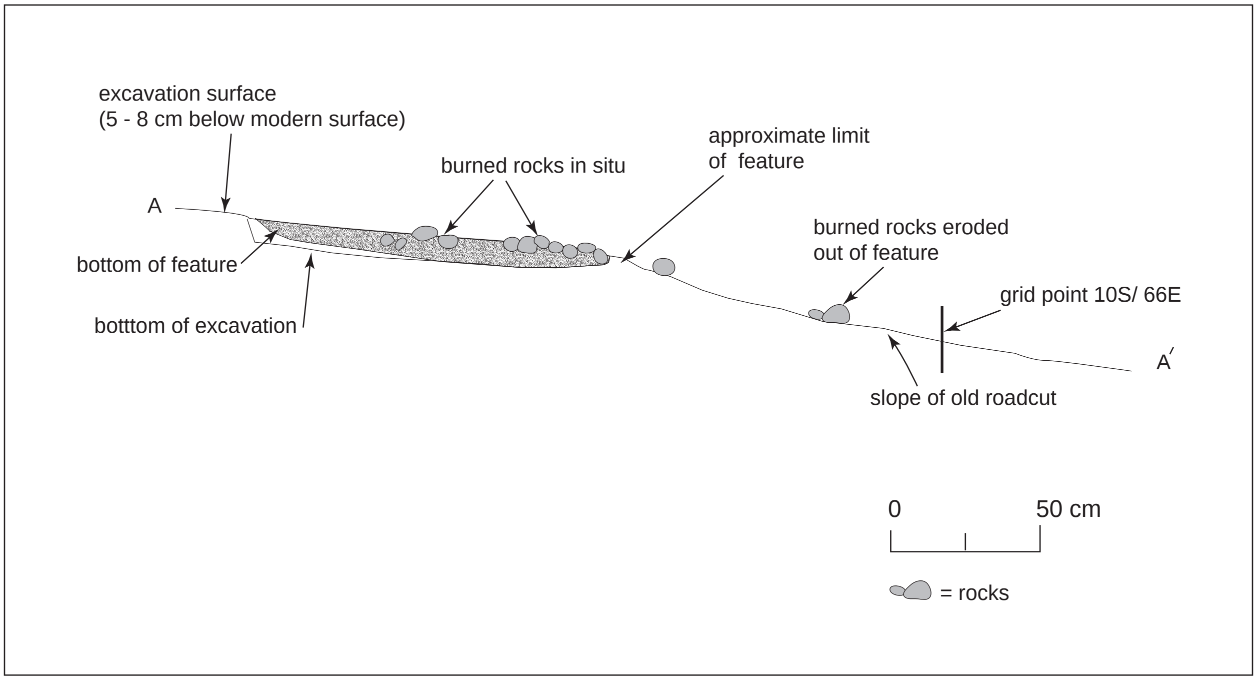


Figure 7.7. Profile of TF 1, LA 112349.

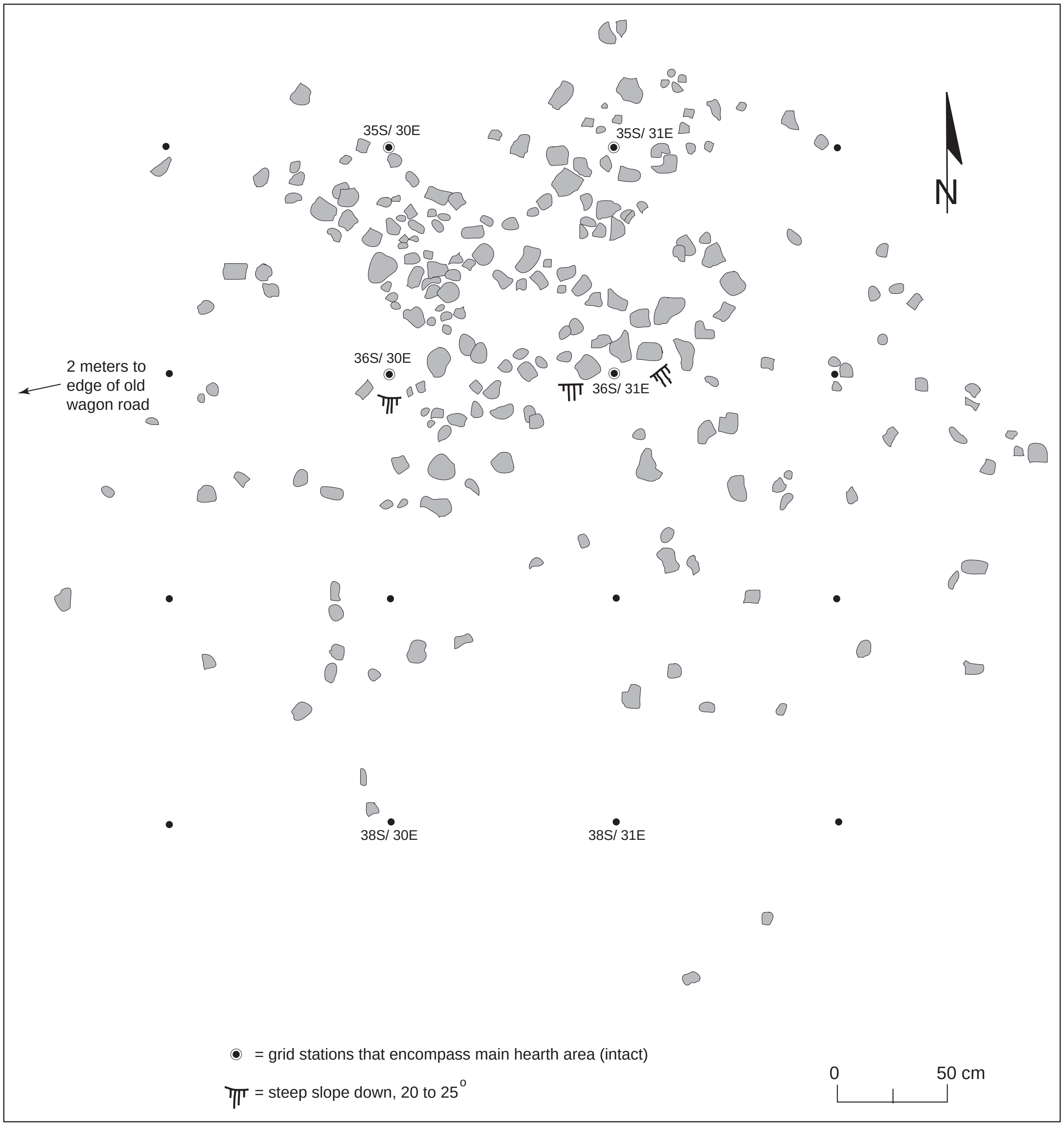


Figure 7.8. Plan of TF 2 (not excavated), LA 112349.

Plant Processing–Related Artifacts

Mano

An oval, one-hand mano has a single grinding surface with a moderately strong convex profile along the short (?) axis (Fig. 7.9). It measures 59+ by 90+ by 32+ mm, is made of limestone, and comes from the surface 50 m southwest of the excavated baking pit, only 8 m west of the unexcavated burned-rock feature. It may have been associated with the use of the latter feature.

Animal-Related Artifacts

End Scrapers

One and possibly two end scrapers were recovered from the surface of the site. The complete, thick end scraper (FS 13, Fig. 7.10a), made from a coarse, medium grayish-brown and dark gray chert flake, is intentionally retouched across the end and along the right lateral edge. It measures 38 mm long, 36 mm wide, and 11 mm thick, and it weighs 19.3 g. Its surface provenience 5 m north of the unexcavated burned-rock feature (TF 2) suggests that it might date to the same occupation.

The second artifact, (FS 18, Fig. 7.10b), may be the proximal end of another end scraper, this one of Edwards chert (ultraviolet value medium). It is intentionally flaked along both lateral edges; measures 25+ mm long, 29+ mm wide, and 6 mm thick; and weighs 6.2+ g. Its provenience is the surface 22 m west of the small baking pit (TF 1) and 29 m north-northeast of the unexcavated burned-rock feature (TF 2).

Pottery

Two small pottery sherds were recovered from the site surface (see Appendix 4). One and perhaps both are South Pecos Brown.

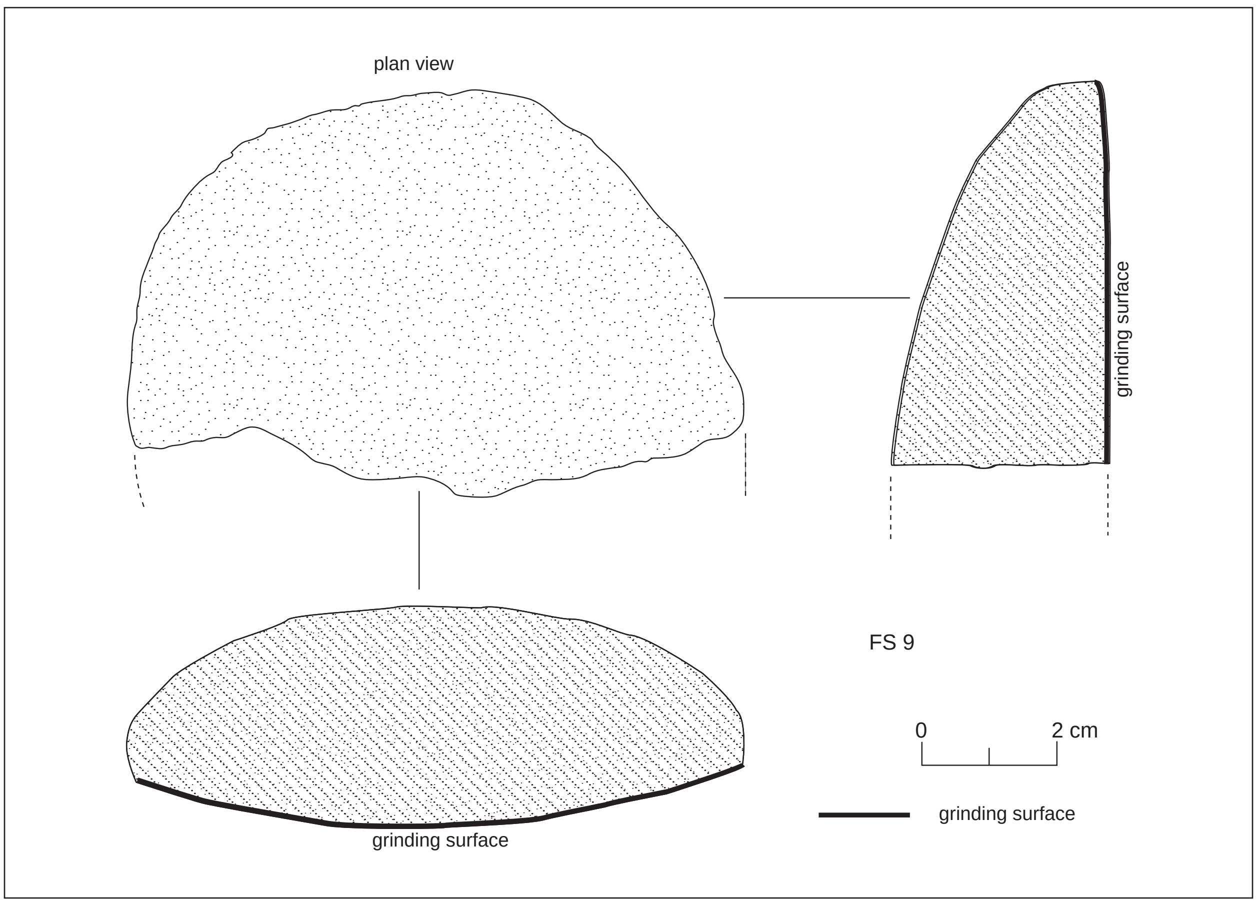


Figure 7.9. Mano fragment, LA 112349.

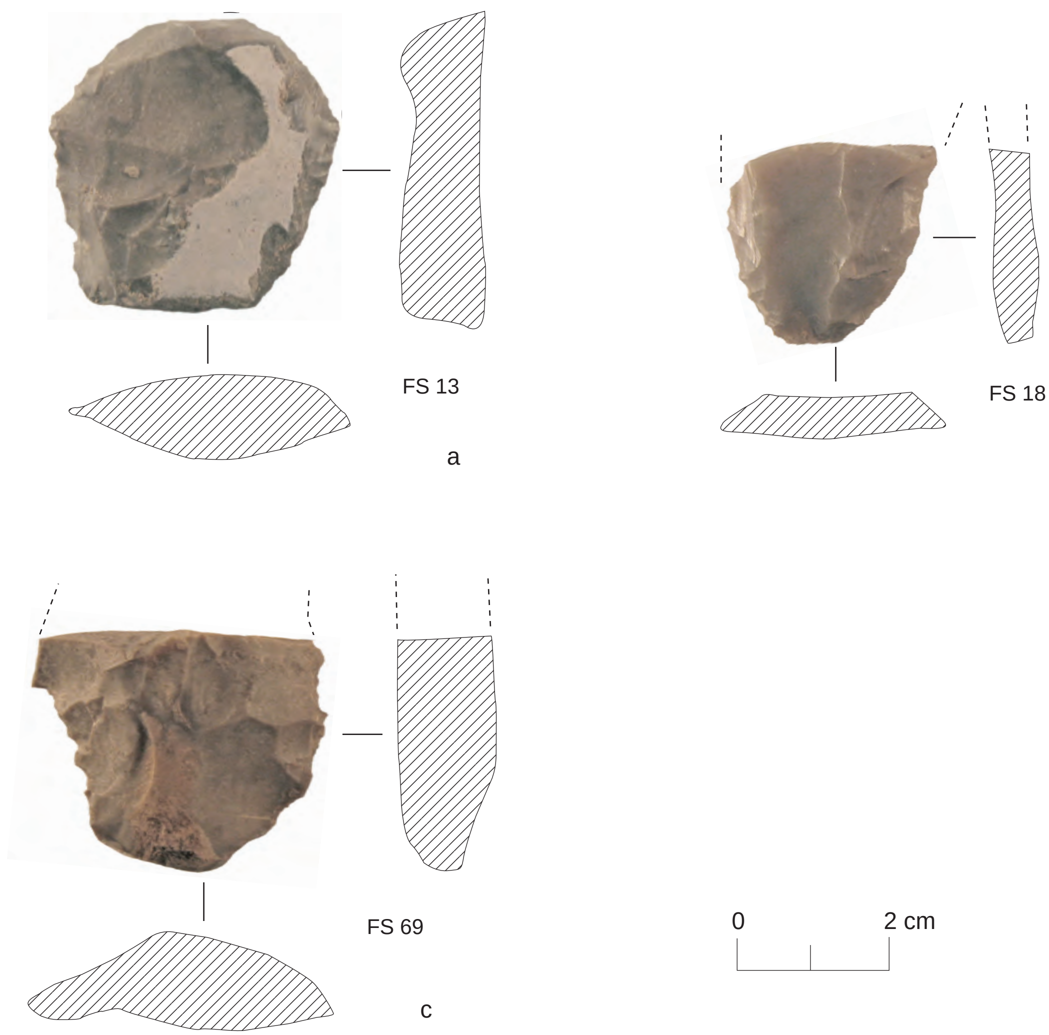


Figure 7.10. (a) End scraper, (b) possible end scraper, and (c) roughout from the surface of LA 112349.

The definitively identified sherd (FS 5) is 5 mm thick, has lightly polished surfaces, and contains gray feldspar, off-white feldspar, hematite, magnetite, hornblende, quartz, and clear feldspar temper. Its provenience is 35 m west of the small baking pit (TF 1), which it postdates by at least 1,500 years, and 23 m north of the unexcavated, burned-rock feature (TF 2).

The second potsherd, FS 68, may not in fact be South Pecos Brown. It is 5.5 mm thick, has lightly polished surfaces, and contains gray feldspar, off-white feldspar, hematite, magnetite, and gold mica temper. It was found on the surface.

Chipped Stone Manufacture Debris

Cores, flakes, shatter, and a single roughout biface fragment constitute the bulk of the artifacts recovered from the River Crossing site (Table 7.2). The analysis of these materials, following the standard analysis methods I have used in the Roswell region over the past 20 years, focuses on reconstructing the lithic technology and the identification of materials and sources. The raw materials and definitions used to classify and analyze chipped stone debris are described in Appendixes 1 and 6. Descriptions and discussions of the gray chert sourcing study and a model of core-reduction technology believed to apply to southeastern New Mexico can be found in Wiseman (2000a). The roughout biface, cores, core-reduction flakes, and biface-thinning flakes are described below. No pieces of debitage bearing use-wear or intentional retouch were recovered from this site.

Manufacture Bifaces

Oval/lenticular roughout (first-stage biface). This broken item (Fig. 7.10c) is actually an outrepassé flake. It measures 31+ by 39+ by 13+ mm, weighs 16.2+ g, and is made of medium gray-brown and dark gray chert. It was found on the surface.

Lithic Debitage (n = 28)

Cores. Eight cores include four subtypes (Table 7.2). The single-platform core is the most common. Materials are varied but are dominated by local gray chert (Table 7.3). Sizes vary (Table 7.4); the thickness to weight dimension is significantly correlated. However, we have too few cores to assess the significance of these and other correlations other than to say that these cores do not appear to be as well controlled as they might be. Heat treatment of cores may not have been practiced, since none of the eight specimens displays this attribute.

Core-reduction flakes. Only 23 percent (n = 16) of the 70 core-reduction flakes are complete. Summary statistics (Table 7.5) indicate that, on average, they are small, basically as long as they are wide, relatively thick, and, accordingly, somewhat heavy (14–15 g). Parenthetically, the average flake weight relates more to the presence of the limestone flakes than to any other single factor. The 10 complete limestone flakes average 75.3 g, 2 weigh 100 g or more, and only 4 weigh about the average or less for all flakes.

A two-tailed Pearson correlation matrix (Table 7.5) suggests that many of the values are significant. However, considering that flake dimensions are generally correlated by their nature, only one value is as high as we believe they should be (.8s and .9s) to be truly significant. Thus, the correlation of width and weight (.8376) is interesting, but on the whole, this assemblage displays virtually no standardization in flake dimensions.

Other characteristics of the core-reduction flakes include the following (Tables 7.3, 7.5, and 7.6). The primary materials are local cherts (63 percent) followed by limestone (30 percent). Heat treatment was rarely used; the total positive and possible cases total only 10 percent of the assemblage. Core platforms are about twice as common as any other individual type but represent less than half of all platform types. Over 80 percent of the flakes have feathered or modified-feathered terminations. Less than 20 percent of the complete flakes lack dorsal cortex, whereas the greatest number (38 percent) have from 11 to 25 percent cortex.

Biface-thinning flakes. Four biface-thinning flakes were recovered from LA 112349. All are fragmentary, and all are made from local gray cherts. All came from the excavated squares in the vicinity of the small baking pit (TF 1).

Exotic lithic materials. The only lithic material that originated outside southeastern New Mexico is Edwards chert, which the probable end scraper fragment is made of.

Local gray chert study. The rationale and method of this study are described in Wiseman (2002:77–82). Earlier applications of this approach have found that most presumed local gray cherts give little (warm) or no response to ultraviolet light and that very small numbers of flakes give a medium or bright response. However, a series of sites located a short distance south and southwest of the city of Roswell have produced much larger numbers of flakes that respond in the medium and bright categories, thereby distinguishing these assemblages from all others analyzed to date. While the meaning of this difference is still being evaluated, the method holds promise for detecting intraregional differences in cultural relationships.

As can be seen in Figure 7.11, the gray chert assemblage from LA 112349 falls within the main grouping of sites defined to date. Thus, the River Crossing site is "normal" for the region in this regard.

Floral Remains

The only floral materials recovered from LA 112349 are fragments of mesquite and saltbush/greasewood that represent fuelwood in TF 1, the

Table 7.2. Lithic knapping debris, LA 112349

Category	Number	Percent
Cores		
Single platform	4	3.6%
Two platforms adjacent	2	1.8%
Two platforms parallel	-	-
Three platforms	1	0.9%
Tested cobble/pebble	-	-
Flake core	1	0.9%
Total	8	7.1%
Flakes		
Core reduction	70	62.5%
Biface thinning	4	3.6%
Decortication	2	1.8%
Platform preparation	-	-
Potlid flake	-	-
Indeterminate	17	15.2%
Total	93	83.0%
Shatter		
Total	11	9.8%
Table total	112	100.0%

Table 7.3. Lithic debitage attributes, LA 112349

Frequency Column %	Cores	Core-Reduction Flakes	Biface-Thinning Flakes	Other Flakes	Shatter	Total
Material						
Local chert	4	44	4	16	9	77
	50.0%	62.9%	100.0%	84.2%	81.8%	68.8%
Other chert	1	4	-	3	-	8
	12.5%	5.7%	-	15.8%	-	7.1%
Chalcedony	-	-	-	-	-	-
	-	-	-	-	-	-
Limestone	2	21	-	-	2	25
	25.0%	30.0%	-	-	18.2%	22.3%
Siltite/quartzite	1	-	-	-	-	1
	12.5%	-	-	-	-	0.9%
Other	-	1	-	-	-	1
	-	1.4%	-	-	-	0.9%
Total	8	70	4	19	11	112
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Heat Treatment						
No	8	63	3	17	9	100
	100.0%	90.0%	75.0%	89.5%	81.8%	89.3%
Yes	-	6	-	1	1	8
	-	8.6%	-	5.3%	9.1%	7.1%
Possibly	-	-	-	-	1	1
	-	-	-	-	9.1%	0.9%
Indeterminate	-	1	1	1	-	3
	-	1.4%	25.0%	5.3%	-	2.7%
Total	8	70	4	19	11	112
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 7.4. Statistics, complete cores, LA 112349

	Descriptive Statistics			
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	52.00	41.50	29.50	93.81
SD	10.07	7.73	10.66	88.13
Range	30.00	23.00	34.00	273.30
Number	8	8	8	8

	Correlation Matrix of Dimensions (Pearson's r, two-tailed test)			
	Length	Width	Thickness	Weight
Length	1.0000			
Width	.6700	1.0000		
Thickness	.8061	.8044	1.0000	
Weight	.7907	.8664*	.9281**	1.000

* Significant at .01 level.
** Significant at .001 level.

Table 7.5. Dimensions of complete core-reduction flakes, LA 112349

	Descriptive Statistics			
	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)
Mean	28.63	27.69	11.44	14.52
SD	15.36	15.14	7.55	21.16
Range	50.00	55.00	24.00	79.90
Number	16	16	16	16

	Correlation Matrix of Dimensions (Pearson's r, two-tailed test)			
	Length	Width	Thickness	Weight
Length	1.0000			
Width	.6383*	1.0000		
Thickness	.6561*	.7470**	1.0000	
Weight	.7821**	.8376**	.7822**	1.000

* Significant at .01 level.
** Significant at .001 level.

Table 7.6. Core-reduction flake attributes, LA 112349

Attribute	No.	Percent
Platform Types		
Cortex	7	43.8%
Single flake scar	3	18.8%
Multiple flake scar	2	12.5%
Pseudodihedral	4	25.0%
Edge/ridge remnant	-	-
Pointed	-	-
Destroyed during detachment	-	-
Total	16	100.0%
Distal Termination Type		
Feathered	13	81.3%
Modified feathered	1	6.3%
Hinged or stepped	2	12.5%
Total	16	100.0%
Dorsal Cortex		
0%	3	18.8%
1-10%	1	6.3%
11-25%	6	37.5%
26-50%	3	18.8%
51-75%	2	12.5%
76-90%	-	-
91-99%	-	-
100%, including platform	1	6.3%
Total	16	100.0%

small baking facility. Some of these materials were used for dating the feature.

Faunal Remains

No faunal materials were recovered from LA 112349.

Radiocarbon Dates

Two radiocarbon dates were obtained for LA 112349. Both were obtained from mesquite charcoal in TF 1 fill. The calibrated intercept dates are 1045 BC (2 SD, 1250–925 BC) and 1170 BC (2 SD, 1315–1015 BC). Details are provided in Addressing the Data Recovery Questions.

A later use of the site is suggested by the two pottery sherds of South Pecos Brown and possible South Pecos Brown. Jelinek (1967) suggests that this type dates to AD 900–1300.

Summary of Prehistoric Components

The dispersed surface artifacts of this site were point-provenienced and collected. Lithic debitage predominates, although a one-hand mano, one and possibly two end scrapers, and two small potsherds were recovered. One of two rock thermal features was excavated and found to be either a large pit-hearth or small baking pit. The flotation samples taken from this feature revealed no subsistence information, nor were any animal remains recovered.

The formal artifact assemblage—mano and two end scrapers—and pottery divulge little about the function of the site in addition to the use of the thermal facility for baking food. One of the end scrapers is made of Edwards chert and indicates either movements and/or contacts with people to the east and southeast in Texas. A single roughout or first-stage biface and biface-thinning flakes suggest projectile point production on-site.

The lithic debitage of cores, flakes, and pieces of shatter consists solely of locally available materials. The few cores are dominated by single-platform types and do not appear to display much control in their geometry and use. The core-reduction flakes are small, thick, somewhat heavy, and equidimensional in length and width. Only four biface-thinning flakes were recovered. The lithic materials were only occasionally heat-treated, which shows up on the core-reduction flakes and the shatter but not on the cores or the biface-thinning flakes. The ultraviolet profile of the local gray cherts in the assemblage falls within the very low reactivity category of the majority of the assemblages within the region.

The area excavated around the hearth/baking feature showed a distinct zonation in artifact distribution. No items were recovered from within 1 m of the feature. Artifact-recovery density started at 1 m from the edge of the feature and increased zonally as distance from the feature increased. Each zone appears to be about 3 m wide, with quantum leaps in density from one zone to the next. However, no zone is characterized by even internal distribution of artifacts (not all squares produced items), perhaps because artifact densities were low overall. This suggests that the feature was used only once.

Two radiocarbon dates from fuelwood

indicate use of this feature during the late Middle Archaic Avalon phase, or cal. 1315–925 BC. South Pecos Brown pottery indicates short-term use of the site after AD 900.

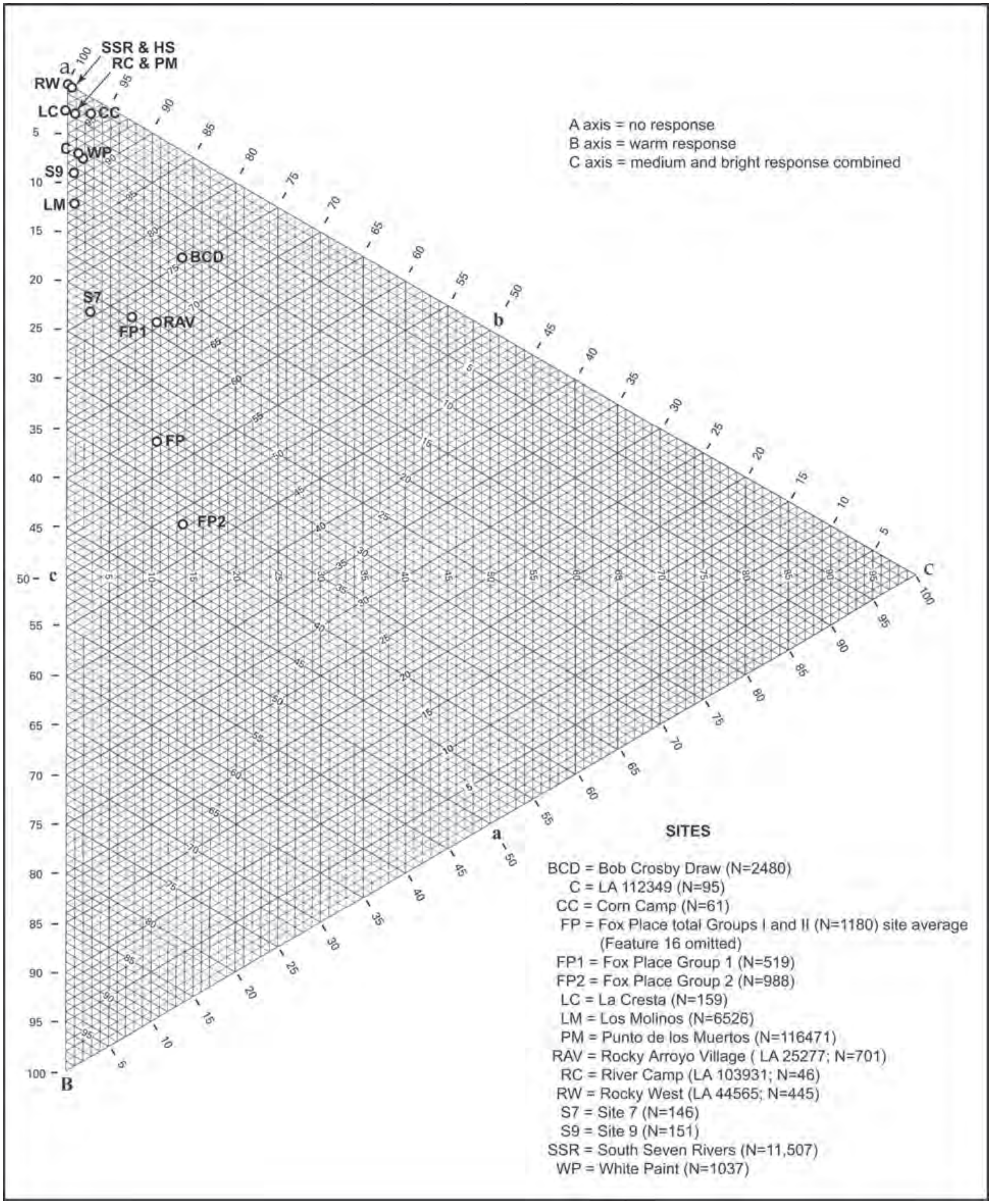


Figure 7.11. Responses of local gray chert assemblages to ultraviolet light for southeastern New Mexico sites.

8. The Temporal Dimensions of Two Types of Small Thermal Features

My several projects in southeastern New Mexico (Wiseman 1996a, 2002, 2004, and this volume) provided convincing evidence that a small thermal feature of whatever sort is not just a small thermal feature. This fact was strengthened by the results of burned-rock studies conducted by Steve Black and others (Black et al. 1997; Black et al. 1998: Chapters 8, 9, and 10; Hester 1994; Tennis et al. 1997; Duncan and Doleman 1991; Doleman 1997). Especially interesting was the discovery that I was uncovering two basic types of small thermal features that seemed to have specific temporal dimensions that inconsistently overlap.

The better known of the two types, small burned-rock thermal features, usually measure about 1 m in diameter but can be as large as 2 m in diameter. The other type, shallow (usually 5 to 20 cm deep) nonrock thermal features (Wiseman 2001b), measure from 0.25 to 1 m in diameter. The term "nonrock" for the latter is not totally accurate, for some examples have up to six, usually very small (<10 cm diameter) pieces of burned rock or caliche. The sizes and numbers of burned rocks or caliche obviously can require a judgment call when distinguishing between the rock and nonrock types of thermal features, but this is usually not a problem.

To investigate the temporal dimensions of the two types of thermal features, I consulted much of the extant testing and excavation literature for sites east of the Capitan/Sierra Blanca/Sacramento/Guadalupe mountain chain of southeastern New Mexico. The archaeological sites lie on the long slopes to either side of and within the Pecos River Valley in the northern Chihuahuan Desert and the southwestern Southern Plains biotic provinces. Culturally speaking, archaeologists assign these archaeological sites to the Archaic, Neo-Archaic, Eastern Extension of the Jornada Mogollon, and protohistoric/early historic periods/cultures, depending on their radiocarbon dates, cultural content, and geographic location.

Comments on the Dates and Features

Some of the dates in the literature are conventional, others are calibrated according to one or another methods developed over the decades, and others are not specified. Thus, we simply use the dates as presented in the source documents. Information on the correction methods that have been applied is noted in Table A9.1 (see Appendix 9). All unannotated calibrations are one or another version provided over the years by Stuiver and associates and are based on tree-ring data from both New and Old World contexts.

Most radiocarbon-dated small thermal features are represented by a single date (Appendix 9). In those few for which two or more dates are available, all dates are included in this study. Most dates subjected to one of the Stuiver calibration routines encompassed a single intercept date, and that date is used here. The ranges for some dates encompass more than one intercept of the curve, in which case the *median* date (not the mean or average in the case of three or more intercepts) between the earliest and the latest intercepts is used here.

I suspect that more dates on small burned-rock thermal features will mostly strengthen the curve for these features. They are most easily discovered during survey and normally become the focus of excavations.

By way of contrast, nonrock thermal features are less often exposed to discovery from surface observation during survey and are more likely to be missed during excavation (Wiseman 2001b). Another major problem regarding these features is that their fills often lack black coloration and readily observable pieces of charcoal, causing some archaeologists to wonder whether they are really cultural features. This factor alone discourages many archaeologists from collecting the fill for recovering and dating charcoal. I have had extraordinary success in collecting the entirety of the usually gray (rather than black) fills from these features, recovering through water screening (i.e., flotation technique) sufficient quantities of identifiable charcoal flecks to identify genus or species, and to date the samples by the AMS radiocarbon technique.

It remains to be seen to what degree these periods of commonness and abundance are real and which are in some way biased by techniques of archaeological investigation. Overall, we must obtain much larger numbers of dates of both types of thermal features in order to confirm/deny the accuracy, increase the robusticity, and promote confidence in these trends. Part of the process of achieving satisfaction in these matters will require overcoming several other shortcomings.

Results

Figures 8.1 and 8.2 are graphs of the dates by small thermal feature type. Figure 8.1 displays all dates grouped in 500-year increments. Thus far for southeastern New Mexico, both types of small thermal features dating prior to 1500 BC are rare. It is only for the last quarter of Katz and Katz's Middle Archaic Avalon phase (1500 to 1000 BC) that we have moderate representation of small rock thermal features. Small nonrock thermal features start appearing in modest numbers during the succeeding McMillan phase (Late Archaic period, 1000 BC to BC/AD).

The use histories of the two thermal feature types differ in interesting ways (Fig. 8.1). Small rock thermal features have two modes, each initiated by an abrupt beginning during one 500-year period, followed by a gradual decline that takes place over the succeeding 1000 years. Small nonrock thermal features have but a single mode that peaks during the second half of the first millennium AD.

Looking at the finer detail available for the period following the birth of Christ (Fig. 8.2), we see what appears to be another interesting pattern. Small rock thermal features were used at a fairly consistent level from the time of Christ until about AD 800, after which their use appears to have been spotty or periodic. Small nonrock thermal features, on the other hand, seem to start making a consistent appearance after AD 200, reach a zenith of use during the AD 800s, when small rock thermal features go into decline. After AD 900, the use of nonrock thermal features starts to decline, continuing to do so into the historic period. Again, we have to wonder in what ways future dates will modify these trends, but for now, they take on an important, albeit heuristic role.

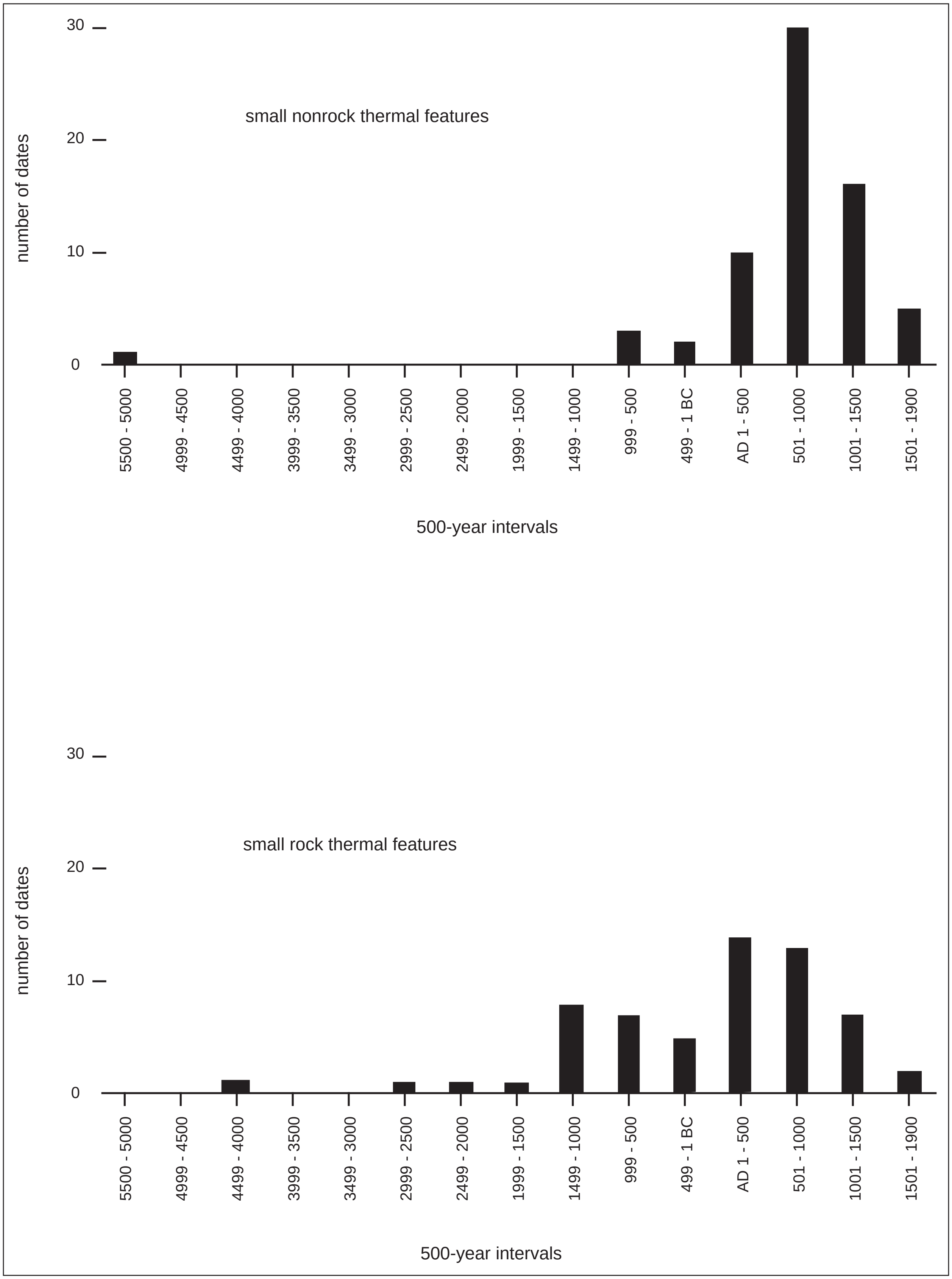


Figure 8.1. Distribution in 500-year increments of small thermal features by type.

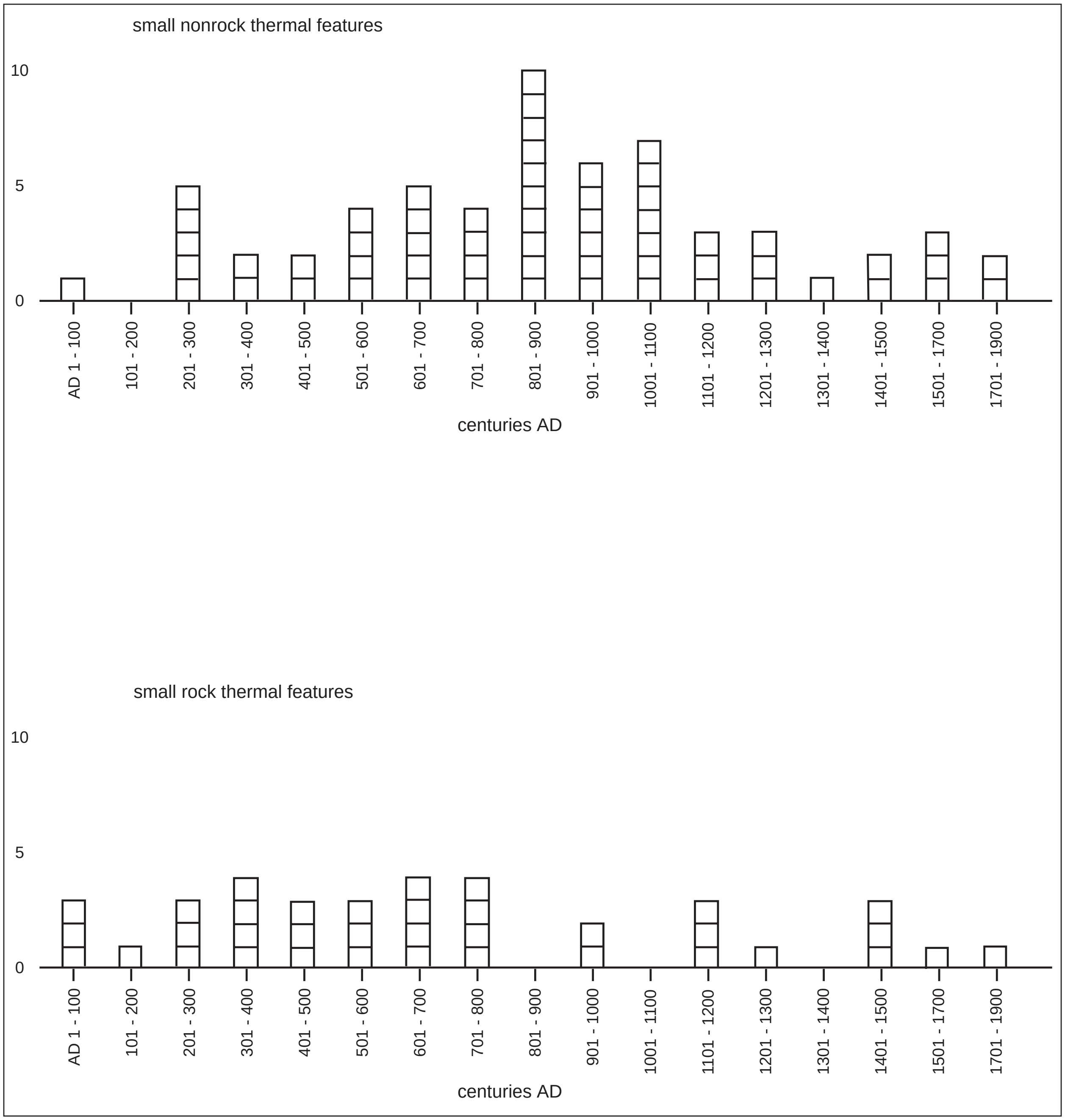


Figure 8.2. Distribution in 100-year increments of small thermal features by type.

9. Ground Stone

Material

The metates and manos from the project sites are made from four types of rock: dolomite, limestone, mesocrystalline calcite, and sandstone. Dolomite, limestone, and mesocrystalline calcite can be distinguished by their reaction to dilute hydrochloric acid. Dolomite has a mild reaction. Limestone has a vigorous reaction. Individual crystals of mesocrystalline calcite look like sand grains at 30x magnification and have a vigorous reaction. As the following descriptions will show, limestone, dolomite, and calcite are similar in most respects and may have similar or related origins and sources. That is, they probably come from stratigraphically related geologic beds and may represent slightly different chemical and temporal events in the same or closely spaced depositional environments. We assume that the source or sources are part of the San Andres formation, which outcrops not far from the project sites. The material source of the one sandstone item, a metate, is unknown.

Dolomite

This particular dolomite is a totally or mostly aphanitic sedimentary rock that reacts weakly (fizzes slightly) to dilute hydrochloric acid (ca. 10 percent HCl). Textural variation may include occasional microscopic, subrounded to rounded calcite crystals singly, in small clusters, or both. This rock was easily powdered by scraping it with a dental pick.

One variety of dolomite is permeated with small vesicles that give the stone the same appearance as vesicular basalt. These vesicles are sufficiently numerous that they probably functioned during grinding in much the same way as vesicles of vesicular basalt. Such vesicles probably also precluded the need to occasionally "sharpen" the grinding surface by pecking to restore grinding efficiency.

Limestone

This particular limestone is a totally or mostly aphanitic sedimentary rock that reacts violently (fizzes vigorously) to dilute HCL and is easily powdered by scraping with a dental pick. It may or may not have occasional microscopic, mostly subrounded to rounded crystals of calcite singly, in small clusters, or both.

One variety of limestone is permeated with small vesicles that give the stone the same appearance as vesicular basalt. These vesicles are sufficiently numerous that they probably functioned during grinding in much the same way as the vesicles of vesicular basalt. Such vesicles also precluded the need to occasionally "sharpen" the grinding surface by pecking in order to restore grinding efficiency.

In one example of vesicular limestone (FS 771, from LA 38264 East) the vesicles are so numerous and large that they give the stone the appearance of tufa. However, this particular stone is noticeably heavier and harder than most tufa I have seen in spring deposits.

Mesocrystalline Calcite

Mesocrystalline calcite, as defined here, is a carbonate rock that is aphanitic to the unaided eye. However, microscopically (30x), it is a matrix of subrounded to rounded tiny crystals having the appearance of a very fine sandstone or siltstone. The rock reacts vigorously to dilute HCL. These crystals have the same appearance as those that occur singly in the dolomite and limestone just described. This rock was easily powdered by scraping with a dental pick. The crystals were also easily powdered, and individual crystals were readily cleaved by scraping with a dental pick.

Sandstone

The one piece of sandstone is burned, obscuring its original color and therefore depriving us of an important clue to its source. It is composed of subrounded to rounded grains in a light-colored, calcareous matrix (fizzes vigorously under dilute HCL on a freshly broken surface). The grains are mostly clear to slightly frosted quartz with smaller amounts of dark gray rock fragments and rare mica flecks.

Metates

Nine metate fragments were recovered, one from LA 8053 and eight from LA 38264 East (Table 9.1). All are basin metates, and at least two subtypes are represented: travel metate and other metate. Most of the specimens are burned or possibly burned, probably because their final use was as elements in thermal features.

Travel Metates

The most common metate recovered from the project sites is the basin travel metate, an artifact that is essentially a highly portable grinding surface on a thin slab of rock. The thickness of these metates varies from 23+ mm to 48+ mm. We found two types of travel metates: trimmed-edge (Type 1) and untrimmed-edge (Type 2). The portability of Type 1 metates was further enhanced by shaping the edges through flaking, pecking, grinding, or some combination. The trimmed edge is brought to the edge of the grinding basin. In this way, overall size and weight are reduced to the greatest possible extent.

Other Metates

The other metate category is represented by one example, FS 1130 from LA 38264 East. This specimen was made on a much thicker rock (9.4+ cm, or nearly 5 inches) than the travel metates and is much heavier and less portable. We can say little else about it because of its very fragmentary nature.

Manos

Nine manos, eight of them fragmentary, were recovered from the three project sites: one from LA 112349, two from LA 8053, and six from LA 38264 East (Table 9.2). All but one are clearly of the one-hand type. The exception is probably also of the one-hand type but is larger than the rest; its fragmentary nature precludes making a final assessment of these details. Grinding surface use-wear varies from minimal (under magnification of up to 30x, use-wear shows only on high points of the surface) to well developed (the grinding surface is evenly ground and its juncture with the edges forms a distinct break in the curvature). Most of these manos show minimal to moderate shaping of the edges by pecking and/or grinding. Most also are burned or possibly burned, probably because their final use was as elements in thermal features.

Table 9.1. Metates, Seven Rivers project

Site	FS No.	Provenience	Material	Length (mm)	Width (mm)	Thickness (mm)	Description
LA 8053	365	26N/22W, surface	quartz sandstone	160+	93+	43+	Travel metate with 1 well-developed grinding surface, 13+ mm deep; edges pecked and ground to shape; burned.
LA 38264 East	96	54N/14W, surface	dolomite	114+	94+	48+	Probably a travel metate with 1 well-developed grinding surface, at least 29+ mm deep (no edge by which to gauge actual depth); burned.
LA 38264 East	162	48N/36W, surface	limestone	130+	107+	39+	Type 2 travel metate with 2 grinding surfaces, 1 well-developed (17+ mm deep) and the other minimally developed (5+ mm deep); little or no edge shaping; burned.
LA 38264 East	344	26N/56W, surface	dolomite?	78+	63+	23+	Probably a travel metate with 2 well-developed grinding surfaces but no edge by which to gauge depth or overall modification.
LA 38264 East	787	34N/30W, excavated	limestone	108+	71+	33+	Type 1 travel metate with 1 well-developed grinding surface, 22 mm deep; edge-flaked to shape; possibly burned.
LA 38264 East	811	35N/36W, excavated	dolomite	120+	97+	41+	Type 1 travel metate with 2 well-developed grinding surfaces, 1 36+ mm deep and the other 6+ mm deep; edges chipped and ground to shape; appears to have worn through bottom, leading to breakage; possibly burned.
LA 38264 East	896	40N/36W, E	dolomite	87+	63+	27+	Probably a travel metate with 1 well-developed grinding surface, at least 7+ mm deep; no edge remnant by which to gauge depth or overall modification.
LA 38264 East	1106	46N/30W, E	dolomite/limestone	93+	91+	24+	Probably a Type 2 travel metate with 1 well-developed grinding surface, ca. 18 mm deep; almost worn through bottom; no edge remnant; burned.

+ incomplete measurement because of fragmentation

Table 9.2. Manos, Seven Rivers project

Site	FS No.	Provenience	Material	Length (mm)	Width (mm)	Thickness (mm)	Description
LA 112349	9	surface	limestone	59+	90+	32+	End fragment with 1 well-developed grinding surface; flat longitudinal cross section; convex transverse cross section; burned.
LA 8053	359	surface of highway berm	vesicular dolomite	94+	64+	39+	Lateral edge fragment with 1 well-developed grinding surface; flat longitudinal cross section; slightly convex transverse cross section; no edge modification; burned.
LA 8053	362	11N/9W, surface	mesocrystalline calcite	55+	82+	32+	End fragment with 1 well-developed grinding surface; flat longitudinal cross section; flat transverse cross section; edges minimally ground.
LA 38264 East	534	29N/56W, surface	limestone	87+	74+	26+	End fragment with 1 well-developed grinding surface; flat longitudinal cross section; flat transverse cross section; edges flaked and ground; larger than other manos but probably still one-hand in size and usage; burned.
LA 38264 East	771	33N/28W, excavation	vesicular limestone, tufalike	118	85	60	Complete, with one lightly used grinding surface and a second face that could have been used but shows no obvious wear; lightly-used grinding surface has slightly convex longitudinal cross section and slightly convex transverse cross section; entire stone well-shaped by grinding and possibly pecking.
LA 38264 East	932	35N/29W, excavation	limestone/dolomite	113	83	47	Complete, with 2 well-developed grinding surfaces and wedge-shaped profile; both grinding surfaces have flat longitudinal cross section and flat transverse cross section; all edges shaped by pecking and grinding.
LA 38264 East	941	40N/29W, excavation	mesocrystalline calcite	92+	70+	50+	Lateral edge fragment with 2 fairly well-developed grinding surfaces; 1 grinding surface has slightly to moderately convex longitudinal and transverse cross sections; the other has flat to slightly convex longitudinal and transverse cross sections; edges pecked and ground; burned.
LA 38264 East	1079	43N/32W, excavation	vesicular limestone	36+	79+	32+	End fragment with 2 lightly used grinding surfaces that are both flat to slightly convex in both longitudinal and transverse cross sections; edges are slightly ground.
LA 38264 East	1481	38N/26W, excavation	limestone	78+	92+	50	End fragment with 1 well-developed grinding surface that is flat along both cross sections; minor edge-grinding; burned.

+ incomplete measurement because of fragmentation

10. Faunal Remains

Susan Moga

Faunal remains were collected from two of the three sites excavated: bone remnants, mussel shell, and eggshell from LA 38264; and mussel shell and eggshell from LA 8053. The amount of bone recovered is small compared to the mussel shell and eggshell. It is evident the inhabitants exploited the local riverine resources. The larger site, LA 38264, was divided into east and west sections. Only the east section produced animal bones, eggshell, and mussels.

Table 10.1 presents the taxa and counts at each site. The remains recovered from each site were considered as a single unit and not divided by features or grids. This is a feasible approach, considering the small size of the faunal assemblage.

Methods

A complete analysis was performed on 439 pieces of faunal remains. The bone was dry-brushed for cleaning, and each piece was assigned a lot number for identification. Faunal information was recorded with coded variables: site; field specimen (FS) and lot numbers; count; taxon; element (body part); side; portion of the element represented; age of the animal; criteria for age determination; environmental, animal, and thermal alterations; and evidence of human processing or bone modification.

The bone was identified with OAS comparative collections. Works on New Mexico fauna (Bailey 1971; Findley et. al 1975) were consulted to determine which wild species inhabit the site area.

Taxa Recovered

Unidentifiable Taxa

The assemblage has three categories of various size ranges (Table 10.1): mammal (unknown size), small mammal (jackrabbit or smaller), and small to medium mammal (dog or smaller).

Neotoma sp. (Woodrats)

Two species of woodrats, *Neotoma micropus* (southern plains woodrat) and *Neotoma albigula* (white-throated woodrat) inhabit regions west of

Table 10.1. Taxa recovered from LA 38264 and LA 8053

Taxon	Common Name	Count	
		LA 38264	LA 8053
Mammal	Unknown size	6	-
Small mammal	Jackrabbit or smaller	5	-
Small to medium mammal	Dog or smaller	2	-
Neotoma sp.	Woodrats	2	-
Sylvilagus aububonii	Desert cottontail	4	-
Lepus californicus	Black-tailed jackrabbit	3	-
Carnivora	Carnivore	1	-
Eggshell	Eggshell	140	2
Accipitridae	Hawks and harriers	1	-
Phasianidae	Quails, partridges, pheasants	1	-
Testudinata	Turtles and tortoises	1	-
Popenaias popeii	Texas hornshell	3	-
Cyrtonaias tampicoensis	Pecos pearly mussel	3	-
Pelecypoda	Mussels	247	18
Total		419	20

the lower Pecos Valley (Findley et. al 1975:238–242). The only distinguishing differences between the two species is the first upper molar (M1). The folds in the first upper molar tooth pattern of the archaeological specimens are often missing or so shallow that species identification is impossible (Hoffmeister and De La Torno 1960:477). Two individual woodrats, one mature and one juvenile, are represented by a mandible and a humerus fragment.

***Sylviligas audobonii* (Desert Cottontails)**

Cottontails are found throughout the Southwest. They prefer plants that are associated with stream beds (Chapman et al. 1982:104). Four bones, a vertebra, and three long bones represent two individuals, one mature and one juvenile.

***Lepus californicus* (Black-tailed Jackrabbits)**

Jackrabbits are found throughout New Mexico. They prefer green succulent vegetation, but during the winter months, when succulents are unavailable, their diet consists of soaptree, yucca, snakeweed, mesquite leaves, and seedpods (Dunn 1982:130–133). Three bone fragments are from one mature and one juvenile individual.

***Carnivora* (Carnivores)**

A complete mature tarsal of a carnivore was recovered. The element is similar in size and some attributes to coyote, but not identical. Therefore, the bone was assigned to the order Carnivora.

Eggshell

Eggshell has the second highest count (n = 140) among faunal remains in the Seven Rivers assemblage. These specimens are highly fragmented, and identification of the species was impossible. Whether the eggshell came from turkey, duck, or some other bird is unknown. Many species of waterfowl inhabit the riverine environment close to the sites.

***Accipitridae* (Hawks and Harriers)**

One compete phalanx from a mature individual was recovered, but firm identification to species was not possible. However, it is similar in size to a Harris hawk, which inhabits the mesquite desert of southeastern New Mexico (Clark 1987:50).

***Phasianidae* (Quail, Partridges, and Pheasants)**

The members of this family vary in size. They are mostly ground dwellers and possess limited powers of flight (Ligon 1961:94). One fragmented carocoid is similar in size to that of a bobwhite or Gambel's quail.

***Testudinata* (Turtles and Tortoises)**

A variety of turtles inhabit the ponds, marshes, rivers, and lakes of New Mexico. One small carapace fragment could only be identified as Testudinata.

***Pelecypods* (Mussels)**

Ten species of mussels are recorded from the Rio Grande and its tributaries. These species are also assumed to be present in the Pecos River system (Murray 1985:A-24). Two of the ten species, *Popenaias popeii* and *Cyrtonaias tampicoensis*, were identified in the Seven Rivers faunal assemblage. Mussels are distinguishable only by their umbos or hinge plates. Fragments lacking these critical features were identified as *Pelecypods* (mussel); they constitute the largest count in the assemblage (n = 265).

Shell fragments displaying any signs of modification were recorded. Three fragments in the assemblage were modified and possibly used as personal adornments. One fragment retains a yellowish pigment, possibly yellow ochre, along the shell edge; one has a semicircular ground edge; and another has a drill hole. Considering the proximity of the site to the waterway, the shell fragments from the assemblage were probably food refuse. Mussels could have been easily obtained and eaten immediately by the site occupants.

Taphonomy

Taphonomic variables include environmental, animal, and thermal alterations. These alterations were minimal in the Seven Rivers assemblage.

Environmental factors include root etching, which occurs when bone is buried. Roots of plants excrete humic acid and dissolve bone where they come in contact with the bone surface (Lyman 1994:375). Several bones (n = 5) from LA 38264 are etched, including bird, cottontail, woodrat, and small- to medium-sized mammal.

Sunbleaching, caused by overexposure to the sun, dries and crackles the bone until it turns white. Two small-mammal bones exhibit sunbleaching.

Two bones from LA 38264 have animal alterations, a jackrabbit ilium with a carnivore puncture mark and a scatological bird carocoid. Scatological bones have passed through the digestive tract of an animal, and in the process, stomach acids produce smooth edges on the bone (Fisher 1995:42).

Only two bones from LA 38264 are burnt. A small-mammal bone was calcined (white) from a high temperature, and one small-mammal to medium-mammal bone was partially carbonized (blackened) and calcined. To create this degree of burning on bone, both specimens were probably tossed directly into a campfire. None of the remains from LA 8053 exhibit thermal alterations.

Modification

Modification is the alteration of bone or shell for use as tools or personal ornamentation. LA 38264 produced three modified shell specimens: a mussel fragment with a drill hole, possibly used as a pendant; a semicircular shell piece with a ground edge; and a broken piece of shell with a stripe of yellow pigment. The pigment, possibly yellow ochre, is very chalky. The stripe, on the edge of the shell fragment, is 3 mm wide. No modifications were noted on shell specimens from LA 8053.

Summary

LA 38264 and LA 8053 are 50 m north and south, respectively, of the South Seven Rivers drainage. Fresh drinking water and succulent vegetation create prime habitat for cottontails and jackrabbits. Both of these species and woodrats are in the assemblage. The riverine environment would also attract birds and a variety of turtles. Samples of these species were small, but present in the assemblage, and they are assumed to have been exploited by the occupants of the sites.

The frequency of eggshell (n = 142) is high but deceiving, because the shell sample is severely fragmented. All of these tiny pieces may have constituted only one or two whole bird eggs, but they indicate the consumption of this food item.

Mussels were definitely consumed at the project sites. They are a nutritious food and were easily accessible in a streambed within walking distance. Two shell fragments were recovered from the Macho Dunes site (LA 29363; Moga 2000), and shell was collected during the Brantley project (Katz and Katz 1985a:96). Both sites are near Carlsbad. The Brantley project recovered shell scrapers and twelve shell ornaments. Shell is soft enough to readily create expedient tools and ornaments. The inhabitants of these sites exploited nearby resources for food and adornment.

11. Flotation and Radiocarbon Sample Analysis

Pamela J. McBride

Between Artesia and Carlsbad, the Seven Rivers sites lie in a typical contemporary Chihuahuan semidesert grassland biotic community where pure grassland has been replaced by a predominance of shrubs and cacti (Brown 1994). Biotic communities vary in composition due to a number of factors. After examining the effects of fire and drought on plant communities, Burgess (1977) concluded that evidence does not indicate that vegetative stability in the Pecos Valley ever existed. Rather, it is the dominance of a grass type (perennial vs. annual) or shrubs and cacti over grass that fluctuates (Brown 1994:124).

A vegetation survey was conducted in the area in October 1996 (McBride 1996). *Larrea tridentata* (creosote bush), *Prosopis* sp. (mesquite), and *Atriplex canescens* (four-wing saltbush) were the dominant shrub species. One stunted *Ephedra* sp. (Mormon tea) plant was observed as well as specimens of cf. *Gutierrezia sarothrae* (snakeweed) and cf. *Condalia warnockii* (Mexican crucillo). Cacti species included *Opuntia* sp. (prickly pear), cf. *Opuntia kleiniae* (Klein desert Christmas cholla) with its festive bright red fruits, *Opuntia imbricata* (cholla), *Opuntia clavata* (dagger cholla), *Echinocactus texensis* (horse crippler), and cf. *Coryphantha vivipara* (pincushion cactus). *Yucca elata* (soaptree yucca) was the only representative of the leaf succulents. The tan, dormant, hollylike leaves of *Perezia nana* (dwarf desert holly) were frequently observed, and a few specimens of the red stemmed succulent *Portulaca mundula* (rose purslane) were also growing in the area. Grasses that could be identified included cf. *Aristida purpurea* (purple three-awn), *Setaria* sp. (bristlegrass), *Tridens pulchellus* (fluffgrass), *Sporobolus flexuosus* (mesa dropseed), *Muhlenbergia porteri* (hoegrass), and cf. *Bouteloua barbata* (six-weeks grama). The purple three-awn grass was the dominant species present. Several species were absent in the dry grassland but grew along the banks of South Seven Rivers or in the streambed itself, including *Mimosa biuncifera* (wait-a-minute bush), *Amaranthus* sp. (pigweed), *Chloris virgata* (feather fingergrass), *Chilopsis linearis* (desert willow), *Lupinus* sp. (lupine), *Xanthium strumarium* (cocklebur), *Datura* sp. (jimsonweed), and *Hymenoclea monogyra* (burrobush). Creosote bush, desert willow, four-wing saltbush, mesquite, snakeweed, and burrobush would have been handy for fuel during the occupation of the Seven Rivers sites. Mesquite beans, cactus fruits, prickly pear pads, purslane seeds, dropseed grass seeds, and pigweed seeds and leaves all have documented ethnobotanical uses and are among food resources that could have been used by the prehistoric occupants of the Seven Rivers sites.

Features that were sampled for plant remains included several nonrock hearths, a ring midden (communal baking facility), two large hearths/ small baking pits, and four rock hearths from LA 38264 East and LA 8053. In addition, 37 radiocarbon samples were analyzed from LA 38264 East, LA 8053, and LA 112349. The goals of the analysis were to identify fuelwood species and possible plant resources that were processed in the thermal features found at LA 38264 East and LA 8053.

Methods

Radiocarbon Sample Analysis

Charcoal specimens examined prior to submission for radiocarbon dating were examined by snapping each piece to expose a fresh transverse section and identified at 45x. All charcoal from each sample was identified and separated by taxon with the exception of very small fragments of charcoal that were impossible to identify. Charcoal from each taxon identified was weighed on a top-loading digital balance to the nearest .01 g and placed in labeled foil packets. Low-power, incident-light identification of wood specimens does not often allow species- or even genus-level precision but can provide reliable information useful in distinguishing broad patterns of utilization of a major resource class.

Flotation Scan Analysis

The 30 soil samples collected during excavation were processed at the Museum of New Mexico's Office of Archeological Studies by the simplified bucket version of flotation (see Bohrer and Adams 1977). Each sample was immersed in a bucket of water and a 30–40 second interval allowed for settling out of heavy particles. The solution was then poured through a fine screen (about 0.35 mm mesh) lined with a square of chiffon fabric, catching floating or suspended organic materials. The fabric linings were laid flat on coarse-mesh screen trays until the recovered material had dried.

In scanning, flotation samples are first separated by screening into major particle-size categories using a series of nested geological screens (4.0, 2.0, 1.0, 0.5 mm mesh) and then reviewed under a binocular microscope at 7–45x. Scanning involves looking at all the material larger than 2.0 mm and most material larger than 1.0 mm. Corn kernels and cob fragments (relatively common in flotation samples) and bean and squash remains (relatively rare in flotation samples) are almost entirely restricted to these two screen sizes, so that scanning provides a reliable view of the presence or absence of cultivated taxa. Wild taxa recovered in these larger screen sizes may include twigs and seeds or berries from shrubs or trees, large seeds from perennial species like yucca or squawberry, and grass and annuals with particularly large seeds, such as ricegrass and beeweed. Most annual seeds are caught in the 0.5 mm screen, which is usually examined partially in the scanning procedure.

Scanning accurately picks up the presence of higher-frequency taxa such as the chenopods, pigweed, and purslane. Among the material that passes through the smallest screen size, botanical remains are often completely absent or else consist of fragments of seed types encountered in larger screens. Rarely, low frequencies of small seed types such as tansy mustard or dropseed, will occur in the smallest screens without also occurring in the larger screens. For the time invested, then, scanning provides relatively reliable presence/absence flotation data, as well as general information about relative quantities of specific taxa and about whether carbonized specimens are present. Indicators of postdepositional disturbance (modern roots and other vegetative parts, insect exoskeleton fragments, rodent and insect scats) are also noted.

Results

Hedgehog cactus was the dominant charred taxon recovered from flotation samples. The nonrock hearth (TF 1) and the ring midden from LA 38264 East as well as the nonrock hearth at LA 8053 (TF 11) yielded seeds from the fruit of this cactus. Other carbonized remains recovered included purslane and pigweed seeds along with unidentifiable seeds and plant parts from the ring midden at LA 38264 East. Charred sedge family seeds from the nonrock hearth at LA 8053 (TF 6) were the sole indicators of riparian resource use. Uncharred plant material was ubiquitous (Tables 11.1 and 11.2), including 27 taxa. Together with the presence of roots, insect parts and feces, and rodent feces in most samples, a significant degree of contamination by noncultural intrusives is indicated. Contamination could be due to natural deposition factors (wind, bioturbation) and/or shallow depth of deposits.

Mesquite charcoal (Tables 11.3–11.5) represented over 90 percent of the total wood weight from all three sites. Small amounts of piñon, saltbush/greasewood, cholla, rose family, and monocot stems were also recovered from LA 38264 East. Saltbush/greasewood was a small component of the wood assemblage at LA 8053. Mesquite wood and mesquite bean seeds were identified in samples from TF 6 at LA 8053. Agave terminal leaf spines, leaf fragments, and stem fragments were recovered from eight of the multiple samples examined from the rock hearth (TF 9), also at LA 8053.

Discussion

Several researchers have claimed that burned-rock features in New Mexico and Texas were used to process leaf succulents, but very little direct evidence supports their claims (O'Laughlin 1980; Seaman et al. 1987; Carmichael 1985; Gasser 1983). O'Laughlin (1980) identified possible carbonized yucca/agave carpel fragments from Archaic contexts at the Keystone Dam Site 33 in northwest

Table 11.1. Flotation sample scan analysis results, LA 38264

Feature	TF 1	TF 3	TF 5	TF 4					
Feature type	Nonrock Hearth	Nonrock Hearth	Nonrock Hearth	Ring Midden					
FS number	613	924	1100	1218	1220	1222	1224	1226	1228
Context	fill	fill	fill	49N/33W 20-30 cm above bottom	49N/33W 0-10 cm above bottom	49N/34W 20-30 cm above bottom	49N/34W 0-10 cm above bottom	49N/35W 20-30 cm above bottom	49N/36W 0-10 cm above bottom
Cultural									
Annuals:									
Portulaca (purslane)	-	-	-	+*	+*	-	-	-	-
Unidentifiable	-	-	-	-	+*, plant part*	-	-	-	-
Perennials:									
Echinocereus (hedgehog cactus)	+*	-	-	-	-	-	-	-	-
Noncultural									
Annuals:									
Amaranthus (pigweed)	-	-	-	-	-	+	-	-	-
Chenopodium (goosefoot)	+	+	+	+	+	+	-	+	-
Descurainia (tansy mustard)	+	-	+	-	-	+	-	+	+
Kallstroemia (caltrop)	-	-	-	+	-	+	-	-	-
Portulaca (purslane)	-	+	-	+	+	+	+	+	+
Talinum (flame flower)	+	-	+	-	-	-	+	-	+
Grasses :									
Gramineae (grass family)	+	-	-	-	-	-	-	-	-
cf. *Setaria* (bristle grass)	-	-	-	+	-	+	-	+	+
Sporobolus (dropseed grass)	+	+	+	+	+	+	+	+	+
Other:									
Boraginaceae (borage family)	-	-	-	-	-	-	-	-	+
Euphorbia (spurge)	+	+	+	+	++	+	+	+	+
Plantago (plantain)	+	-	+	-	-	-	-	-	-
Solanum (nightshade)	-	-	-	+	-	+	-	-	-
Unidentifiable	+	-	-	+	-	-	-	-	+
Verbena (vervain)	+	-	+	-	+	-	-	-	-
Perennials:									
Atriplex canescens (four-wing saltbush)	-	-	-	-	-	fruit+	-	-	fruit+
Cactaceae (cactus family)	fruit+	-	-	-	-	-	-	-	-
Echinocereus (hedgehog cactus)	-	-	+	-	-	+	+	+	-
Platyopuntia (prickly pear cactus)	+	-	-	-	-	+	-	-	-
Prosopis (mesquite)	+, leaf+	-	leaf+	+, leaf+	-	+, leaf+	-	-	-

* charred; + 1-10/liter; ++ 11-25/liter.

Note: Plant remains are seeds unless indicated otherwise.

Table 11.1 (continued). Flotation sample scan analysis results, LA 38264

Feature Feature type	TF 4 Ring Midden					TF 7 Rock Hearth	TF 6 Large Hearth/ Small Baking Pit		TF 12 Large Hearth/ Small Baking Pit
FS number Context	1398 47N/34W 20-30 cm above bottom	1400 47N/34W 0-10 cm above bottom	1402 49N/34W 0-10 cm above bottom	1404 50N/34W 20-30 cm above bottom	1406 50N/34W 0-10 cm above bottom	1418 fill	1419 fill	1420 fill	1477 fill
Cultural									
Annuals:									
Amaranthus (pigweed)	-	-	-	-	+*	-	-	-	-
Other:									
Unidentifiable	+*	-	-	plant part +*	-	-	-	-	-
Perennials:									
Echinocereus (hedgehog cactus)	-	+*	-	+*	-	-	-	-	-
Noncultural									
Annuals:									
Chenopodium (goosefoot)	+	+	+	+	+	+	+	+	+
Descurainia (tansy mustard)	-	+	-	-	+	+	+	+	-
Kallstroemia (caltrop)	+	-	-	-	-	-	-	-	-
Mentzelia pumila (stickleaf)	-	-	+	-	-	-	-	-	-
Portulaca (purslane)	+	+	+	+	+	+	+	+	+
Talinum (flame flower)	+	-	+	-	+	+	+	+	+
Grasses:									
cf. *Setaria* (bristle grass)	+	-	+	-	-	+	-	-	+
Sporobolus (dropseed grass)	+	+	-	-	-	+	+	+	+
Other:									
Dicotyledonae (dicot)	-	-	-	-	leaf+	-	-	-	-
Euphorbia (spurge)	+	+	+	+	+	+	+	+	+
Papaver (poppy)	-	-	-	+	-	-	-	-	-
Unidentifiable	fruit+	spine+	-	plant part +	-	plant part+	-	-	-
Perennials:									
Echinocereus (hedgehog cactus)	-	-	+	+	-	-	-	-	-
Prosopis (mesquite)	+, leaf+	-	-	-	-	-	-	-	leaf+
Ulmus (elm)	-	-	-	-	samara+	-	-	-	-

* charred; + 1-10/liter; ++ 11-25/liter.
Note: Plant remains are seeds unless indicated otherwise.

Table 11.2. Flotation sample scan analysis results, LA 8053

Feature Feature type	TF 6 Nonrock Hearth		TF 7 Nonrock Hearth	TF 8 Nonrock Hearth	TF 1 Rock Hearth		
FS number Context	808 fill	809 fill	865 fill	866 fill	916 fill	917 fill	918 fill
			Cultural				
Other:							
Cyperaceae (sedge family)	+*	-	-	-	-	-	-
			Noncultural				
Annuals:							
Amsinckia (fiddleneck)	-	-	+	-	-	-	+
Chenopodium (goosefoot)	+	+	+	+	+	+	+
Descurainia (tansy mustard)	-	+	-	-	-	-	-
Kallstroemia (caltrop)	-	+	-	-	+	-	-
Portulaca (purslane)	-	+	+	-	+	+	-
Talinum (flame flower)	+	-	+	-	-	+	+
Grasses:							
Gramineae (grass family)	+	-	-	-	-	-	-
cf. *Setaria* (bristle grass)	+	-	-	-	+	+	-
Sporobolus (dropseed grass)	+	+	+	-	+	+	+
Other:							
Boraginaceae (borage family)	-	-	-	-	+	+	+, fruit+
Compositae (composite family)	-	-	-	-	+	+	-
Dicotyledonae (dicot)	-	-	-	-	-	leaf+	-
Euphorbia (spurge)	+	+	+	+	+	+	+
Leguminosae (bean family)	-	-	-	-	-	+	-
Plantago (plantain)	-	-	-	-	+	-	-
Solanum (nightshade)	+	+	+	+	+	-	+
Unidentifiable	spine+	-	-	-	+, leaf+, fruit+	+	+, fruit+
Perennials:							
Echinocereus (hedgehog cactus)	-	+	+	-	+	-	-
Platytopuntia (prickly pear cactus)	-	-	-	-	-	+	-
Sphaeralcea (globemallow)	-	-	+	-	-	-	-

* charred; + 1-10/liter.
Note: Plant remains are seeds unless indicated otherwise.

Table 11.2 (continued). Flotation sample scan analysis results, LA 8053

Feature	TF 9			TF 10	TF 11
Feature type	Rock Hearth			Nonrock Hearth	Nonrock Hearth
FS number	923	925	927	988	989/991
Context	fill	fill	fill	fill	fill
Cultural					
Other:					
Unidentifiable		spine+*			plant part+*
Perennials:					
Echinocereus (hedgehog cactus)					+*
Noncultural					
Annuals:					
Amsinckia (fiddleneck)	+				
Chenopodium (goosefoot)	+	+	+	+	+
Descurainia (tansy mustard)				+	
Kallstroemia (caltrop)					+
Portulaca (purslane)					+
Talinum (flame flower)	+				
Grasses:					
Gramineae (grass family)	floret+, leaf+			+	+, floret+
Sporobolus (dropseed grass)	+	+		+	+
Other:					
Compositae (composite family)	+	+		+	
Euphorbia (spurge)	+	+	+	+	+
Gaura (gaura)					fruit+
Leguminosae (bean family)					+
Solanum (nightshade)	+	+		+	
Unidentifiable	+, fruit+				
Perennials:					
Echinocereus (hedgehog cactus)	+			+	

* charred; + 1-10/liter.
Note: Plant remains are seeds unless indicated otherwise.

Table 11.3. Species composition of flotation wood, LA 38264 East and LA 8053 (pieces [weight in grams])

	LA 38264 East								
Feature	TF 5	TF 4							
Feature type	Nonrock Hearth	Ring Midden							
FS number	1100	1218	1220	1222	1224	1226	1228	1398	1400
Prosopis (mesquite)	4 (<0.1)	20 (0.3)	20 (0.3)	19 (0.2)	20 (0.2)	18 (0.1)	18 (0.2)	18 (0.2)	20 (0.3)
Unknown nonconifer	-	-	-	1 (<0.1)	-	-	-	-	-

Table 11.3 (continued). Species composition of flotation wood, LA 38264 East and LA 8053 (pieces [weight in grams])

	LA 38264 East						LA 8053		Total	
Feature	TF 4			TF 6		TF 12	TF 10	TF 11	Weight	% Weight
Feature type	Ring Midden			Large Hearth/ Small Baking Pit		Large Hearth/ Small Baking Pit	Rock Hearth	Nonrock Hearth		
FS number	1402	1404	1406	1419	1420	1477	988	989/991		
Prosopis (mesquite)	8 (0.1)	20 (0.2)	20 (0.3)	20 (0.1)	19 (0.1)	8 (<0.1)	1 (<0.1)	-	2.6	100%
Unknown nonconifer	-	-	-	-	-	-	-	1 (<0.1)	<0.1	<1%

Table 11.4. Species composition of charcoal samples, LA 38264 East (weight in grams)

Feature	TF 1	TF 3	TF 5	TF 4								
Feature type	Nonrock Hearth	Nonrock Hearth	Nonrock Hearth	Ring Midden								
FS No.	FS 613	FS 924	FS 1100	FS 1219	FS 1221	FS 1223	FS 1225	FS 1226	FS 1399	FS 1400	FS 1403	FS 1405
Conifers:												
Pinus edulis (piñon)	-	-	-	-	-	-	-	-	-	-	-	0.04
Undetermined conifer	-	-	-	<0.01	-	-	-	-	-	-	-	-
Nonconifers:												
Atriplex sp./*Sarcobatus* sp. (saltbush/greasewood)	-	<0.01	-	-	0.13	-	0.07	-	-	0.07	<0.01	<0.01
Cylindropuntia (cholla)	-	-	-	-	-	-	-	-	-	<0.01	-	-
Prosopis sp. (mesquite)	0.08	0.49	1.55	2.24	2.88	0.55	2.36	0.73	0.5	6.25	0.58	2.85
Rosaceae (rose family)	-	-	-	-	-	-	-	-	-	<0.01	-	-
Undetermined nonconifer	-	-	-	0.05	0.04	-	0.33	0.01	0.01	0.19	-	-
Unknown	-	-	-	0.08	-	-	-	-	0.11	-	-	0.28
Other:												
Monocotyledonae stems (monocot)	0.08	-	-	-	-	-	-	-	-	-	-	-
Total weight	0.16	0.49	1.55	2.37	3.05	0.55	2.76	0.74	0.62	6.51	0.58	3.17
Total taxa	1	2	1	4	2	1	2	1	2	5	2	3

Table 11.4 (continued). Species composition of charcoal samples, LA 38264 East (weight in grams)

Feature Feature type	TF 4 Ring Midden	TF 7 Rock Hearth	TF 6 Large Hearth/ Small Baking Pit			TF 12 Large Hearth/ Small Baking Pit			TF 13 Hearth	Total Weight	 % Weight
FS No.	FS 1407	FS 1418	FS 1419	FS 1420	FS 1421	FS 1476	FS 1477, 1479	FS 1478	FS 1685		
Conifers:											
Pinus edulis (piñon)	0.47	-	-	-	-	-	-	-	-	0.51	1%
Undetermined conifer	<0.01	-	-	-	-	-	-	-	-	<0.01	<1 %
Nonconifers:											
Atriplex sp./*Sarcobatus* sp. (saltbush/greasewood)	0.05	<0.01	-	0.04	-	-	0.06	0.32	-	0.74	2%
Cylindropuntia (cholla)	-	-	-	-	-	-	-	-	-	<0.01	<1 %
Prosopis sp. (mesquite)	6.66		6.54	2.69	1.09	0.31	1.06	0.44	0.63	39.85	92%
Rosaceae (rose family)	-	-	-	-	-	-	-	-	-	<0.01	<1 %
Undetermined nonconifer	<0.01	<0.01	0.33	0.24	-	<0.01	-	-	-	1.2	3%
Unknown	0.24	-	-	-	-	-	-	-	-	0.71	2%
Other:											
Monocotyledonae stems (monocot)	-	-	-	-	-	-	-	-	-	0.08	<1 %
Total weight	7.42	<0.01	6.87	2.97	1.09	0.31	1.12	0.76	0.63	43.72	100%
Total taxa	4	2	2	2	1	2	2	2	1		

Table 11.5. Species composition by weight in grams of charcoal samples, LA 8053 and LA 112349

Site	LA 8053								
Feature	TF 6				TF 1			TF 9	
Feature type	Stain Hearth				Rock Hearth			Rock Hearth	
FS number	FS 806	FS 807	FS 808	FS 809	FS 916	FS 917	FS 918	FS 919	FS 920
Nonconifers:									
Atriplex sp./*Sarcobatus* sp. (saltbush/greasewood)	0.05	0.07	0.01	0.04	-	-	-	0.01	<0.01
Prosopis sp. (mesquite)	0.38	0.18, 1 seed + 2 fragments	0.74, 2 seed fragments	0.24, 6 seed fragments	0.01	0.01	0.02	1.42	2.15
Undetermined nonconifer								0.03	
Other:									
cf. *Agave* (agave)	-	-	-	-	-	-	-	0.01 tls, 0.01 leaf	0.02 stem, 0.25 leaf, 0.09 tls
Undetermined seed	1	4 fragments	10 fragments	1 fragment	-	-	-	-	-
Total weight	0.43	0.25	0.75	0.28	0.01	0.01	0.02	1.48	2.51
Total taxa	2	2	2	2	1	1	1	4	2

Table 11.5 (continued). Species composition by weight in grams of charcoal samples, LA 8053 and LA 112349

Site	LA 8053							LA 8053 Total		LA 112349
Feature	TF 9									TF 1
Feature type	Rock Hearth							Weight	% Weight	Large Hearth/ Small Baking Pit
FS number	FS 921	FS 922	FS 923	FS 924	FS 925	FS 926	FS 927			FS 142–145
Nonconifers:										
Atriplex sp./*Sarcobatus* sp. (saltbush/greasewood)	-	-	-	-	-	-	-	0.18	1%	0.01
Prosopis sp. (mesquite)	3.23	5.11	0.57	0.34	1.09	2.27	3.17	20.93	95%	3.60
Undetermined nonconifer	-	-	-	-	-	-	-	0.03	<1%	-
Other:										
Agave (agave)	0.04 tls, 0.05 stem, 0.06 leaf	0.05 tls, 0.07 leaf		0.02 tls, 0.05 leaf	0.01 tls, 0.11 leaf	0.03 tls, 0.04 leaf	<0.01 tls, 0.08 leaf	0.99	4%	-
Total weight	3.38	5.23	0.57	0.41	1.21	2.34	3.25	22.13	100%	3.61
Total taxa	1	1	1	1	1	1	1			2

El Paso, Texas. The protected environment at Fresnal Shelter in the Sacramento Mountains of southern New Mexico contributed to the recovery of agave and other leaf succulent fibers (Bohrer 1981). Evidence of agave processing from an open burned-rock feature at Cornucopia Draw, west of the Guadalupe Mountains in southern New Mexico (McBride 2002), provides the only other indication of agave use in New Mexico. Therefore, the recovery of probable agave remains from Seven Rivers is significant in the continuing struggle to understand subsistence in southern New Mexico, where maize seems to have played a minor role in contrast to comparable sites and time periods in the San Juan Basin. Although agave does not grow on LA 8053 today and probably didn't in the past, it was a mere 1–2 km walk south to collect the plant in the Seven Rivers Hills, where agave can be encountered today.

The Seven Rivers floral assemblage displays similarities to other assemblages in southeastern New Mexico (Table 11.6). Perennial use at Seven Rivers was more limited than evidence indicates at Cornucopia Draw, and grasses were absent from the record at Seven Rivers. Besides these differences, grasses, annuals, and perennials were used to a greater or lesser degree depending on what environmental zone was exploited. This is especially apparent in the wood data, where juniper wood is nonexistent at Seven Rivers and Cornucopia Draw; and ocotillo only occurs in the wood assemblage at Cornucopia Draw, where it is prevalent and the environment more marginal as far as fuelwood availability. While the small percentage of piñon wood identified at Seven Rivers could be accounted for by the collection of driftwood carried downstream to the site, it would be highly unusual to find the piñon nut remains such as those recovered from Beth's Cave and the Sunset sites, situated much closer to conifer woodland.

Along the Rio Hondo and its tributaries, human inhabitants took advantage of extra species richness from the riparian habitat for food, fuel, and manufacturing plant resources. Evidence of riparian-resource exploitation was restricted to a few charred sedge family seeds at Seven Rivers, in contrast to the cottonwood/willow, boxelder, and walnut wood recovered at Tintop Cave and the Archaic era Sunset Site.

The Chihuahuan Desert floristic communities of southern New Mexico and the Rio Abajo near Socorro appears to provide a resource base with some distinctive qualities (Toll 1983). In cooler deserts to the north, many perennial resources are restricted to specialized soil and drainage conditions, which tend to occur in higher elevations towards the upper altitudinal limits of these species. In southern New Mexico, greater profusion of gravelly outwashes and other coarse-textured soils, together with milder winters and a longer growing season (180 to 200 or more days), favor denser and more widely distributed populations of various cacti and broad-leaf yucca. Mesquite and certain species of agave are restricted almost exclusively to this zone.

A discussion of a neat transition from mobile groups moving across the landscape exploiting multiple environmental zones to a more sedentary lifestyle in the later Ceramic period may not be possible in southeastern New Mexico. For one thing, the lack of much direct evidence of species utilized in the Archaic era prevents such a comparison. Another consideration is that this scenario, which can be clearly seen in northwestern New Mexico, may not be applicable to southeastern New Mexico. Several authors have suggested that multiple adaptive strategies were used simultaneously in southeastern New Mexico. Most researchers agree that agriculture was not a significant part of subsistence regimes until ca. AD 850. Low population pressure allowed for a late addition of farming to the subsistence repertoire, where wandering hunter-gatherers coexisted with sedentary farmers until ca. AD 1100 (Stuart and Gauthier 1981:289). Lord and Reynolds (1985:237) refer to these late, mobile foragers, who appear to have pursued an Archaic adaptation with the benefit of ceramics and the bow and arrow, as "Neoarchaic." Sebastian and Larralde (1989:83) suggest that Ceramic period agriculturalists may have been "much less dependent on agriculture and far more mobile than their contemporaries elsewhere." Seven Rivers adds to the growing collection of floral data documenting hunter-gatherer pursuits that began before the Archaic and continued into the early historic period, when Apaches used the landscape in much the same way as their predecessors.

Table 11.6. Economic plant taxa at sites in southeastern New Mexico

Site	LA Number(s)	Dates	Site Type	Elevation (m)	Drainage	Reference	Number of Flotation Samples	Flotation and Macrobotanical Species	Wood
Beth's Cave	LA 47481	AD 600-700?	shelter	1,890	Rio Bonito	Wiseman (1988)	0	Annuals: none Perennials: *Pinus edulis* , *Yucca* , *Juglans* , *Quercus* Grasses: none Cultivars: *Zea* , *Cucurbita* , *Phaseolus*	none
Sunset Archaic Site	LA 58971	AD 1-400?	open	1,515	Rio Hondo	Toll (1996)	26	Annuals: *Chenopodium* , *Portulaca* , *Descurainia* Perennials: *Pinus edulis* , *Rhus trilobata* , *Prosopis* Grasses: *Sporobolus* Cultivars: *Zea* , *Phaseolus*	creosotebush 21% juniper 10% mesquite 9% plus 17 other taxa including box elder and walnut
Tintop Cave	LA 71167	?	shelter	1,487	Rio Hondo	Toll (1996)	4	Annuals: *Chenopodium* , *Portulaca* , *Amaranthus* , *Helianthus* Perennials: *Echinocereus* Grasses: *Sporobolus* Cultivars: *Zea*	creosotebush 31% juniper 24% mesquite 10% plus 10 other taxa including cottonwood/willow and walnut
Diamond Shamrock El Paso Pipeline	LA 107597 LA 107600 LA 107601 LA107625 LA 107661 LA 107602	Archaic/ Apache	open	1,525	Cornucopia Draw	McBride (1996b)	21	Annuals: *Amaranthus* , *Chenopodium* , *Portulaca* , *Talinum* Perennials: *Agave* , Cactaceae, *Cylindropuntia* , *Echinocereus* , *Mammalaria* , *Platyopuntia* , *Sphaeralcea* , *Yucca* Grasses: Gramineae, *Sporobolus* Cultivars: none	ocotillo 34% mesquite 10% saltbush/greasewood 7% cholla 5% plus 5 other taxa
Seven Rivers	LA 38264 LA 8053 LA 112349	Archaic/ Apache	open	1,000	South Seven Rivers	this volume	30	Annuals: *Amaranthus* , *Portulaca* Perennials: *Agave* , *Echinocereus* , *Prosopis* Grasses: none Cultivars: none	mesquite >90% saltbush/greasewood 2% piñon 1% plus 2 other taxa

Annuals will be underrepresented at sites without flotation analysis (Beth's Cave).

Summary

Plant remains from the Seven Rivers sites indicate that prehistoric and Apache populations were primarily targeting three perennial species: agave, hedgehog cactus, and mesquite. The recovery of agave remains is a significant addition to our understanding of where and when agave was utilized. Fuelwood species were dominated by locally available species (primarily mesquite and saltbush) along with small amounts of exotic woods that may have been carried downstream in the South Seven Rivers and collected for fuel.

12. Subsistence-Area Size in Southeastern New Mexico: A Pilot Study

As archaeologists, we study prehistoric subsistence practices, carefully noting the evidence of plant and animal species used in an attempt to reconstruct economic lifeways. Sometimes we discuss the environmental zones that these species represent and refer to the seasonal rounds that the people, especially hunter-gatherers, would have made to provision themselves on a year-round basis. Over the past 35 years, archaeologists have even looked at the question of subsistence-area size for hunter-gatherers, agriculturists, and herders (for instance, Vita-Finzi and Higgs 1970; Findlow and Ericson 1980; see Dennell 1980 for an early critique). These studies, called catchment analysis, usually involve single sites rather than entire regions. Earlier regional studies elucidated settlement systems with regard to vegetational zones and landforms but did not deal specifically with subsistence-area size (MacNeish 1967, 1991). More recently, major advances have been made in these types of studies, but again, they do not directly address the question of subsistence-area size (for instance, see various contributions in Beck 1999b).

In this chapter, we look at the question of actual subsistence-area size, in this case, for local groups of prehistoric peoples. We define *local group* as the smallest cooperative economic unit, comprising one or more families, that habituates the same general locality, exploits the same general use-area, and cooperates in most matters on a day-to-day basis. Local groups are mostly comprised of biologically related persons but may also include one or more "extras" that have attached themselves to the local group through various mechanisms and for various reasons. With regard to larger social, economic, and/or political groups, two or more local groups comprise a band, and two or more bands comprise a tribe.

Our conception and use of the term *local group* essentially coincides with W. B. Griffen's (1983:334–335) use of the term *band*. Griffen's definition and use of the term is in many ways more loaded or restrictive. Although his descriptions are based on his reconstructed social organization of pre-Apachean hunter-gatherers of the Chihuahuan Desert in Mexico, we prefer the more generalized and thereby less-loaded term *local group*.

Obviously, many variables affect local-group use-area size. First, we have the local group itself—its size, composition, organization, technological capabilities, and food habits and preferences. The availability, distribution, growth characteristics, and dependability of food resources on the landscape are also critical. Additional important factors include the presence or absence and density of other local groups, bands, and tribes attempting to use the same land and resources. This last aspect includes the potential for intergroup competition for the same resources and raises the question of resource degradation through time. Under such circumstances, each local group would have to adjust to changing food possibilities through a variety of mechanisms and strategies. An example of the annual subsistence round of the members of one village in southeastern California can be found in Appendix 8.

Thus, the answer to the initial question of local-group use-area size is an extremely complicated one. Obviously, an attempt to obtain a reasonably accurate assessment of southeastern New Mexico would require a tremendous amount of data that simply does not exist. If for no reasons other than to promote contemplation of the question and to gain an initial perspective, we devise an estimate here. To accomplish this, we use data from the Great Basin of North America, a region that is environmentally similar in many respects to that of southeastern New Mexico. More importantly in recent years, scholars working in that culture area have collected data, performed analyses, and given much thought to related matters (see various contributions in Beck 1999b).

Historic Hunter-Gatherers of the Great Basin

The Great Basin lies principally in the state of Nevada and in small sections of adjacent states.

Our initial data source is Julian H. Steward's (1970 [1938]) ethnographic study of the Shoshonis and Paiutes. These hunting-gathering peoples occupied an environment characterized by xeric and semixeric sage and grass plains interspersed among numerous, north-south-trending mountain ranges. Some of these ranges reached to the Transition zone and higher, presenting humans with a variety of plant and animal species similar to those also available in southeastern New Mexico. The terrain and climate of southeastern New Mexico do not exactly duplicate those of the Great Basin, but the two regions are sufficiently similar that a modeling of data from the one for the other, while not perfect, is not unreasonable for heuristic purposes.

The groups of interest here, those inhabiting terrain most similar to southeastern New Mexico, are the southern bands of the Western Shoshonis and some Northern Paiutes. Steward (1970 [1938]) summarized their subsistence practices, seasonal movements, and resulting encampment locations:

> Among Western Shoshoni plant harvesting was the main subsistence activity, game being relatively scarce. For the greater part of the year families necessarily traveled alone or in very small groups and harvested a very large area. They ordinarily ranged 20 miles or more in each direction from the winter village. Their itinerary, though usually the same each year, was not always fixed. Seasonal variation in rainfall and consequently in crop [i.e., wild plant] growth frequently required that they alter their routine.
>
> The most permanent association of families was at winter encampments. These were sites where certain families habitually remained during the months when vegetable foods could not be had. Necessary conditions for such sites were accessibility to stored seeds, especially pine nuts, water, sufficient wood for house building and fuel, and absence of extremely low winter temperatures. These conditions were most often fulfilled in the mouths of canyons or within the pine-nut juniper belt in the mountains, though sometimes broad valleys near fishing streams were chosen. Encampments tended to cluster with respect to mountain masses rather than valleys. But whether they were scattered at intervals of several hundred yards to a mile along streams, were situated at springs on mountain sides, or were clustered in dense colonies depended upon the quantity of foods which could be gathered and stored within convenient distance of each camp. In some places families had to camp alone, elsewhere as many as 15 or 20 could congregate in a true village.
>
> But another factor affecting population distribution was annual variation in seed occurrence. Though a winter encampment was always located near the greatest amount of stored foods, the natural yield was not everywhere and always the same. In some areas, for example, Owens Valley, crops [of wild plants] were fairly reliable and villages consequently stable. Elsewhere, especially in the deserts bordering Death Valley, the Great Salt Desert, most of Nevada, and the Snake River, people had to traverse enormous territories, modifying their itinerary considerably from year to year as local rainfall or other factors affected plant growth. The erratic occurrence of the all-important pine-nut crops, for example, required that a family often remain in different localities in successive years. . . .
>
> Western Shoshoni cooperative hunts did not permit permanent associations of families or villages for several reasons. First, these hunts lasted only while the quantity of meat taken was sufficient to feed the assembled crowd—a few weeks. There was rarely a surplus which, being stored for winter, would be a factor in the location of winter villages. Second, alinement [sic] of families or villages for hunting was often different for each species. Antelope and rabbits, the most important species in this part of the area, often occurred in different parts of a valley. Moreover, the more important hunts were held only where there was an antelope shaman or rabbit drive director; every valley did not have such men. For communal hunts, therefore, families traveled from their village or from sites where they happened to be gathering seeds to the most convenient location and often cooperated with very different people in successive hunts. They might join families from across their valley

for a rabbit drive, go to a neighboring valley to hunt with its residents in an antelope drive, travel in another direction to a marsh to join a waterfowl drive, and associate with immediate neighbors to hunt deer in their own mountains. If their local pine-nut crop failed the next year they might be thrown into association with still other people for these hunts.

> Because the territory exploited by different families was variable as well as overlapping, ownership of food areas would have been impractical. It is absent among Western Shoshoni, excepting possibly the Reese River area. [Kelly 1995 provides interesting conclusions about when food resources may or may not be subject to ownership among hunter-gatherers.] The only exceptions to these generalizations were Owens Valley and possibly other Northern Paiute, the Snake River Shoshoni, and the Southern Paiute. (Steward 1970 [1938]:232–233)

Before proceeding, we should acknowledge that Steward's data and conclusions are not totally accepted by present-day scholars. For instance, some point out that, although Steward's intention was to reconstruct Shoshoni and Paiute lifeways prior to contact with Euroamericans, none of his informants had actually experienced a pre-Euroamerican existence. The arrival of Euroamericans brought environmental degradation in the form of overhunting, overgrazing, disturbance of aboriginal vegetative patterns and species availabilities, monopolization of water sources, reconfiguration of riverine vegetative patterns for agriculture, introduction of diseases, and the consequent disruption and marginalization of the native peoples. Thus, some would say that the family-based economic unit described by Steward may have been the result of the impoverishment of the native landscape; therefore, it is not necessarily reflective of the condition of these peoples and their culture prior to Euroamerican contact (see Beck 1999a; Fowler 1999; and Rhode 1999 for these and related discussions).

Having said this, it should also be noted that at least one scholar has demonstrated the archaeological utility of Steward's data and ideas. David H. Thomas (1973; and later publications listed in Beck 1999a) made a thorough interdisciplinary study of two different localities in central Nevada to evaluate Steward's ideas. Thomas concludes that his test showed that the archaeological data resulted in a high degree of fit with the expectations derived from Steward.

Another problem is the fact that horses had made it into the Great Basin some time prior to AD 1800 (Steward 1970[1938]:201–202; see also 26, 46, 152, 153, 177, 181, 223, 232, 235, 236), skewing upwards the size of ranges used by those who had them. While certain groups such as the Northern Shoshonis and the Utes became dependent upon this animal and the hunting lifestyle that it afforded, few of the animals appear to have been acquired by the southern Western Shoshonis and Paiutes further to the south and west. In some cases, these latter groups used the horse for food and as pack animals, but they evidently did not rely upon them to the extent that their more northerly and easterly kinsmen did.

Prior to the introduction of the horse, the ancestors of the Shoshonis and Paiutes were forced by the distances among critical resources to live in smaller groups spread out across the land where they could exploit these resources and the overwintering food stores they cached nearby. Acquisition of the horse, then, if horses were used only as pack animals, permitted some of these people to gather into larger winter groupings and engage more frequently in other activities such as social events, mutual defense, and hunting over much greater distances. This all has implications with regard to the current study of hunter-gatherer subsistence use-area size.

Returning to the present exercise, we selected certain groups (or local groups, as we use the term here) of southern Western Shoshonis and Northern Paiutes in Steward (1970 [1938]) for inclusion in the calculations presented here. Some groups, like the Medicine Spring (our #25) and East-of-Ely (#22) groups, are included even though their larger use-areas and/or larger numbers of people suggest that they may have used horses to some extent. But because they were situated away from major rivers, their inclusion here is instructive.

Other groups were excluded: (1) those groups known to have practiced horticulture (Owens Valley); (2) those populations having densities that were comparatively high because of especially favorable environmental conditions

(Owens Valley, Reese River, and upper Humboldt River Valleys); and (3) groups that traveled extraordinary distances to specific resources and almost certainly had horses (for instance, the group at Skull Valley, Utah).

The values presented in Table 12.1 are, at best, very rough approximations for 30 local groups of mainly southern Western Shoshonis and also some Northern Paiutes. Local-group sizes varied from 1 to 30 families, and all but three local groups in our sample had 15 or fewer families.

The use-area for each local group was derived from the maps by measuring the greatest north-south and east-west distances among the resources used. Festival loci are included because all-important feasting took place there on one or more occasions in most years. The two values (north-south and east-west distances) were then multiplied to estimate the potential area used by each local group. Each final value designates a rectangular area (i.e., a quadrat).

While we can be certain that few, if any, of the local-group use-areas in our sample are actually rectangular, no single shape will suffice any better. One colleague, in discussing the intent and preliminary findings of this project, suggested using a circle to characterize use-area shape. But, because so many of the local-group base camps (assuming that the family symbols on the maps represent such) are not centrally located within the use-areas, the circle is also inappropriate.

The average use-area size of the study sample is 4,200 sq km (range of 768 to 18,721 sq km; Fig. 12.1). However, the curve is skewed left, with a strong mode (comprising one-third of local groups) between 2,000 and 3,000 sq km.

Table 12.1. Use-areas of Nevada-California sample

Local Group	Map Location	Steward's Figure No.	Number of Families	Use Area (sq km)	North-South (km)	East-West (km)
1	Saline Valley (CA)	7	6	4,480	80	56
2	Fish Lake Valley (CA)	7	4	768	24	32
3	Gold Mountain (CA/NV)	7	4	2,928	48	61
4	Rose Spring (NV)	7	2	2,328	97	24
5	Beatty (NV)	7	8	13,289	137	97
6	Horse Canyon (NV)	8	6	18,721	97	193
7	Morey (NV)	8	2	1,920	40	48
8	Fish Spring (NV)	8	5	2,240	56	40
9	Hot Creek (NV)	8	3	4,032	72	56
10	Tybo Creek (NV)	8	4	2,688	48	56
11	Blue Eagle Springs (NV)	8	7	1,728	72	24
12	Warm Springs (NV)	8	6	2,520	105	24
13	Nyala (NV)	8 SE	10	3,584	64	56
14	Bull Creek (NV)	8	8	2,112	88	24
15	Fish Creek (NV)	8	1	2,560	64	40
16	Hamilton (NV)	8	2	1,064	56	19
17	North Shellbourne (NV)	9	5	2,816	88	32
18	South Shellbourne (NV)	9	18	5,424	113	48
19	Antelope Valley (NV)	9	6	1,280	32	40
20	North Antelope Valley (NV)	9	2	1,152	48	24
21	Kern Mountains (NV)	9	3	3,880	97	40
22	East of Ely (NV)	9	28	7,760	97	80
23	Baker (NV)	9	6	2,904	121	24
24	South Spruce Mountain (NV)	11	5	6,984	97	72
25	Medicine Spring (NV)	11	30	4,312	77	56
26	Middle Huntington Creek (NV)	11	11	3,280	40	82
27	Humboldt/Ruby Mountainss (NV)	11	13	2,430	90	27
28	Southeast of Mineral (NV)	11	15	1,656	72	23
29	Clover Valley (NV)	11	10	5,353	101	53
30	North Roberts Mountain (NV)	11	6	9,797	101	97

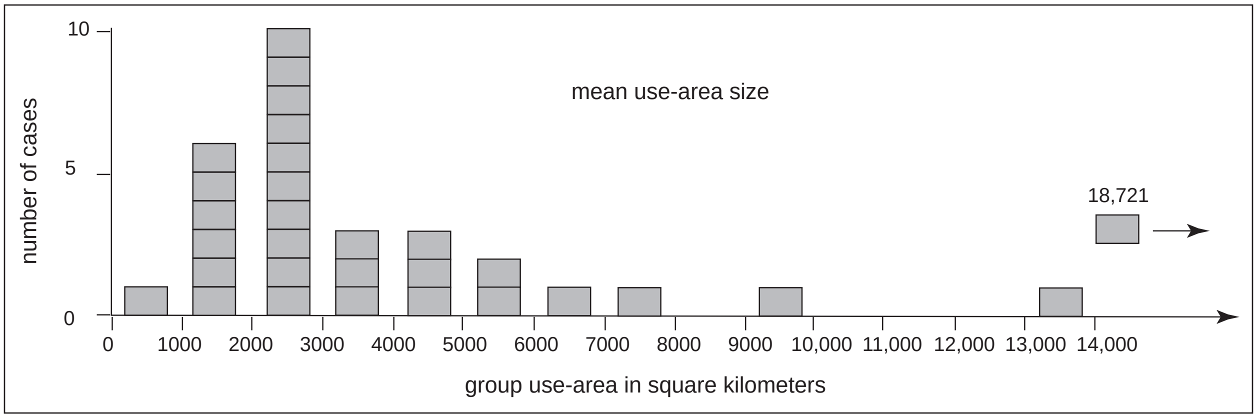


Figure 12.1. Mean use-area size of Great Basin study groups. Numbers refer to Great Basin study groups (see Table 12.1).

The shapes depicted in Figure 12.2 are the configurations created by tracing the points of the family locus (winter camp?), the major resource areas, and the festival loci shown on Steward's (1970 [1938]) maps and bounding them with lines of our own. Several of the local-group use-areas are defined by very few points, indicating that the data are incomplete. Others spread over distances that may have been possible in some cases only because the people had horses.

These observations raise several questions. Without the horse, would some of these longer distances have been traversed by people on foot? Steward (1970 [1938]) indicates that foot trips on the order of 25 to 50 miles to gather critical resources were not uncommon. Is it safe to say that such trips would have to be made only in years of scanty resources? Alternatively, the inability to acquire critical resources could have resulted either in substandard nutrition or periodic starvation (certainly possible), or nonuse of certain areas. Or, is it possible that the winter camps and the overall configurations of the use-areas during the prehistoric period were different from those related by Steward's informants? This does not seem too likely for most use-areas, for the places used as winter camps in recent times are the best from the standpoint of the availability of water and fuel. Thus, we suggest that the use-area sizes contemplated in this study do have at least some utility even for peoples lacking horses, mules, donkeys, and other forms of nonhuman conveyance.

Beyond this, we cannot guess the actual sizes of the tracts exploited around each resource locus as shown on Steward's maps, further indicating that shapes of the use-areas as depicted here should only be considered a convenience to our study. Many resource areas were used by more than one local group, and some of the smaller local groups had to travel through or around other, sometimes much larger local groups to get to preferred resource areas. Two things are clear, however. A local group was not necessarily restricted to its "home" valley and the enclosing mountain ranges, and it seems to have traveled as far as necessary for the foods and socializing its members needed and desired.

Another interesting phenomenon is that the number of families comprising local groups varies in a nonlinear fashion by size of use-area. While this is not surprising given the patchy distribution of resources across the landscape, it is instructive to look at the relationship (Fig. 12.3). As noted earlier, the use-areas exploited by 15, or one-half, of the local groups form a cluster between 700 and 3,000 sq km. Another 7 local groups, each comprising 15 or fewer families, expands the initial cluster (n = 22 local groups, or more than two-thirds of the sample) to a maximum size of 4,500 sq km. Although the terms are not particularly satisfactory from a stereotypic perspective, we might refer to these local groups and their use-areas as the normal or typical examples among the study sample.

The remaining 8 local groups are widely dispersed outside the expanded cluster just described. These local groups, which vary from 5 to 30 families, used areas as small as 4,300 sq km and as large as 18,721 sq km. The largest local

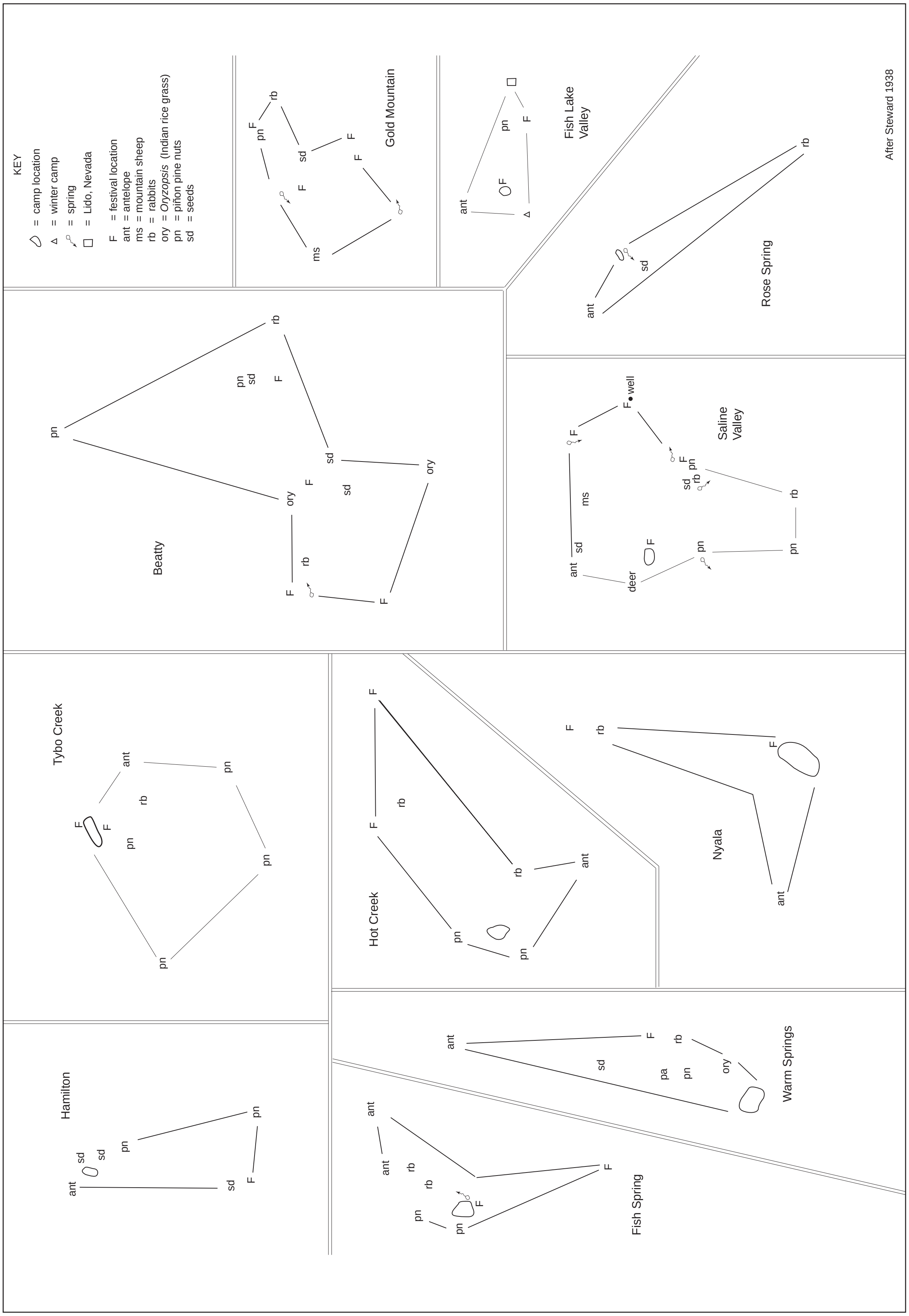


Figure 12.2. Examples of Great Basin study group use-areas (adapted from Steward 1938).

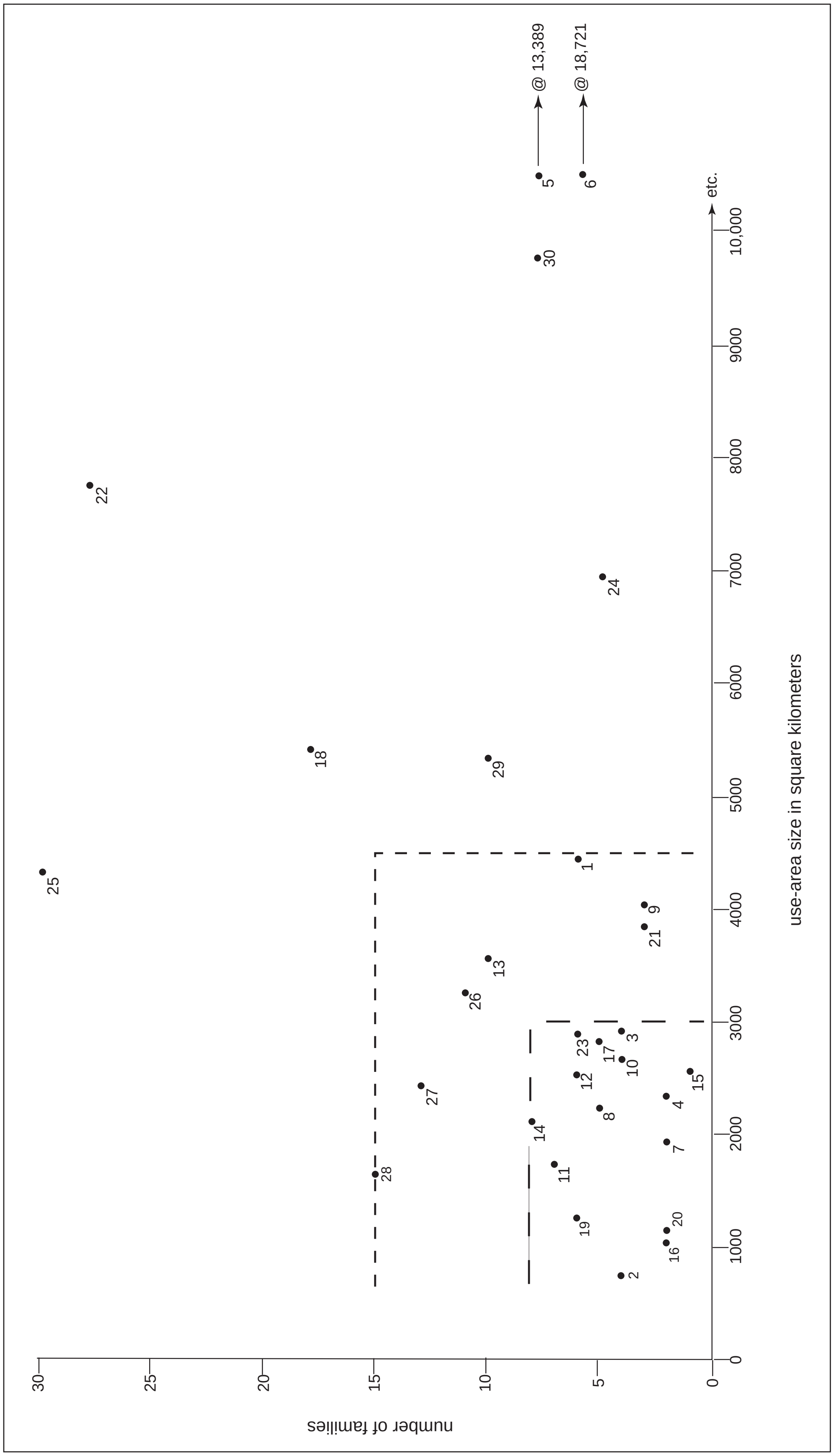


Figure 12.3. Number of families by use-area size in Great Basin study groups.

group, comprising 30 families, used an area of approximately 4,300 sq km, while elsewhere, a local group of only 6 families required an area of 18,721 sq km.

Social relationships may have been another reason for the increased size of some local-group use-areas, for some of the longer distances on Steward's maps were traveled to festival loci. Festivals are important periodic congregations of local groups for socializing, trading, finding mates, and the like.

In summary, our assessment of use-area size suggests the following:

1. Most local groups in the study sample are small, individually comprising 15 or fewer families. Steward (1970 [1938]) does not provide the actual number of members in individual families, but he does state that the average family size was about 6, and some had as many as 10 people.

2. For most aspects of life, including acquisition of food, the majority of local groups require use-areas on the order of 750–4,200 sq km.

3. We assume that areas that are more or less productive than those in the 750–4,200 sq km range have fairly predictable correlations between use-area size and local-group size. In areas where resources are generally more abundant, larger local groups are possible. The relationship could be linear in that, as resource productivity increases, the size of the local group could also increase. In areas where resources are generally less abundant, small local groups are characteristic, and the amount of land they need to sustain themselves increases as the productivity per unit of land decreases.

4. The calculations presented here are affected to an unknown degree by the use of the horse. We know of no way to correct for this situation other than to point out that the use-areas of the southern Western Shoshoni and Northern Paiute local groups that form the basis for these calculations evidently were not as horse-dependent as those of some of their relatives (northern Western Shoshonis, Utes). Apparently, they had fewer animals and therefore generally less mobility for each local group as a whole.

None of this is new, and it is all intuitively expected. However, to the degree that these observations are reasonable, especially concerning the correlation between local-group sizes and use-area sizes, we can now look at southeastern New Mexico.

Southeastern New Mexico

In broadest perspective, three major biotic provinces meet in Southeastern New Mexico—the Basin and Range from the west, the Great Plains from the east, and the Chihuahuan Desert from the south. Each of these provinces offers a vast range of plant and animal species useful to people, as evidenced by the various prehistoric and historic remains that characterize each.

In southeastern New Mexico, the mountain chain consisting of the Sacramento, Sierra Blanca, and Jicarilla Mountains stretches northwest from the Guadalupe Mountains and constitutes the eastern margin of the Basin and Range Province. This chain is characterized an ideal physical setting for hunter-gatherer subsistence. Starting at the Pecos River, the primary drainage system of this sector of the state, and moving westward, the terrain increases in elevation from lows of 3,200 (Carlsbad) and 3,700 (Roswell) ft above mean sea level along the river, to a high of 12,000 feet at Sierra Blanca. Within this stretch, many of Dick-Peddie's (1993) vegetation types are present (Fig. 12.4), including all of the plant and animal resources typical of those units in New Mexico. These units, from next to the Pecos to the top of Sierra Blanca, include desert grassland, plains-mesa grassland, juniper savanna, coniferous and mixed woodland, montane coniferous forest, subalpine coniferous forest, and alpine tundra. A small tract of Chihuahuan desert scrub also occurs along the west side of the Pecos in the vicinity of Roswell.

Technically speaking, the Guadalupe Mountains (elevation of 7,300 ft) are also part of the Basin and Range province. However, we separate them for discussion here because, culturally speaking, they belong to the Trans-Pecos culture area of Texas and they are completely surrounded by the Chihuahuan Desert. The biotic resources of the Chihuahuan Desert useful to humans are well established in the archaeological literature

Figure 12.4. Vegetation types in southeastern New Mexico (adapted from Dick-Peddie 1993).

and need not be repeated here. It suffices to say that, like the Pecos to Sierra Blanca section, as the land between the Pecos River and the Guadalupe Mountains changes in elevation, it crosses several vegetation units, including the Chihuahuan desert scrub and desert grassland next to the Pecos, juniper savanna, montane scrub, and coniferous and mixed forest. In the Guadalupes, the montane coniferous forest is limited to the southernmost peaks, and alpine tundra is absent. Thus, pretty much the full range of plant and animal species that characterize the Pecos to Sacramento section, plus greater acreages of desert species, are and were available for human use in this sector.

East of the Pecos River, in the direction of the Great Plains, once one leaves the Pecos Valley and its peripheral breaks, the terrain gradually ascends to the foot of the High Plains, or Llano Estacado. In this part of New Mexico, the Llano forms a 150- to 200-feet-high escarpment along its western edge. Known locally as Mescalero Ridge, its elevation is about 4,400 ft. Thus, the elevational succession east of the Pecos is shortened and consists of only three vegetational units: Chihuahuan desert scrub and desert grassland nearest to the Pecos River, and plains-mesa sand scrub nearest to the base of the Llano. East of Carlsbad, desert grassland and plains-mesa sand scrub are patchy, providing an even richer set of habitats for plants and animals alike.

In many respects, the plains-mesa sand scrub is the most interesting of the vegetation types. The area in which this vegetation type occurs, known locally as the Mescalero Sands, supports an extensive shinoak or scrub oak growth (*Quercus havardii*) that at a casual glance appears to offer little in the way of sustenance for humans. This essentially treeless environment is generally unappealing to people who are more comfortable in woodlands and forests. Nevertheless, the rich and extensive plant and animal biota associated with the shinoak community constitute major resources for humans, rivaling those of the regions west of the Pecos. In recent times, the shinoak community is estimated to have covered as much as 2.6 million acres in New Mexico, perhaps the result of overgrazing of grasses and subsequent expansion of the shinoak. However, biologists estimate that in premodern times, shinoak probably covered at least 1.5 million acres in New Mexico and about equal acreages in West Texas and western Oklahoma (Peterson and Boyd 1998).

In addition to large-scale acorn production, the shinoak community is also characterized by a variety of mammals, rodents, reptiles, and birds that are known to have been used by humans for food and other necessities. These include, but are not limited to, mule deer, white-tailed deer, antelope, peccary (javelina), cottontail, jackrabbit, porcupine, pocket gopher, woodrat, cotton rat, ground squirrel, kangaroo rat, many species of mice, prairie chicken, turkey, mourning dove, hawks, eagles, owls, dozens of local and migratory songbird species, box turtles, and dozens of snake and lizard species. Predators are also known, including black and grizzly bears, wolves, coyotes, mountain lions, bobcats, foxes, ringtails, raccoons, and skunks (Peterson and Boyd 1998). Prior to their near-extinction in the late 1800s, buffalo, or bison, were present in the plains-mesa sand scrub and nearer to the Pecos River in varying numbers and at varying times (Dillehay 1974; Huebner 1991). It seems quite likely that during prehistoric and early historic times, southeastern New Mexico east of the Pecos River was not appreciably poorer in resources than the country west of the river.

Use-Area Size of Prehistoric Hunter-Gatherer Local Groups

To gain perspective on use-area sizes of local groups in southeastern New Mexico, we chose to apply four sizes derived from the Great Basin data in Table 12.1: the smallest area (Group 2, 768 sq km), the lower-end mode (Group 7, 1,920 sq km), the upper-end mode (Group 3, 2,938 sq km), and the average area of the study sample (4,200 sq km). We omit all of the larger-than-average use-areas because an unknowable number of them, perhaps all, may owe their size to the use of the horse for packing distant resources such as piñon and antelope back to the winter camp. Movement of these goods such long distances without pack animals may not have been possible. Also, it seems that attendance at some of the more distant festivals may have been possible without the use of horses, but we suspect such visits were not common.

Again, we arbitrarily use the rectangle or quadrat for the use-area shapes because we have no realistic way of determining the actual configurations of aboriginal use-areas. It is interesting to note that the quadrats of the 30 cases in our Great Basin study sample fall evenly into two groups: regular quadrats and long quadrats. These are demonstrated when we plot each use-area based on the width as a percentage of the length (Fig. 12.5; data from Table 12.1). As can be seen in Figure 12.5, the values of the regular quadrats range from 20 to 50 percent, and those for the long quadrats range from 60 to 100 percent.

The exercise begins with the regular-size quadrats. These are placed on a succession of maps using the project sites on the South Seven Rivers as the focal point (indicated by a star in Figs. 12.6–12.10). The placements represent local-group use of the land west of the Pecos River, local-group use of the land east of the Pecos, and local-group use that centers on the river and encompasses the terrain to either side. Discussion of each quadrat follows from the smallest to the largest.

The first map (Fig. 12.6) shows the quadrats positioned with the project sites at the east-center, supposing that the subsistence use-areas of the sites' occupants were west of the Pecos River. The occupants of the sites would have ranged west from the river towards the multiple vegetation types between the river and the Guadalupe Mountains. In this scenario, the smallest quadrat includes only two vegetation zones, the Chihuahuan desert scrub, south of South Seven Rivers; and the desert grassland, north of it. This use-area would have included the Seven Rivers Hills and extended well into but not beyond Indian Basin. Lacking vegetational diversity, this size of use-area does not appear to be sufficient for year-round human sustenance.

The lower-end-of-the-mode quadrat includes the vegetation units intersected by the smallest quadrat and extends through the juniper savanna and into the montane scrub. Thus, we consider this size of quadrat in this position to have marginal merit for year-round sustenance, since it intersects four vegetation types.

The upper-end-of-the-mode quadrat intersects all of the same vegetation types as the previous two quadrat sizes; it also penetrates the coniferous and mixed woodland as far as Guadalupe Rim. The vegetation types within this quadrat are Chihuahuan desert scrub, desert grassland, juniper savanna, montane scrub, and coniferous and mixed woodland. Year-round sustenance should have been assured within this quadrat size and position.

The average quadrat reaches from the Pecos River to and well beyond Guadalupe Rim. Because Guadalupe Rim is very high and steep, and has only a few difficult passages to the low country to the west, I believe that ventures by people living within and east of the Guadalupe Rim were not common and therefore not part of the normal subsistence use-area. Thus, this quadrat size duplicates the upper-end-of-the-mode quadrat and is not applicable in this position.

The second map (Fig. 12.7) shows the quadrats positioned with the project sites at the west-center. This position supposes that the primary subsistence use-area of the sites' occupants were

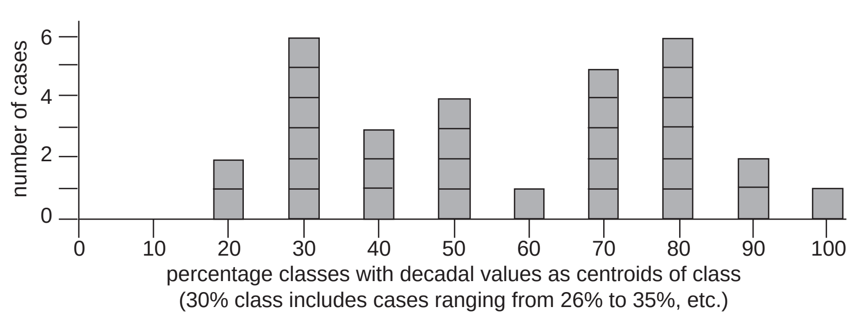


Figure 12.5. Quadrat configuration indices (width as a percentage of length) of use-areas in Great Basin study groups.

Figure 12.6. Regular quadrats with project sites (star) at east end.

Figure 12.7. Regular quadrats with project sites (star) at west end.

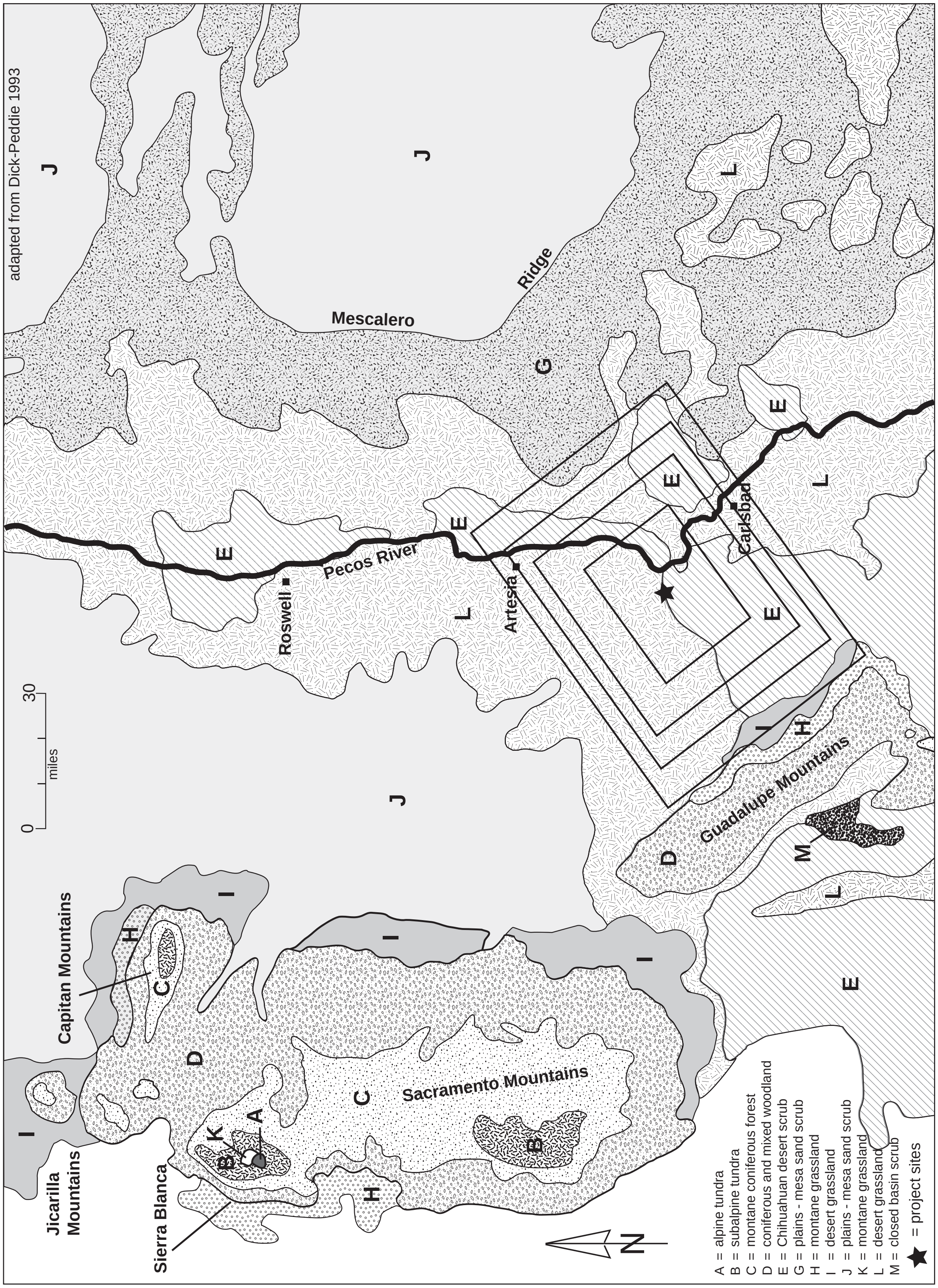


Figure 12.8. Regular quadrats with project sites (star) at center.

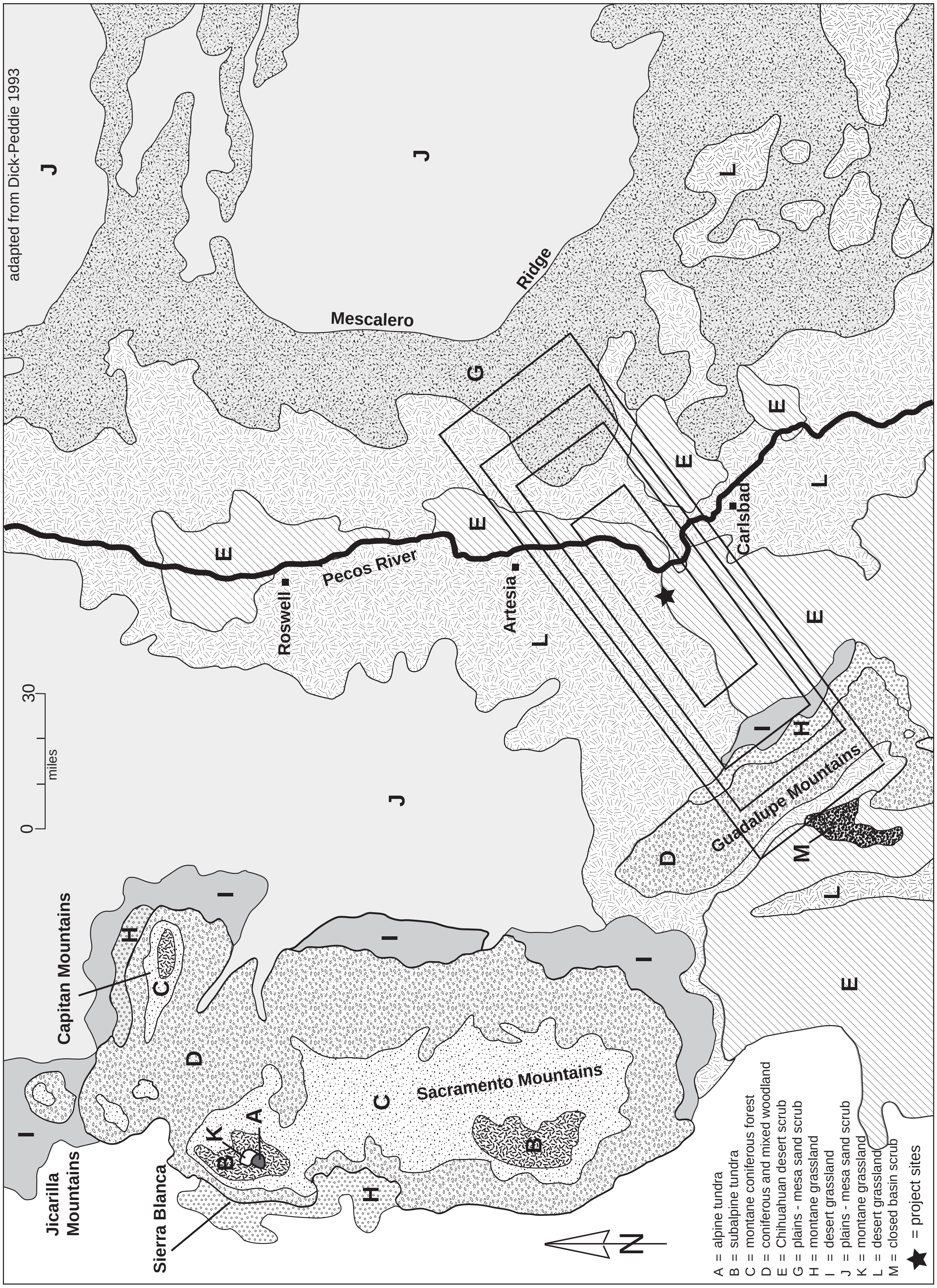


Figure 12.9. Elongate quadrats with project sites (star) at center.

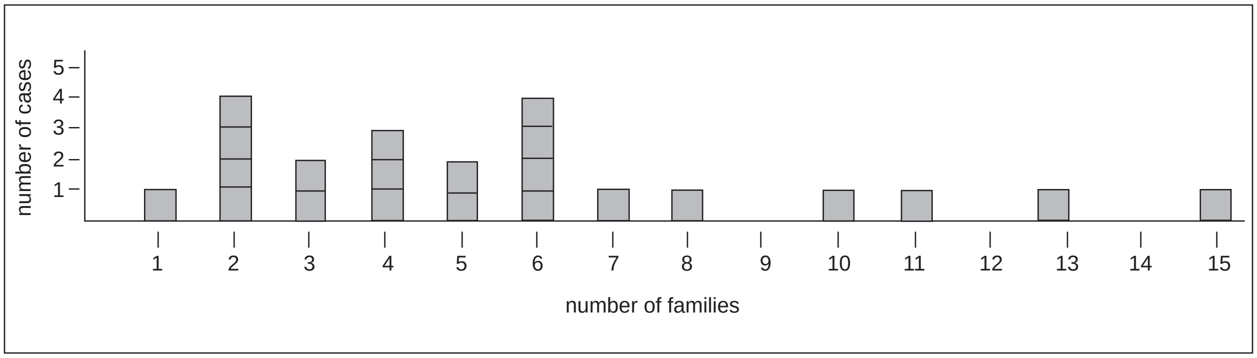


Figure 12.10. Number of families per Great Basin local study group with use-areas of up to 4,500 sq km (n = 22).

east of the Pecos River, but with a small foothold west of the river. The occupants of the sites would have ranged eastward from a point just west of the river towards the multiple vegetation types from the river to (and including) the Llano Estacado. In this scenario, the smallest quadrat intersects only two vegetation zones, the Chihuahuan desert scrub and the desert grassland. The area of the foothold west of the river would have been important because the Chihuahuan desert scrub patches west of the river contain *Agave lechuguilla*, while those east of the river do not. This important food plant is probably represented by the unspecific agave remains recovered during excavations at LA 8053. However, a use-area of such restricted size and biotic diversity probably could not support a local group throughout the year.

The lower-end-of-the-mode quadrat includes the vegetation units intersected by the smallest quadrat and extends into the plains-mesa sand scrub. This size of quadrat in this position has questionable merit for year-round sustenance because it intersects only three vegetation types and only a small tract of one of the more important vegetation types, the plains-mesa sand scrub.

The upper-end-of-the-mode quadrat intersects all of the vegetation types as the previous two quadrat sizes, plus it encompasses a much larger portion of the plains-mesa sand scrub. Year-round sustenance may have been possible, though probably not bountiful, within this quadrat size and position.

The average quadrat extends from west of the river (the project sites) to the edge of the Llano Estacado. Although it crosses only three vegetation types (Chihuahuan desert scrub, desert grassland, and plains-mesa sand scrub), the biotic resources of the plains-mesa sand scrub, as related earlier, would make up for any deficiencies of the other two. Thus, obtaining a successful year-round hunter-gatherer diet should be assured within the limits of this use-area size and location.

The third map (Fig. 12.8) shows the quadrats positioned with the project sites at the center. This position supposes that the primary subsistence use-area of the sites' occupants was on both sides of the Pecos River. The occupants of the sites would have ranged both east and west of the river, and so they would have had to cross it.

In this scenario, the smallest quadrat includes only two vegetation types, the Chihuahuan desert scrub and the desert grassland, and the largest tracts of both are west of the river. As before, we consider this option to have little merit because a use-area of this size and biotic content should have been too limited to permit successful, year-round hunter-gatherer subsistence.

The lower-end-of-the-mode quadrat takes in roughly two and one-half times as much land as the smallest quadrat, yet it does not encompass any more vegetation types than the smallest quadrat. Thus, we consider this size of quadrat in this position to have little merit other than more resources from the Chihuahuan desert scrub and desert grassland vegetation types. Year-round sustenance within this quadrat in this position does not seem feasible.

The upper-end-of-the-mode quadrat takes in roughly four times as much land as the smallest quadrat, yet it does not encompass any more vegetation types than the smallest and the lower-end-of-the-mode quadrats. Year-round sustenance does not seem possible within this quadrat in this position.

The average quadrat has greater possibilities. It extends west to the foothills of the Guadalupe Mountains and east into the edge of the shinoak community. A local hunter-gatherer group living within this use-area would have access to four vegetation types: Chihuahuan desert scrub, desert grassland, juniper savanna, and plains-mesa sand scrub. However, the addition of the very small tracts of juniper savanna and plains-mesa sand scrub to this quadrat probably would have been insufficient to permit year-round sustenance.

These results, intriguing though they are, beg one important question about the configurations of the quadrats. What effect would the long quadrats have on accessing the various vegetation types? The fourth map (Fig. 12.9) looks at this question.

Using the project sites as the central point, the long quadrats clearly show that the subsistence variety afforded within each is much more significant than is the case for the regular quadrats. If the long quadrats were positioned either west or east of the river (as in Figs. 12.6 and 12.7), the smallest quadrat should have provided sufficient year-round sustenance for our local group, and the three larger quadrats would seemingly be unnecessary.

But how viable are the long quadrats? After all, the southeastern New Mexico landscape lacks the constrictions imposed by the long, narrow, steep-sided valleys of the Great Basin examples, which produced the elongated use-areas of some local groups. Therefore, is it reasonable to assume that the southeastern New Mexico people would have arbitrarily restricted themselves to running back and forth in long, narrow transects? Intuitively, this possibility seems unlikely, but we cannot rule it out.

The final question concerns the number of families that might have composed a local group in southeastern New Mexico. Looking at the local groups for Great Basin quadrats that are 4,200 sq km or less in area, we find a range from 1 to 15 families (Fig. 12.10). However, nearly two-thirds (14 of 22, or 64 percent) of the cases have only 2 to 6 families. This modal range for the number of families in a local forager group is in general agreement with figures derived from a pilot study of bedrock mortar sites in southeastern New Mexico (Wiseman 2000a).

Summary

In this exercise, we developed a set of subsistence use-area sizes from Steward's (1970 [1938]) monograph on the Great Basin. We then applied these use-area sizes, in the form of quadrats, to the southeastern New Mexico landscape. The quadrats were spatially tethered to two project sites in the Pecos River Valley at Seven Rivers, New Mexico.

The use-areas of the Great Basin study sample of 30 local groups range in size from 768 to over 18,000 sq km, with a strong mode between 2,000 and 3,000 sq km and an average of 4,200 sq km. It is known that horses were used by some local groups for accessing resource patches and transporting food back to winter camps. Accordingly, in an effort to minimize the potential effects of horse use on use-area size, we employed only the smaller quadrat sizes here, including the smallest (750 to 800 sq km), the small end of the mode (2,000 sq km), the large end of the mode (3,000 sq km), and the sample average (4,200 sq km).

This study focuses on two excavated prehistoric sites near the Pecos River in the vicinity of Seven Rivers, New Mexico. Topographic relief and vegetation types in the study area vary from the Llano Estacado (High Plains) on the east, west through the Pecos River Valley, to the Guadalupe Mountains on the west.

Since we have no way of knowing where our archaeological sites lay within their subsistence system, we employed three placements of the quadrats with respect to them. One placement has the sites at the east end of the quadrats, another at the west end, and the third centered on the sites. Quadrat orientation is tied to what we presume to be the necessary components of a viable subsistence system for a hunter-gather society—topographic relief from lowlands to highlands, and including the greatest possible variety of plant and animal resources.

The study area contains a wide range of the vegetation communities and animals defined by Dick-Peddie (1993), including desert scrublands and grasslands, the shinoak thicket east of the Pecos River, the grasslands of Llano Estacado, and the varied woodland and forest communities in the foothills and along the crest of the Guadalupe Mountains. These biotic communities, broadly representing the Great Plains, the Basin and Range,

and the Chihuahuan Desert biotic provinces, offer a tremendous set of plant and animal species known to have been used by hunter-gatherers in the temperate latitudes of western North America. Under the right circumstances, survival of hunter-gatherer local groups in the study area should have been mostly assured throughout prehistoric and early historic times.

We employ two shapes of quadrats based upon bimodal dimensions in the Great Basin sample. Regular quadrats are only slightly longer than they are wide, and long quadrats are much longer than they are wide.

The object of this exercise is to obtain perspective on the size of subsistence use-area a local group composed of a few families might need to make a living in this part of New Mexico. Because the data for this exercise comes from local groups in the Great Basin who evidently shared key resources with other local groups, the assumption of nonexclusive use pertains here as well.

As could be expected, the potential viability of the different quadrat sizes and shapes varied with their placement with regard to the sites and the terrain. The following results are presented with respect to these variables.

The Regular Quadrats

The small regular quadrat (750 to 800 sq km) probably would not have provided year-round sustenance regardless of placement.

The small-end-of-the-mode regular quadrat (2,000 sq km) may have been marginally useful for year-round sustenance both east and west of the river, but this is doubtful. If centered on the sites and the river, year-round sustenance probably would not have been possible.

The large-end-of-the-mode regular quadrat (3,000 sq km) west of the river almost certainly would have provided for year-round sustenance. The same might have been true east of the river. However, a central placement would not have worked.

The average regular quadrat (4,200 sq km) should have provided for year-round sustenance both east and west of the river but would have been marginal at best if centered on the sites and the river.

The Long Quadrats

The small long quadrat (750 to 800 sq km) probably could have provided sufficient year-round sustenance east or west of the river but probably not if centered on the sites and the river. However, the narrow width and long length of this quadrat, in the absence of topographically induced strictures on movement, renders its viability questionable. If it is viable, then it probably would have sustained only a small local group of perhaps two or three families.

All of the larger long quadrats (2,000, 3,000, and 4,200 sq km) would have worked both east and west of the river. In the centered position, all of them might have provided for year-round sustenance. The average quadrat was obviously the most advantageous. However, the same caveat concerning the distance of the required movements for the local group (in this case, 120 km from one end of the use-area to the other), as expressed above, applies here as well. Also, each successively larger quadrat would have permitted correspondingly larger local groups.

Local-Group Size

Based on Great Basin data, we suggest that the prehistoric local groups in southeastern New Mexico were comprised of 1 to 15 families. If we use Steward's (1970 [1938]) estimates, the actual number of people would have ranged from 6 to 90. Perhaps two out of three of the southeastern New Mexico local groups had only 2 to 6 families, with an estimated population of 12 to 36. These figures generally agree with the implications from a study of bedrock mortars in the Carlsbad region (Wiseman 2000a).

Conclusions

We acknowledge that this exercise is just that—an attempt to gain perspective on use-area sizes needed by prehistoric local groups for year-round subsistence in southeastern New Mexico. We have employed comparative data from the Great Basin province of the American West to structure our expectations. Although the climate, landforms, biota, and conditions of the Great Basin cold desert are not precisely duplicated by the hot

Chihuahuan Desert, we feel that the similarities sufficiently outweigh the dissimilarities such that our results are useful in a heuristic sense. That is, we cannot know how well our figures approximate reality in the past, for we can only judge the results by how reasonable they seem in light of our present state of knowledge about the prehistoric remains in southeastern New Mexico.

13. Pre-Apachean Historic Native Americans of the Chihuahuan Desert

Foreword, by Regge N. Wiseman

The following study of early historic Chihuahuan Desert hunter-gatherers was gleaned from the historic records by William B. Griffen. This important work, now out of print, was originally published as Chapter 4 ("General Ethnography") of *Culture Change and Shifting Populations in Central Northern Mexico* (Griffen 1969:104–133) and is reprinted here with permission from Dr. Griffen and the publisher. It is important to extend the availability of this information, which provides the human backdrop to the archaeology of the former inhabitants of the New Mexico portion of the Chihuahuan Desert.

As a general work regarding a large number of now "extinct" peoples, the information is a compilation of cultural commonalities among the early historic groups who inhabited the vastness of the Chihuahuan desert. They were mainly hunter-gatherers, some of whom engaged in at least some gardening of squash but not of corn. According to the Spanish records as compiled by Griffen, the lifestyles of the peoples were quite simple and devoid of excessive material things. And, since the modern conditions of the Chihuahuan desert were extant by about 2000 BC (Wills 1988), the climatic regime stretching from the Seven Rivers area of New Mexico through west Texas and points south, including the Mexican states of Chihuahua and Coahuila, was roughly the same. Because the area under consideration is a desert, with the same or very similar plant and animal communities from one end to the other, all prehistoric and early historic peoples would have been faced with the same food and material options for making a living. It is not surprising, then, that the archaeological sites, artifacts, and other cultural remains are quite similar in content and general lack of diversity when compared to other regions and more complex societies.

Thus, it is reasonable to postulate that many, perhaps most, of the culture of Griffen's ethnographic peoples pertain to the inhabitants of Seven Rivers area. This includes such things as the social organization and religious and ceremonial aspects. This last point I believe to be especially important because of the tendency for Southwestern archaeologists to assume that the prehistoric inhabitants of southeastern New Mexico were "Puebloans" because "some used Southwestern pottery and had structures that are likened to pithouses. This is precisely where the problem comes in. Why would we assume that a hunting and gathering people would have a Puebloan cultural configuration simply because they used pottery they did not make and lived in houses having depressed floors? With this, let's move on to Griffen's reconstructed ethnography and its possibilities for providing a more accurate portrayal of the lives of the inhabitants of the Seven Rivers sites.

General Ethnography, by William B. Griffen

[The text of "General Ethnography" is quoted here in full from *Culture Change and Shifting Populations in Central Northern Mexico*, by William B. Griffen.

The ethnography of the Greater Bolsón de Mapimí area has been only partially illuminated in the present study. Many aspects of the ways of life of the region—such as social organization—remain virtually unknown, and for any single group only a very small amount of information exists. However, the information encountered in the documentary sources is presented herein. By piecing together the few data that do exist, the broad outlines of the ethnographic picture for the general region can be reconstructed, aided by some general supporting information from surrounding areas. This ethnographic account, with a judicious amount of inference, will be used to establish a rough cultural base line in order to evaluate later some of the general processes of cultural change that occurred during a portion of the Colonial period.

Material Culture

Very little has come to light as to the nature of "uncontaminated" material culture—dress, hair style, and the like. Of the few references that have been found, a number evince synthesis with introduced Spanish items or models. Owing to the conglomeration that often occurs, it is virtually impossible to keep Spanish and Indian, as well as individual Indian, material separate. Such a mixture, of course, does represent the cultural situation of the Colonial Indians in this area at this period. Inventories of native camps usually list many Spanish goods and are also interesting from the standpoint of seeing just what items did get into the back country. Unfortunately, the significance of these goods and the part they actually played in native life can only be inferred.

Dress and Decoration

Dress exhibited a great deal of variation. Apparently from the time of first contact with Spanish culture, directly or indirectly, and particularly when the Indians took up raiding on a rather regular basis, they began to acquire some items of Spanish dress. In fact, the acquisition of clothing was often stated by the Indians as one of their prime motives for raiding. However, the native dress style was never given up entirely—in 1726 Spanish captives reported that their captors (a mixed group of Cocoyomes, Coahuileños, and Chisos) made them put on breech clouts of cloth (*paño* and *bayeta*), stating that trousers (*calzones*) were no good. The women here had worn deer skins secured around the waist (AHP 1724Aa). Another reference to the use of deer skin pertained to an occasion when a Suniyoligla man gave a Batayoligla one such skin (*gamuza*) to wear (BL 1709–1715). Coahuileño groups—Boboles, Gicocoges, and Yoricas—around the Sabinas river utilized both deer skins and buffalo hides for dress (Portillo 1887: 71–72).

Pérez de Ribas gave a description of female dress for the Laguna area. The women wore animal skins adorned with other small pieces of the same skin, the hair was braided, and around the neck were strings of snail and other shells. The feathers of parrots (*guacamayos*) and other birds were worn during dances (1944 III: 254, 265). Mota y Escobar stated that the people at La Laguna used rabbit-skin blankets for dress (1940: 169). On the other hand, the *Anua* of 1600–1602 reported that the people of Parras went nude (BL 1600–1602). Farther to the west, strings of beads and bones (*sartas de cuentas y huesos*), probably to be worn as adornments, were cited for Mapimí (Pérez de Ribas III 1944: 275).

Attackers were reported at different times to have different dress. Some, judged on one occasion to be Cocoyomes, were wearing short jackets (*cotones*) of baize (*bayeta*), new hats, and blankets tied around the waist (AHP 1715Aa). In an assault upon two Conchos by Tobosos, the latter were dressed like Spaniards (AHP 1654Ac). Sometimes the enemy was in the nude (i.e., wearing a loin covering only) (AHP 1654Ca), other times mostly dressed (AHP 1656Aa), and still others in various combinations (AHP 1657Bb; AHP 1669Ba). For the most part, it seems, Spaniards associated "nudity" with the Tobosos, clothing somewhat more with the Salineros and Cabezas, but particularly with Indian hacienda laborers (AHP 1654Ac).

The Tobosos were reported to possess sandals (*cacles*) of *palmilla* and to have made others from the deerskin (*gamuza*) trousers of another Indian they had killed (AHP 1686Bc). Batayoliglas, or at least "Chisos," also wore sandals (*cacles*) (BL 1709–1715). A Spanish woman held captive by the Cabezas—from one report—was given a small doublet or jacket (*juboncillo*), a skin (*cuero*), and sandals to wear (AHP 1652Dc), and, according to another writing, "some deer skins which the Indian women use and *un saquillo de sayal*," plus sandals (*cacles*) (DHM 1645). Feather headdresses (*plumero*, *plumajes*) were worn by Tobosos and Cabezas (Alegre III 1956: 290; AGN 1669), and the feathers of parrots (*guacamayos*) and other birds were worn during dances in the Parras district, as were the tails of various animals (Pérez de Ribas III 1944: 265; DHM 1598).

Face painting was referred to a number of times, but the descriptions unfortunately are very poor. In one unnamed group, but apparently Salineros from the circumstances, two men each had two lines drawn from their lower lips to their chins, and two more lines near their eyes (AHP 1669Ba). A thirteen-year-old girl who escaped from the enemy gave a description of the face decorations of her captors, although she could not identify them as to tribe. They may have been Cíbolos, or nearby peoples, as they had told her there were buffalo in their land. The girl apparently communicated with them in Mexican. There had been thirteen men in this group. One had a line (*raya*) from his forehead to the end of his nose. Two others each had a line drawn along the left side of the face, from the nose to the ear, like a moustache cover (? *bigotera*). The rest were not painted (AHP 1654Ac). One Spaniard, held as a slave by the Colorados, and formerly among the Cíbolos, was described as painted (*rraiado*) with a black line from his forehead to his nose and another in the manner of the sign of a slave (? *Clabo*; nail?; or from the lip—*labio*—see Portillo 1887: 93) above the chin on the cheek (BL 1674).

In general, assailants were often said to be painted (e.g., AHP 1652Bb; AHP 1652Da; AHP 1653Ae; AHP 1654Aa; AHP 1654Ca; AHP 1686Bb), although frequently they were not positively identified. Not all attackers were painted however (AHP 1654Ac; AHP 1654Ad; AHP 1656Aa)—specifically the Cocoyomes and Acoclames in 1710 (BL 1709–1715). The Alamamas from around Parras painted their faces with lines (*rayados*) (BL 1604).

Arlegui describes war paint as he knew of it. The pigment consisted of different colored clays with which serpents, snakes, toads, and other low animals were represented on the body. Bright colored feathers were also placed on the heads of those going to war. All of this, Arlegui states, was done in order to cause terror in those who saw them (even mules trembled at the sight of them!) as well as because the Indians felt that the special qualities of the animals painted on them would be transferred to themselves (Arlegui 1851: 150). Alonzo de León reported that each Nuevo León nation had a different style of decoration (García 1909: 36).

No clear identification of peoples by hair style is possible at this time. The previously mentioned thirteen-year-old girl described the hair of the people she had been with. Three of the men had their hair cut in the form of a tonsure (*cerquillo*), and the rest had their hair cut very short, except for the part in front and heavy sideburns (*balcarrotas*) (AHP 1654Ac). On another occasion, of some fifty assailants said to be of "several" nations, most had long hair and bound foreheads; only some eight or ten wore the tonsure (AHP 1656Aa). These people were not identified, although the description might fit the Concho-"Toboso" group known to be operating at this time.

Another group of attackers was reported to have their hair cut in the manner of friars (tonsure?), and one witness stated that they might be Concho because of this style (AHP 1654Ca). However, of another group of Indians wearing the tonsure style, one was reported to have spoken the Salinero tongue, and no other language was mentioned (AHP 1655Ab). Much later one Cocoyome chief was said to be distinguished by his long hair (AHP 1704Ab). A woman captured by the Salineros in the 1644 Revolt had her hair cut back to her ears (DHM 1645). The *Anua* of 1606 referred to the great diversity in hair styles at a camp of fugitives at Pelayo. Some wore their hair in the Christian fashion without long locks (*cabelleras*); others had long locks partly braided and partly loose; some had only two large locks of hair (*mechones*) on either side of the head; and others parted their hair down the middle in the style of young Indian girls from Mexico (City). Some, with rather long hair, wore snake's rattles in it (BL 1606). The Alamamas wore their hair held by a comb and twisted once on top of the head (BL 1604). While the foregoing may be of some help in the future when more information is uncovered pertaining to this general area, it is offered here in part to show the general mixing of peoples and of cultural elements during the Colonial period.

Miscellaneous Material Items

Gourds (*calabazas*) were used by the Acoclames to obtain water at a water hole (AHP 1658Aa). Many were found at a camp near Nonolat, belonging to the several "Toboso" bands there at the time of Barraza's siege; they had been used for storage of water supply (BL 1649–1700). Pérez de Ribas mentions gourds used as water containers in the Parras area (1944 III: 277). Gourd cups (*tecomates*) were also cited as used by the Ocomes and the people of Mapimí (Pérez de Ribas III 1944: 275; AHP 1652Dc), and *tecomates* for carrying water were employed by the desert-dwelling Tepehuanes at Pelayo in 1606 (BL 1649–1700).

At one place seven Indians were discovered making small bags of hide (*botanas*) from some mules they had killed in order to transport water

(AHP 1653Ae). Chisos in 1748 stated that the Indians carried water in cured (*curadas*) horse intestines and stomachs when they moved to camps without water supply (BL 1748).

Leather straps or thongs (*correas*) of mule hide were also reported (AHP 1654Aa), as were deer skins—although the specific use of these is often not stated (AHP 1704Ab). The Salineros and the people of the Laguna district made blankets from the skins of rabbits (Mota y Escobar 1940: 169; DHM 1645).

Mortars (of unspecified type) for mesquite were discovered at an enemy camp at Baján, apparently belonging to the Cocoyomes (AHP 1716Ab), and Mota y Escobar cited mortars for mesquite for the people of the Laguna (Mota y Escobar 1940: 168). Palmilla was employed to tie up a piece of jerky (AHP 1657Bb), and the Cocoyomes made *petates* from *palmas* (BL 1693b). One Spanish woman captive with the Cabezas was made to carry a wooden carrying crate (*cacastle*) (AHP 1652Dc), and *guacales* were reported for the Cocoyomes (BL 1693b). Baskets, combs (*peines*), jugs (*jícaras*), platters (*platos*, *escudillas*), and obsidian knives (*navajas de pedernales*) without description were cited for the Laguna district (Alegre II 1956: 151–152; Pérez de Ribas III 1944: 273–275; AGN 1607c). A type of eye shade was also cited, a frame work of grass (?) "which they [the Indians] tie to their heads when they want to see a long distance" (*un enarme* (?) *de silla de sacate que se atan a la cavessa quando quieren divisar*) (AHP 1654Aa). Flutes (*flautas*) are mentioned for the composite group at Pelayo in 1606 (BL 1606).

Pérez de Ribas and Mota y Escobar noted balsas or rafts made from cattails (*espadañas*) at La Laguna (Mota y Escobar 1940: 169; Pérez de Ribas 1944 III: 288). The *Anua* of 1605 stated that these Laguna craft were made of three bundles (*manojos*) of *juncia* (cyprus, sedge) tied in the manner of a raft (*balso*) and were called *naboyas* (BL 1605). Both fish and ducks were taken in the Parras-Laguna district with nets and bow and arrow, and ducks were knocked down in flight with *sondas* (*bolas*) (Alegre 1956 II: 107; BL 1604). Mota y Escobar described large baskets (*nasas*) made of willow branches (*mimbres*), in the form of a large jug (*tinaja*), with which fish were caught in the San Pedro Lagoon (Mota y Escobar 1940: 167).

Dwellings

No information is available on house types, except for the Cocoyomes who lived in huts (*jacales*) over which skins were used as coverings (*los cueros que tapaban sus jacales*) (AHP 3715Aa). The Sisimbles were also stated to have jacales (BL 1709–1715), as were the Salineros with little huts (*jacalillos*) (DHM 1645). The Coahuileños at the town of Cinco Señores possessed grass huts (*jacales de sacate*) (AHP 1722Aa), and two grass huts were found at San Ildefonso, twelve leagues north of the Sabinas River, apparently belonging to Coahuileños (Portillo 1887: 109–110).

One "shelter" (*enramada*) was reported built by the Cocoyomes in 1720 (AHP 1720Aa), and a shelter (*ramada*) and *jacalo* (*sic*) were both mentioned for the Tepehuanes of the Pelayo area in 1606—used as churches, according to the missionary (BL 1606). The *Anua* of 1600–1602 mentioned a place near Parras where the houses were small huts in the form of caves (*chosuelas a manera de cuebas*), a site used by hostile Indians, judging from the great quantity of horse and mule bones nearby. Elsewhere, however, the same source stated of the Indians that their beds were the ground and their shelter the trunks and branches of some mesquites that had not yet sprouted and which afforded no shade (BL 1600–1602).

The utilization of caves was mentioned on four occasions, none of which referred to actual habitation. The Tobosos buried their dead in a cave after a battle (AHP 1653Ad), the Cabezas and Tobosos used one (how?) while out scouting (AGN 1667), the Acoclames and Cocoyomes deposited some stolen priests' garments in one (AHP 1704Ab), and a Cocoyome raiding party kept two captives tied up in a cave while they went out to continue their marauding (AHP 1715Aa). However, fifty years after the Toboso demise, Morfi reported "many caves" which, according to what he had been told, had been Toboso dwellings (Morfi 1958: 376). Alonso de León described the Nuevo León house as bell-shaped, made of grass (*sacate*) or cane (*carrizo*), with low entrances (García 1909: 35).

Weapons

Bows and arrows were used by all of the Indians of

Nueva Vizcaya (Alegre II 1956: 107; Arlegui 1851: 137; Mota y Escobar 1940: 169; Pérez de Ribas III 1944: 254; AHP 1653Ae; AHP 1676Aa; DHM 1669; UTD 1710–1738b). Pérez de Ribas came closest to a description of a bow, in reference to the people around the Laguna district —"they make them longer than do other nations, and they use them with great power and skill" (III 1944: 354). Males began to practice with the bow and arrow from a very early age (Alegre II 1956: 107; Arlegui 1851: 137; UTD 1710–1738a), and Mota y Escobar noted their great dexterity (1940: 169). Obsidian points also were employed in this area (Alegre II 1956: 151; Pérez de Ribas III 1944: 273; DHM 1607c). No information is available on Toboso bows, although the Chisos to the north were reported to have used bows of brazil wood and arrows of cane (*carrizo*) (AHP 1704Ab); in another place Chiso arrows were said to be of *lechuguilla* with turkey feathers (AHP 1644Aa). Both the Salineros and Tobosos used arrows of *lechuguilla* (BL 1693–1702; AHP 1652Db; AHP 1655Ab; AHP 1670B; AHP 1716Aa). Acoclame and Cocoyome arrows (at least) had an identifying mark, a twisted or zigzagged line (*culebrilla*; *aculebreada*) on the shaft (AHP 1715Aa). Conchos were also said to use arrows of *lechuguilla* (AHP 1654Ac). Arrows were carried in quivers, on which adornments (of unstated description) were sometimes placed (AHP 1652Bb). Chisos, together with nations from the north, once used poison on their arrows while fighting in the employ of the Spaniards (BL 1693–1702).

Lances (*lanzas*) were mentioned, but much more deadly in battle were the pikes (*chuzos*), which were made by hafting whole Spanish swords (*espadas*) on long poles (*palos*, *astas*) (AHP 1704Ab; AHP 1718Ac; AHP 1724Aa). While the bow and arrow was the common shooting weapon in warfare, occasionally hostile Indians would be found using Spanish arquebuses (there is no mention that these were employed on horseback). However, the use of arquebuses by Indians was no doubt severely restricted, since the guns and the necessary powder and balls could be obtained only by theft (see Secoy 1953).

Tobosos who attacked two Concho Indians had two arquebuses with them (AHP 1654Ac). In 1653 it was reported that Nonojes, Acoclames, and Cocoyomes or Coyotes had had an arquebus among them (AHP 1653Ad). Two gentiles with the Cocoyomes in the 1690's were reported to have each an arquebus—one gun may have been a carbine (*carabina*). One of these men, a chief, seemingly was not a Cocoyome; he was said to be called El Julime, and to have been either a Chiso or Julime. He also had powder and balls for the gun. A Satayoligla later testified that the Cocoyomes had met with other bands, at which time they had with them "many" arquebuses plus two *cueras* (BL 1693b).

About a decade later it was reported that two Cocoyomes and two Acoclames each possessed arquebuses that they used in fighting the Spaniards, including in the battle at Sierra Mojada. Another man, apparently a Cocoyome, had had one also, but he had broken it up and made knives from it (AHP 1704Ab). It was reported that on another occasion the Ocomes, Acoclames, and Nonojes were together with many arquebuses, Spanish leather military jackets (*cueras*), swords, saddles, and *medias lunas* (AHP 1652Ac). Acoclames and Cocoyomes also possessed *cueras* (AHP 1704Ab). Shields (*chimales*) were utilized (AHP 1653Aa; AHP 1686Bb). Saddles, *cueras*, arquebuses, carbines, swords, and spurs were reported to have been seen in Cocoyome-Acoclame camps by captives, and Sisimbres, Suniyoliglas, Cocoyomes, and Acoclames had both *cueras* and *adargas* (BL 1709–1715). The use of rocks and stones in battle has not been documented here, but it was mentioned a number of times (e.g., AHP 1718Ac; BL 1649–1700; CD 1647–1648); in at least one instance the Indian women also threw stones during the fighting (AHP 1653 Ad).

Stolen and Traded Goods

Aside from the items already mentioned, many other Spanish goods, some of much less practical value, were discovered at abandoned enemy camps. The inventories of some of these camps are instructive as to the infusion of Spanish material culture into the native setting. Many of these things, and probably most, were stolen from Spanish settlements, wagon trains, and the like, but the Spaniards themselves were directly responsible for the introduction of some items. Apart from the source of goods from natives who returned to their people with "goodies" after having worked for Spaniards in mines or on ranches, when the wild bands came in to make peace, the Spaniards usually gave them gifts. Also, groups on their way to Spanish localities to settle would often be sent supplies—material items as well as foodstuffs—including blankets (*frasadas*), knives (*cuchillos* and *navajas*), cloth of various kinds (*paño*, *sayal*, *bayeta*), hats (*sombreros*), ribbons (*listones*), cloaks (*capotes*), beads (*abalorios*), saints (*santos*), rosaries, tobacco, paper, meat, flour (*harina*), corn (*mais*), salt, chile, chocolate, and raw sugar (*chancacas*) (e.g., AHP 1652Ba; AHP 1653Ad; AHP 1655Ab; AHP 1658Aa; AHP 1704Ac; AHP 1716Aa; AHP 1716Ab; BL 1694–1698). Once a Toboso woman was given, for example, a green skirt, a *huipil*, red ribbons, belts of *chochomite*, and glass earrings (*zarcillos de vidrio*) (AHP 1652Ac).

Items actually found by Spaniards out in the bush, for example, included steel (*yslabon*) and flint (*yesca*), which a group of the enemy, caught by surprise, had left after having begun a fire (AHP 1653Ae). A raiding party camp, near Canatlán, apparently belonging to Tobosos produced nine quivers, seven bows, three swords, three *armadores* (? jackets), and some blankets (AHP 1658Aa). Another camp contained an arquebus, a broken sword, a doublet (*jubon*), and a torn-up cloak (*capote*) (AHP 1654Aa). Indians would steal practically anything that was small and movable—all kinds of clothing, medallions, weapons, knives, halters, and the like (AHP 1655Aa; BL 1693b). Probably the fifes (*pifanos*), and perhaps the drums (*tambores*), and even the banners used by the natives in some attacks—as reported by the Spaniards—should be mentioned here (AHP 1715Aa; AHP 1718Ac).

Some of the less practical items were reported in later documents. At a site in Sierra Mojada the Spaniards found—after a battle—part of an ornament, one large bell and one medium-sized bell, a painting on linen of the King (*un lienzo de Su Magestad*), pictures (*quadritos*) from Michoacán, a small copper box (*un cassito pequeño de cobre*), two saddles, "and many other things of little value," plus over seventy horses and mules. Following another skirmish at Sierra de Conula (near Sierra Mojada), a cup (*taza*), a silver spoon, some well-cared-for clothing of men and women, and twenty-two horses and mules were discovered (AHP 1715Aa). A camp at the Peñol de Santa Marta produced "some church valuables (*alajas*) which are a missal, a stole and maniple, a little bell and a wafer-box (*hostiario*), and other letters and papers" (BL 1695a).

Three rancherias at Baján were found to contain a knife (*cuchillo cavizero*), a large knife (*balduque*), a linen stocking (or shoe ? *escarpin de Bretana*), a sword guard from Puerta Cerrada de Madrid (*una guarnicion de espada*), and "a rosary with a medallion (*medalla*) of silver with the Holy Sacrament on one side and on the other the image of Our Lady with her Holy Son in her arms when He was taken down from the Holy Tree of the Cross" (AHP 1716Ab). Again, religious items show up at a camp at Chocamueca—a Christ child, a new ornament, an old chausable (*casulla*), and a small bell (*campanilla*) (AHP 1725Aa; AHP 1725B). Other items reported stolen by Indians were wax candles, books, a bag of [holy] oils (*oleos*), silver tips for canes or staffs (*casquillos de plata de baston*), and escopettes (*escapetas*) (AHP 1710a; AHP 1716Aa; AHP 1722Aa).

A captive of the last Sisimble band told of the goods she had seen at the Indians' camps. These were "a new cape (*capa*) of Castillian cloth (*paño de Castilla*) of a dark cinnamon color"; "some used red sleeves (*mangas coloradas*), a black *cotrencilla*, two small escopettes (*trabuquillos*), and a kettle (*caldereta*)"; "a vest (? *solapa*) of deep-red scarlet . . . a girdle-belt (*ceñidor*) of red Chinese silk (*saya saya colorada*), and a black hat *de concha*," a white hat, "some sheets (altar cloths) of linen (*sabanas de Ruan*), and a blue *chaqualito* also of linen (*deste mismo*) . . . a blue *coton* (cotton print ?), and a deep-red sash . . . a black wool girdle"; and "two pairs of small cushions, a white coverlet (*colcha*), two pieces of blue cloth, and many new huaraches (*Guarachas*)." The Sisimbles stated they had stolen *cotones*, *capotes*, *frezadas*, *mantas*, and *camisas* (BL 1748).

These pieces of material culture have been listed here to show the extent of their penetration into native culture and the possibility of rising expectations in this sphere of the natives themselves. That the latter did in fact occur to some extent is lent support by the two letters requesting ransom for prisoners that the Cocoyome chief, Juan de Lomas, sent the Spaniards in 1722. For the ransom itself, cloth such as *paño* and *bayeta*, blankets, knives (*belduques*), *suacales*, and hats were asked for. Apart from this ransom, as gifts to the Cocoyomes, Lomas requested silk ribbon interwoven with gold and/or silver (*liston labrado de tisu*), blue *suacales*, *cardonillo* (cochineal ?), loaves of bread (*panecillo*), cakes (of some type—*pastilla*), brown sugar (*piloncillo*), saffron (*azafran*), and bells (*casacabeles*) and beads for the children. One of the captives, the one who wrote the letter, mentioned other items for the Cocoyomes such as a shawl (*reboso*), beads, and a little *pita* (thread?) for Lomas' wife, as well as some small white skirts (? *faldillas*), a number of pairs of *xeras*, needles and thread, and playing cards (*barajas*) (AHP 1722Aa; AHP 1722Ab).

Lomas ended one of his letters with the request that good clothing be brought out to them as his men had much money to buy with and valuable things (*alajas*) to trade with. Trading in some form with neighbors no doubt had gone on before Spanish contact times. The general increase in material goods, and the greater mobility with the horse, would seem to indicate that trade possibly became more important, either among the several Indian groups since booty was distributed among them (AHP 1652Dc), or between them and the Spaniards, during the Colonial period. Some of the trading at this time can be glimpsed from several sources, as well as gift-giving and the distribution of goods at ceremonies.

On one occasion the Gavilanes of El Mapochi, after a raid in the San Juan del Río area, invited the Cocoyomes and Hijos de las Piedras to visit them. They regaled their guests with some of their recent take—apparently mostly clothing—and invited the other two groups to join them in a future expedition (AHP 1655Ab). The Spanish woman captured during the 1644 Revolt was traded among the Indians several times for various material items (DHM 1645). In 1684, it was reported that the Tobosos had been negotiating with several Chiso bands to establish an alliance, for which purpose the Tobosos had been sending them arrows while the Chisos had been giving the Tobosos buffalo hides in return (AHP 1684Aa). Individual Tepehuanes were said sometimes to join the "Tobosos" (specifically El Mapochi's and Casa Zavala's groups) if they were "paid" (AHP 1654Ac), probably in booty. The Cabezas of Don Pedrote were said to divide up their booty constantly with Don Dieguillo of the Nadadores mission as part of their friendship, and the latter used booty in an attempt to induce the Teodocodamos, Jumanes, and others into alliance (Portillo 1887: 201–202, 222).

Salineros, Cabezas, Mayos, Cíbolos, and Tobosos were reported to have taken stolen goods such as arquebuses, swords, saddles, trousers, hats, stockings, footwear (*zapatos*), military jackets (*cueras*), doublets (*coletos*), coins (*dineros*), figurines of saints (*hechuras de santos*), silver boxes (*cassos*), crocks or plates (*escudillas*), jugs (*jarros*) in which to make chocolate, as well as horses, mules and cows, to Tizonazo to trade there. Some of the "merchandise" was kept here where the Cíbolo Indians would come to exchange it for buffalo hides. Four captives were also turned over to the Cíbolos at this place (AHP 1655Ba; AHP 1667Aa).

The Acoclames took a Spanish captive to the Parras area and traded him for some ears of corn (*elotes*) and squash, and they and the Cocoyomes exchanged deer skins for buffalo hides with the Chisos (AHP 1704Ab). Soldiers and Indian auxiliaries traded with both of these groups during peace negotiations while out on campaign (AHP 1716Aa). The Cocoyomes and Coahuileños were reported to have traded with the settled Cabezas Indians at Parras, and in part to have reimbursed the latter for spying for them, with such items as deer skins, quivers of arrows, and coins. The Cabezas would supply them with *cotones* (cloth?), blankets, figs (*higos*), raw sugar (*chancacos*), and bread (*pan*), some of which they would purchase locally (AHP 1722Aa).

Subsistence

The early Jesuits reported that the general Bolsón area was exceedingly impoverished and so dry that it would support only wild and spiny brambles. This was not the case around the district of La Laguna and Parras, however, as the latter eventually became the center or *cabecera* of the missions of this region. The San Pedro lagoon, fed by the Nazas River, was some forty leagues in circumference at high water. The surrounding land was fertile and would produce nearly any kind of plant in abundance. The Indians would farm here during the periods of low water, although moisture was available and used for farming some distance from the lagoon itself (Alegre II 1956: 107; Pérez de Ribas III 1944: 245–246; BL 1600–1602; BL 1604).

Some of the reports for the San Pedro lagoon may also have applied in part to the much smaller lagoons and marshy areas to the north—those which today are called La Estacada, Las Palomas, Los Frailes, El Rey, La Leche, La Mula, Jaco, Los Gigantes, Los Patos, Clavos, Pastores, Chicuas, and Colorada, for example. Documentary evidence indicates that in the vicinity of these spots a small amount of agriculture may have been practiced. The Laguna area was said to be especially abundant in fruits, seeds, roots, and various kinds of fish and ducks—all of which were used by the local population. Fish became especially important, partly because they were easy to secure at times of low water, as were fruits and roots (Alegre II 1956: 107; Mota y Escobar 1940: 168; Pérez de Ribas III 1944: 246–247, 289; BL 1600–1602; BL 1604; BL 1615a).

Mota y Escobar specified some of the fish—*bagre*, *matalote*, a kind of sardine or trout (*trucha*), and a great number of very tiny fish (Mota y Escobar 1940: 167–168). Indians of other areas probably made use of all of these items whenever they could, although few specific references exist for the Chiso, Toboso, and Salinero groups. Fishing is specifically mentioned for Coahuileños, however, after they settled along the Nazas River (AHP 1722Aa), a practice they may have brought with them if there was any truth to statements concerning the abundance of different kinds of fish in places such as the Nadadores River (BL 1674).

Gathering

The subsistence pattern of the general area was basically one of gathering and hunting, plus fishing in some places. Probably most of the edible items in the environment were utilized. Mezcal, tunas, and mesquite were important for all groups—Laguneros, Salineros, Tobosos, and Chisos (Portillo 1887: 199, 202; AGN ca 1640; AHP 1651A; AHP 1652Ac; AHP 1652Dc; AHP 1653Ad; AHP 1655Ab; AHP 1658Aa; AHP 1658Ab; AHP 1684Aa; AHP 1704Ab; AHP 1716Ab; AHP 1722Aa; AHP 1724Ab; BL 1600–1602; BL 1606; BL 1676; BL 1693–1702; BL 1694–1698; BL 1748; CD 1650a; DHM 1645). Mota y Escobar reported the use of mesquite, maguey, and *agua miel*, as well as fish, by the people of the San Ignacio *partido*, up the Nazas River from San Pedro (1940: 170).

Maguey was mentioned specifically for the Cabezas (BL 1693b), and *nopales* for the Ocomes (AHP 1652Dc) and Chisos (AHP 1684Aa). Dates (*dátiles*) were found at a Cocoyome camp (BL 1693b). One Sisimble woman told of eating roots (*raizes de las yerbas*) (BL 1748), and the same item was attributed to the Tobosos by Governor Larrea (BL 1649–1700). The Coahuileños were reported to use *agua miel* from the maguey plant (AHP 1652Ab), and *lechuguilla* and maguey were cited for the Parras area (BL 1600–1602). Mota y Escobar noted the great quantity of mescal (cooked maguey leaves) at Parras, and that these Indians possessed another kind of mescal called *noas*, much softer than that from the maguey plant (Mota y Escobar 1940: 170). Pinole was mentioned as used by the Gavilanes (AHP 1688Cb) and Chisos (AHP 1723A). Wild tobacco was sought, although its use was unspecified, by Salineros (AHP 1653Ad) and Coahuileños (AHP 1653Aa). The Salineros were also said to eat their own excrement (DHM 1645), that is, a "second harvest" in order to utilize the undigested seeds of the first eating.

Roots, fruits, and seeds, as previously noted, were especially abundant in the Parras-Laguna district. A type of cat-tail or reed-mace (*espadaña*) was cited as important. Flour from the roots was utilized in drink (gruel?) or as solid food in the form of loaves or cakes. These foods could be kept for many days without becoming too hard to eat. Mesquite, mescal, and tunas were also used as "bread" (*panes*) or "wine" (Alegre II 1956: 57,107; Mota y Escobar 1940: 168; Pérez de Ribas III 1944: 247, 258; BL 1600–1602; BL 1604; BL 1605; BL 1606).

Specifically, for bread, mesquite was ground in mortars. For wine, the fruit was first cooked and then left to ferment. Bread was also made from the roots of a reed (*tule*), like a cat-tail (*espadaña*), and from other seeds native to the land. One of these was *alpiste* (*Phalaris canariensis*?), which without sowing grew in such quantity that it gave the impression of a wheat field. The Parras Indians also utilized pinyon nuts (Mota y Escobar 1940: 166–169).

The use of tuna cakes (*pan de tuna*) was cited for the Chisos (BL 1695a), and Balcárcel once wrote that the Coahuileños ate only roots that were available in different places at different times (Portillo 1887: 89–90). Arlegui mentioned the great number of herbs in the general area of the central Mexican plateau (1851: 139) and the use of alcoholic beverages made from almost any available plant (1851: 146). Peyote was cited a number of times (e.g., Arlegui 1851: 154; Pérez de Ribas III 1944: 248; AHP 1652Ab; AHP 1653Aa; BL 1600–1602).

Lack of water in much of the desert area, especially at certain times of the year, would restrict or be a fairly decisive factor in the organization or execution of many activities. The Spaniards constantly had difficulty in finding water for themselves and their animals when traveling or campaigning in the area (e.g., Arlegui 1851: 134; Pérez de Ribas III 1944: 277; AHP 1656Aa; AHP 1708b; BL 1694–1698). Even for the Laguna region, Father Arnaya reported in 1601 that it was so dry that only four spots (Nazas-Laguna area) adequate for large settlements had been found (DHM 1601). The Indians north of the Laguna district were characterized as living from "pools of rain water" (AHP 1708b). Sierra Osorio stated that they utilized "the filthy and impure water from some few lagoons, and that which was conserved for a short while after rains in the hollows or rocks, and failing this, the moisture from wild plants, roots, and the bark of plants and trees" (Hackett 1926: 220). In most of the area the Spaniards considered the major portion of the water holes as exhausted the greater part of the year.

Despite this, the Indians apparently could get along in the area considerably better than could the Spaniards. In some places when and where there was no water, the natives simply relied on plants such as *lechuguilla* (AHP 1653Ad) or wild maguey (Pérez de Ribas III 1944: 254, 277). The same practice was noted for some of the Tepehuanes by Arnaya in 1601 (DHM 1601) and also in the *Anua* of 1600–1602 (BL 1600–1602). In the 1690's the Cocoyomes were reported to have opened up a great quantity of magueys because the water hole where they were camped was very short (BL 1693b).

Agriculture

The peoples of the general region in the main have been considered to have had no, or only a slight amount of, agriculture. The *Anua* of 1596 states that the people of La Laguna "neither sow nor harvest other than that which the land voluntarily offers them in roots and game," although their neighbors, the Tepehuanes, grew corn. The Laguna people wandered the entire year over the places where food was most available (DHM 1596). In the 1615 *Anua* the same people were said to neither plant nor harvest but only to hunt what they could obtain with their arrows (BL 1615b). The 1622 *Anua* stated that these were "untamed people, enemy of settlement, hunters in the mountains and fishers in the lagoons" (AGN 1622). Other references also claimed no agriculture for this area (BL 1605).

On the other hand, however, some references did note agriculture for the Laguna district, maize in particular (Alegre II 1956: 107). The 1606 *Anua* told of a gentile near whose house and field (*milpa*) the Christian doctrine was taught (BL 1606), which may be an indication of pre-mission agriculture. The Zacatecos to the southwest and south were considered nonagricultural for the most part (as noted by Beals 1932: 156–158 who cites *Documentos para la Historia de México*, cuarta serie, 3:47; Arlegui 26–27, 137; and Icasbalceta 2: 543; for no agriculture but Tello, 108, for corn grown by some Zacatecos; see Tello 1891: 108). The 1598 *Anua* said that the Zacatecos were like "beasts, seeking their life's sustenance where they found it, which is maguey, *lechuguilla*, mesquite, tunas, etc." (DHM 1598). The Salineros, Cabezas, Mayos, and Babozarigames of Coahuila were also cited as having had no agriculture (BL 1676), as were the "Tobosos," in a report by Sierra Osorio in 1683 (Hackett 1926: 212).

It is possible, however, that a number of the groups of the general area did practice some crop cultivation. Furthermore, some of the statements made by Spaniards about the Indians in general are either contradictory or rather obviously extreme. The *Anua* of 1604 stated that the Laguna area was so fertile that ears of corn up to one half a *vara* (yard) were grown there (BL 1604), while another reference declared that La Laguna was not appropriate for cultivated crops, although it abounded with birds, fish, and other game (AGN n.d.). Mota y Escobar agreed with the first statement, however. He noted that, "those who live next to the river sow corn on its sandy banks, with no more work than making a hole where they bury the grains." The ears were exceptionally big, and the land so fertile there was no need to work it. Melons, squash, and other fruits were also of very large size (Mota y Escobar 1940: 168–169).

Sierra Osorio wrote that the "Tobosos" were totally without agriculture, that they had no year-around water source, and—from what he had seen—that their land was without birds or animals (Hackett 1926: 212). At the same time, although huts were noted for specific groups, the existence of "houses" (*casas*) was denied for Indians in general reports. The *fiscal* in Mexico City, after reviewing a report that said that the Bovoles (Coahuileños) dwelt in huts, once stated that the Coahuileños "lived without planted fields (*sementeras*), without houses, and nude" (BL 1676; BL 1693b).

A statement by Pérez de Ribas may have been descriptively the most accurate for agriculture in the general region, including precontact times, since it is difficult to see by what process agriculture as cited here for the Tobosos could have been introduced to them during the contact period. De Ribas noted for the people around the San Pedro lagoon that "although they also plant a few seeds, they do not care for them as much as do the other nations"; this attitude he attributed to the abundance of (wild) roots and other items (III 1944: 247).

Several documents mentioned Toboso agricultural activity, always (with one possible exception) with reference to squash. In a series of declarations in 1646, two Tobosos cited squash planting. In the testimony of Cristóbal, the Toboso governor, it was stated, "and this declarant having some *milpas* of squash (*calabazas*) planted and his people waiting to eat them, they did not go to look for the *señor* governor to grant him peace." The other Toboso testified "that the reason for not having come previously to seek the *señor* governor has been because they wanted to finish a *milpa* of squash that they had" (AHP 1652Dc). These testimonies were made in November. Back in July envoys from the Tobosos, Nonojes, Ocomes, and Acoclames had stated that "they are all together ready to come in upon finishing eating the squash (*calabazas*) that they have planted and the corn and mesquite, tunas, dates (*dátiles*) and pitayas" (AHP 1645Aa). The mention of corn together with the uncultivated food is somewhat puzzling and may mean that the Toboso sowed maize to some extent. However, this is the only such reference.

Again, with regard to squash, in 1653 a group of enemy "Tobosos" were reported to be planting *calabazas* at the Sierra de Guapagua. In this same year several Toboso women, while assessing their local food resources, testified that the Tobosos had not planted any squash this year (no other cultivated crops were mentioned); one declared, however, that the Nonojes had sown squash at the Peñol de Nonolat. Nevertheless, Esteban de Levarío reported from Indé in June of this year that a *junta* of Tobosos was at this time planting squash behind the Sierra of Guapagua (this information came via the Salineros) (AHP 1653Ad).

In 1666, a campaign into the Las Cañas region revealed an enemy camping ground at a water hole with a squash field (*calavazal*), apparently planted by the Indians. This site was some six leagues from Las Batuecas (BL 1649–1700). Chisos, testifying in September of 1693 at San Francisco de Conchos concerning the whereabouts of the enemy "Toboso," stated that the Acoclames, Hijos de las Piedras, and Hijos de la Tierra were camped at a water hole in the Jaque-Encinillas area where they had planted their crops (Hackett 1926: 342; BL 1693–1702; BL 1695a). Another reference in December of the same year noted that the Acoclame had planted (*sembrado*) at the Sierra de los Picachos, apparently in the Jaque-Encinillas region, and four leagues from Chocamueca (BL 1695a).

There are no further references to "Toboso" agriculture, and the Spaniards usually considered them as nonagricultural (e.g., AHP 1654Ad; AHP 1676Aa; BL 1649–1700). Chisos, questioned in 1684 about their livelihood, cited mainly wild plants and animals. However one Batayolicla included corn, and another stated that he "lived on the maize he planted in his own territory" (AHP 1684Aa). The *Anua* of 1606 mentioned that the Indians around Mapimí (Tepehuanes?) gave a missionary some ears of corn. Later, reference was made to the "fields and squash" (*milpas y calabasas*) of an enemy group at Pelayo, consisting of people from the "Mission of Tepehuanes" and several rancherias from Mapimí (BL 1606).

Hunting

Hunting, no doubt, was important for all groups, although there are only a few references to it (e.g., for the Cabezas and Salineros—AHP 1651A; AHP 1653Ad; BL 1676). Rabbits were taken by the Salineros, who were said to prepare them by removing only the skins; everything else was eaten, including the intestines (DHM 1645). Mota y Escobar noted rabbit hunting as especially important in the Laguna district (Mota y Escobar 1940: 169). Deer, in particular, were cited for the Cocoyomes and Acoclames (AHP 1686Bc; AHP 1704Ab; AHP 1708a; AHP 1715Aa; BL 1649–1700). One group, apparently Cabezas or their "allies," had eaten a deer at Las Cañas (AHP 1652Da). Chisos hunted and ate rabbits (*conejos*), jackrabbits (*liebres*), deer, mice, and snakes (AHP 1684Aa; BL 1748). Rats, *tuzas*, and snakes were also noted as eaten in the general area, and Arlegui included frogs and worms (Arlegui 1851: 168; Pérez de Ribas III 1944: 273, 281; BL 1600–1602; BL 1604; BL 1748).

Pérez de Ribas stated that possibly the ground or powdered bones of animals were also utilized as food (III 1944: 281). The latter was also referred to by Alonso de León, who gave a rather good account of Nuevo León foods and food processing techniques. Bones, he said, were ground up and mixed with *mesquitamal* (García 1909: 37–40,42). Rabbits, deer, and birds—including herons (*garzas*), geese (*ánsares*), and ducks (*patos*)—were in great abundance in the Parras-Laguna district (Alegre II 1956: 107; Arlegui 1851: 168; Mota y Escobar 1940: 169; Pérez de Ribas III 1944: 247; BL 1600–1602; BL 1604). These same people, as well as the Salineros, were said to be voracious meat eaters (DHM 1598; DHM 1645).

The bow and arrow was the main hunting weapon. Arlegui also mentioned the use of the head of a deer with fruit stuck in its eyes as a decoy for hunting deer in the sierra of Durango (Tepehuanes?) (1851: 169), a practice possibly with somewhat wider distribution than this. Ducks were mentioned as important in the Laguna-Parras district and, aside from the methods already cited, were also caught by hand. This ingenious hand technique may also have been employed in some of the other lagoons. The hunter covered his head with half the shell of a large round gourd, with holes cut in it to see through. He then submerged himself in the water, approached the ducks with only the gourd shell showing above water, and from this position caught the birds by their feet (Alegre II 1956: 107; Arlegui 1851: 168; Pérez de Ribas III 1944: 247).

Bison or buffalo lived to the north in both Nuevo León and Nueva Vizcaya and were no doubt hunted to some extent (Arlegui 1851: 2, 138; Miller and Kellog 1955: 817–818; Reed 1955). The people of the Coahuila area were reported to hunt both buffalo and deer (DHM ca 1706); one group here was known as the Buffalo People (Cíbolos) as was another north of the Río Grande. A number of bands along the Río Grande below La Junta, no doubt including Chisos, were said to participate in buffalo hunts during the winter. Also, when Retana made his campaign in the latter part of 1693, the Suniyoliglas did not accompany him because they had gone off with the Cíbolos of Texas to hunt buffalo (BL 1695a). Boboles were reported to be hunting buffalo on the Río Grande in 1675 (BL 1674).

Wild horses or mustangs were cited as hunted specifically by the Acoclames and Cocoyomes (AHP 1708a; AHP 1716Aa; AHP 1720Aa; AHP 1722A), and wild cattle by the Cocoyomes in 1691 (BL 1693b). In this same year, the Cocoyomes were said to have had a great many wild mustangs in pasture (*repastando*) (BL 1693b). This use of domestic animals gone wild was probably true for other groups as well. Arlegui mentioned that many wild horses and cattle throughout Coahuila were used for food by the Indians (1851: 130, 134). Probably many of these wild animals came from those lost by the Indians after raids as they drove stolen herds back to their camps—losses partly due to the great haste with which they usually traveled (BL 1693b).

Stolen animals from Spanish holdings and settlements, particularly horses and mules but also cattle and sheep, were an important source of food for all groups (Hackett 1926: 220; Portillo 1887: 222; AHP 1653Ad; AHP 1653Ae; AHP 1654Ac; AHP 1654Ca; AHP 1656Aa; AHP 1657Bb; AHP 1669Ba; AHP 1670B; AHP 1673Ab; AHP 1677A; AHP 1699a; AHP 1704Ab; AHP 1715Aa; AHP 1716Aa; AHP 1724Aa; BL 1649–1700; BL 1693–1702; BL 1694–1698; BL 1709–1715; BL 1748). There is evidence of an increasing reliance on these animals as a food supply as the Colonial Period progressed. However, for the time span encompassed in this study, some raiding activity was reported in the earliest years. The *Anua* of 1600–1602 mentioned a place in the Parras district where there were found many bones of the mules and horses (*bestias*) the Indians had stolen and eaten. In another spot there were "small huts (*chosuelas*) in the form of caves from where they endangered (*oseaban*) the roads and valleys and farther ahead at intervals in a wash the graves (*sepulturas*) of those [animals] they had killed in quantity" (BL 1600–1602). The 1604 *Anua* referred to a band that had uprisen and had lived off raiding Spanish cattle and haciendas, until it had been put down by another group (BL 1604). The *Anua* of 1606 also cited raiding by the group at Pelayo a few years previously (BL 1606). The Chiso band captured in 1748 was selective about the animals it stole. During the interrogation Chief Nepomuceno stated that his people tried to steal only fat horses and that they killed or simply left the thin ones behind (BL 1748).

These animals were prepared for eating in several ways. These methods of preparation were probably employed also for game animals, although the majority of references concern the stolen domestic variety. The use of jerky was most commonly cited and was considered one of the more usual of Indian fares. Spaniards sometimes reported having come by surprise upon Indians preparing jerky from the animals they had killed (Arlegui 1851: 130; AHP 1653Ae; AHP 1657Bb; AHP 1658Aa; AHP 1658Ab; AHP 1724Aa). Alonso de León encountered Indians fifteen leagues from the Río Grande, on the Texas side of the river, preparing jerky from buffalo meat (Portillo 1887: 227). This treatment, of course, would make the meat much easier to store and to keep, and it could be more easily used while on the trail (AHP 1724Aa). Sisimbles in 1748 declared that while traveling on foot when they had no horses they carried dried meat reduced to powder, which they mixed in water for use as food (BL 1748). Meat was also cooked or roasted (AHP 1653Ae). Venison was cooked (AHP 1656Aa; AHP 1704Ab), as was beef tripe by Salineros (AHP 1656Ab), and colts were prepared *en barbacoa* (AHP 1644A). Cabezas and Tobosos roasted six oxen (*bueyes*) and a goat when Father Castillo was with them (AGN 1667), and a steer was cooked (*tatemaron*) by El Tecolote's band in the 1690's (BL 1694–1698).

Horses

A few other items representing the horse complex as developed by the Indians have come to light. One of the most notable is the occasional reference to the use of corrals. Out in the Guapagua–Río Angosto region the Spaniards discovered "a corral of large stone where they [the Indians] enclosed all of the horses they had stolen" (AHP 1653Aa). Two others were also mentioned, although they were undescribed as to size and construction materials. One was found at the Cerro de Pelayo in which the enemy had enclosed "a great many animals" (AHP 1652Ab), and another at San Juan de Casta near Mapimí in which stolen mules had been kept (AHP 1656Aa). Horse and mule herds were often discovered at enemy camps (e.g., AHP 1718Ac; AHP 1724Ab; also see elsewhere). Wild mustangs were not only hunted for food but also caught and broken (*domarlos*) (BL 693b) and consequently, no doubt, used for mounts.

Two more items may throw some light upon practices Indians used with horses. A Mexican muleteer, who was attacked by two Indians whom he judged to be Salineros, partly from their accents when they spoke the Mexican tongue, described a halter (*freno*) they were using as a *barbiquejo* (mat-like affair?) of *palmilla*, apparently tied around the head in some fashion (?). These two "Salineros" were wearing a type of colored blanket (*frasadas coloradas*) used only at Minas Nuevas; there is no way to determine if these were stolen or not, or if these were hacienda or other Indians (AHP 1657Bb). One vague reference may indicate the use of skins on the hooves of animals either for muffling sound or blotting out tracks (*y de buelta la parte q les Cabia* (?) *de bestias las llebaban En gamuzas por no ser descubiertos en case de llevar Ropa o Caballos a la buelta a su pueblo*). This was cited as the practice of two Coahuileño Indians who on several occasions had joined the Acoclames to raid (AHP 1704Ab). Some stirrups (*dos pares de estriberas y un estribo suelto*) once were found at the water hole of Acatita—no description was given, and they probably were Spanish (AHP 1715Aa).

General Social Organization

Bands

The largest social unit of the Greater Bolsón peoples seems to have been the "nation" or band. Unfortunately, practically no information is available regarding the specific features of these units, although some of their general characteristics were noted by the early writers.

Father Francisco de Arista noted how divided and scattered (*tan divididos y esparcidos*) the Indians (apparently meaning bands or rancherias) were (Pérez de Ribas III 1944: 255). Many rancherias were reported in the surrounding mountains of the Parras-Laguna district, and many were located in quite inaccessible places as far as the Spaniards were concerned. Pérez de Ribas, discussing the many "nations" in and around this area, stated that, "these, although of few people, I call nations because they themselves treated and named each other with as much difference as do those that are very different in Europe, and I do not know how to designate this difference, except with the term different nations" (Pérez de Ribas III 1944: 255–256, 264–265).

Alegre (1956 II: 42, 56–58, 106, 108, 150) and Arlegui (1851: 136–137) also referred to the numerous nations in and about the Laguna region. Arlegui went on to say, somewhat exaggeratedly, that the major part of the bands "have no abode (*asiento*) anyplace—they continually go about naked, live in the open (en los campos), sheltering themselves in the winters in the ravines and caves in the most austere mountains, and in the summers they live in the same fashion, and they are so accustomed to the rigors of the climate that they seem [to be] insensitive" (1851: 137). However, each band had its territory, as "they have divided among themselves the mountains, fields, rivers, and plains, such that each nation hunts, fishes, and makes use of that which it has marked out (senalado)" (1851: 150).

The *Anua* of 1596 described the Laguna peoples as "half fish, half men, part live in the water, part on the land; but in no place do they have a stable dwelling (*habitacion fuerte*)." They never remained in any definite place "except where they think they can find food, today here, tomorrow over there, wandering all the year" (DHM 1596). The 1607 *Anua*, speaking of the difficulty of bringing the surrounding groups into the missions, stated that "they are divided into rancherias that have their abode (*asiento*) in their mountain tops and hills" (AGN 1607c).

In 1654, Spaniards again noted the territoriality of the "Toboso" groups. They recognized the traditional enmity among many of the bands who would not dare trespass upon each others' territories. At the same time, the Spaniards were aware that alliances often were cemented among the bands (AHP 1654Ad). Governor Pardinas wrote in 1693 that the Toboso bands had "no fixed place in which to reside." Furthermore, they needed "no passes" for their *entradas*, which they made where least expected, as they traveled easiest over the roughest mountain ranges (BL 1694–1698). The Bishop of Guadalajara in 1676, apparently aware of the breakdown of the tribal territories of some groups, stated that the Coahuileños—including the Cabezas, Salineros, Babozarigames, and Mayosalth—although they were wanderers, each had their own territory to which they would return sometime during the year (BL 1676).

Alonso de León's description of the Nuevo León peoples seems to fit quite well the area of concern here, for which reason it is quoted at this time. He stated that the type of government the natives had was "anarchy" (apparently struggling for terminology as was Pérez de Ribas), and that "they inhabit brushy areas in flat lands (*por montes en bajios*), moving from one place to another, the families splitting up or coming together by whim as they are accustomed to. . . . The greatest group (*congregacion*) [which is called a rancheria (which is apparently inserted by the editor, Genaro García)] which they form, usually comprises fifteen huts (*chozas*) in the form of bells (*campanas*); these they place in rows (*hileras*) or in half-moons, fortifying the ends (*puntas*) with another two huts, and this is particularly when they have wars, and when not, each family or *rancho*, or two together, travel around the hills, living two days here and four there; however, not because of this should it be understood that they go out of their boundaries and territory which they have marked off with another rancheria, if it is not with their consent and permission, in each *rancho* or *bajío*, and eight or ten, or more persons, men, women and children come" (García 1909: 34–35).

Only a few hints have come to light concerning the nature of these bands. There seems to have been a primary or minimal named group that was quite small. There is little information on the size of these groups; however, one of the best indications comes from the report on twelve bands that arrived in Atotonilco in January of 1646. The Nonojes consisted of some fifty-nine persons and the Ocomes forty-three. The other ten nations comprised 396 individuals, making an average of about forty persons per band (CD 1650a). Information from other sources indicates that the named groups ran from about twenty-five to seventy-five persons.

These figures are, of course, only approximate and are derived partly from estimates based on the number of warriors reported. The best calculation seems to be to add roughly three to four persons per warrior (because the latter were not necessarily family heads, adding four or five as was usually done for settled Indians seems to result in too high a figure, as not all warriors were married). Therefore, a fifteen-warrior band would probably contain fifty to sixty persons. Utilizing the figures from the various reports is made more difficult, however, by vague or generic use of "nation" names, which often possibly included allies. This becomes even more true with progress of time, as the native groups disappeared or were decimated and/or permanently joined to other bands.

Most of the data indicate that the exogamous social unit was this small, named band or "nation," as the Spaniards generally called them. Particularly in the early years these seem to have been the groups most often referred to in the documents. Later, the tendency was to use more generic terms, although for some groups, such as the Salineros, and probably the Cabezas, generic usage was common from the 1640's on. On the other hand, this increasing general use of terms, and the converse dropping of specific terms, appears to reflect that these groups did in fact become more and more composite, not only because they took refuge with each other as they diminished in numbers but also because larger groups of people could remain together for longer periods of time as the native economy became reoriented.

The church records of the "band" of Cabezas that settled in Parras in the 1690's definitely show the composite nature of this group. They also seem to indicate that the specific named groups were the exogamous units, as in the overwhelming majority of cases there was no marriage between persons of the same band affiliation. A few exceptions do exist, but most of these involve a known generic term such as "Cabeza."

Other cases of band intermarriage tend to support this. A Batayoligla declarant (in a somewhat ambiguous passage) stated that three Suniyoligla men were related to him and were married to Sisimble women (BL 1709–1715). More "distant" bands sometimes also intermarried. In one instance twelve Chisos went to the Acoclames with their families, taking along four girls who were to marry Acoclames. These marriages did not materialize, however, and unfortunately it was not stated if the girls were to remain with the Acoclames after marriage (AHP 1704Ab). Blood relationship was reported elsewhere between Cocoyomes and Cabezas (BL 1693b) and between Acoclames and Coahuileños (AHP 1704Ab). Chisos intermarried with some of the La Junta nations (BL 1695a).

Such matrimonial ties between bands were reported to cement alliances. One long-time captive of the desert Indians indicated that around 1686 this had been the case between the Cabezas and Cocoyomes. The Cabezas had been allied with the Cocoyomes because a Cabeza named Gáspar had been married to a Cocoyome woman, "because the said Indian Gáspar owing to his marriage had made the alliance that only lasted until at Pozo Hediondo about two and a half years ago [before August, 1691] in an encounter the Spaniards killed, among others, the said Gáspar, and afterwards the Cocoyomes began to lose confidence in the Cabezas." It had been understood that because of the marriage there had been peace, and soon afterward the two groups became enemies (BL 1693b).

If the foregoing regarding exogamy is correct, then these bands would have represented, at one time at least, small lineages. In 1653, a Toboso (Antón) was questioned regarding the number of his people left. He stated that only his father remained and, "that although it is said that among the Nonojes there were four Indians of his nation, naturally they are not because they are the sons of the women of the said Nonojes." This contradicted the statement at the beginning of the declaration, that "he said he is named Antón, son of Cristóbal Zapata, Indian of the Toboso nation, and this declarant is of the said nation." If the first statement actually does evince matriliny, then it may be that the second is a supposition of the scribe or of some other patrilineally oriented Spaniard. Later, in his testimony, Antón reported that one Santiago, a Nonoje, had been killed together with the Tobosos and, "that his being with the latter was because he was married to a

Toboso woman" (AHP 1653Ad).

While this evidence is very weak, and the last statement may refer only to Santiago visiting his wife's kinfolk, Gonzalo de las Casas reported in the sixteenth century that among (some of?) the Chichimecas to the south there was matrilocal residence (Las Casas 1936). In 1694 Captain Martín de Hualde wrote that a captive had declared that the Cocoyome chief "Contrerillas joined the Hijos de las Piedras and had married there" (BL 1695a). There is also slight evidence that the Chisos may have been matrilocal. In 1713, a Suniyoligla, telling of the ill feeling between his group and the Sisimbles, declared that three warriors from his band "were with the Sisimbles because of having married into the latter (*alla*) and that these three are brothers (*hermanos*) and are the ones who defended Antonio and his two companions so they [the Sisimbles] would not kill them, and he [the declarant] is certain that because of this they are probably distrusted (*malmirados*) by the Sisimbles, and he imagines that they have now gone to join the Suniyoliglas" (BL 1709–1715).

Evidence from church records is also confusing. In only a few instances did priests note the band or "nation" affiliation of both a person and his parents. The following cases are taken mostly from the Parras Parish Archives (unless otherwise stated).

Matriliny

(1) A baptism in 1609 states that Lucía Paianboa was the daughter of Perico Leguaquin (Bautismos, 1605 . . .).
(2) Baptism, 1658: ". . . Angelina Yndia de nacion Tusar hija legitima de Nicolas Tooca y de Beatris Tusar . . ." (Libro 2b, Bautismos).
(3) Baptism, 1659: ". . . Andres infante hijo lejitimo de Nicolas Tooca y de Luisa Su muger quaaguapaia . . ." On the margin Andres is listed as "Andres Quaaguapaia" (Libro 2b, Bautismos).

Patriliny

(1) In 1694 occurs the baptism of Micaela, a Cabeza, whose parents are said to be Juan Baca and Juana. From several entries these two are a Cabeza and Toboso, respectively (Libro de Bautismos, Ranchería de los Cabezas).
(2) Baptism, 1695: ". . . P.o Agustin yndio de Nazion quesal, yJO + [legitimo] de gaspar Yndio de dicha nasion Y de Marta yndia de Nazon [sic] Cabeza . . ." (Libro de Bautismos, Ranchería de los Cabezas).
(3) Marriage, 1706, of a Contotore " . . . ijo legitimo de Sebastian indio de la nacion Contotores, y de Margarita india de la nacion manos prietas . . ." (Libro de Matrimonios, Ranchería de los Cabezas).
(4) Marriage, 1706 (from the same entry above), of " . . . Magdalena india de la nacion Cocoyome Yja ligitima de fran.co indio de nacion Cocoyome, y de Magdalena de nacion Cabeza . . ." (Libro de Matrimonies, Ranchería de los Cabezas).
(5) Marriage, 1708: " . . . a Joseph Gonzales Indio de la Nacion Maya hijo legitimo de Domingo Mayo, Y de Catalina con Michaela hija lejitima de Juan Baca Indio de Nacion Cabeza, y de Juana . . ." (Libro de Matrimonios, Ranchería de los Cabezas).
(6) Marriage, 1719: an Alazapa is said to be the son of an Alazapa man and a Tetecora woman (Libro de Matrimonios, Ranchería de los Cabezas).
(7) Burial, 1719, of a Maya woman, ". . . hija de Magdalena de Nacion Cabeza y de Fran.co . . . ," apparently Mayo (Libro de Entierros, Ranchería de los Cabezas).
(8) Baptism, 1672, of a Toboso, son of Antón Zapata, who possibly is the Toboso, Antón Zapata, who testified in 1653. (Libro: Bautismos 1662–1678, Archivo de la Parroquia de Allende (Valle de San Bartolomé)).

One doubtful case, that is, whether it might be evidence of matriliny or patriliny, depends on whether the Pies de Venado can be identified with the Babozarigames or not. In 1717, the burial of an old Pies de Venado man said to be the ". . . hijo de Margarita de la Cruz, de su P.e [padre] no se sabe el nom.e [nombre] ni nacion de los dhos, aunq.e dice es su M.e [madre] de la Nacion Bozeregamui [Babozarigami] . . ." (Libro de Entierros, Ranchería de los Cabezas).

There is no way to carry this analysis further or to resolve the contradictions until more data are uncovered. It is possible that both matriliny and patriliny existed, although this assumption does not solve the ethnographic problem. It is also possible that the earlier information is correct and that the entries of the Cabeza Rancheria of Parras reflect either the ignorance or the bias of the priests and/or breakdown or switch in the lineage or naming system.

Marriage

Very little information has come to light regarding specific marriage practices. Arlegui mentioned both monogamy and polygyny (as well as group marriage?) but does not specify the groups or localities where these customs prevailed. He also stated that some kind of bride price, either in goods or in work by the groom for his father-in-law, was common among the central Mexican plateau people—the most usual was for the man to deposit a deer he had hunted at the house of his prospective bride. Separation or "divorce" was also common (1851: 142–143). The 1598 *Anua* referred to the premarital freedom of women and the brittleness of liaisons (DHM 1598). One case of sororal polygyny among the desert Tepehuán of the Mapimí area was cited in the 1606 *Anua* (BL 1606). Possibly a statement by the Spanish governor in 1674 to the Salineros and Cabezas, who had gone to make peace, indicated some polygyny for these groups. He admonished them that those men who had more than one wife would have to give up the extra women and remain with only the one to whom they were legitimately married (BL 1649–1700). The case of Don Pedrote and the two sisters he was living with before his Catholic marriage indicates the possibility of sororal polygyny in this instance.

Arlegui noted the berdache among the Tejas (Texas) Indians (Arlegui 1851: 144), but there is no evidence that this custom existed among the Nueva Vizcayan and Coahuilan peoples.

Chieftains

The people of the general area were reported to be governed by captains or chiefs (Arlegui 1851: 142; Pérez de Ribas III 1944: 259). Arlegui stated that these were the men who had the greatest reputation for valor among them; at each rancheria some obedience was given to the bravest (1851: 142).

There is some evidence of patrilineal aspect or inheritance of chieftainship. Toboso women testifying in 1653 tended to rank chiefs according to their fame, but one stated that the captain of the Gavilanes, the man of greatest reputation among them who had died during the Río Angosto battle, had been replaced by his brother. Since this woman had been captured during this fracas, this seems to have been somewhat of a foregone conclusion (AHP 1653Ad).

Another declarant, Antón, stated that Francisco Casa Zavala and his sons, now all deceased, had been "captains" of the Nonojes, who were now led by Casa Zavala's grandson; and, the deceased Ocome chief had been succeeded by El Zurdo, "his son" or "his nephew"—Antón's two statements as reported being rather confused (AHP 1653Ad). In one series of declarations the Cocoyome chief was said to have been called "captain" since he had been a small boy because his father had also been chief (AHP 1715Aa). Likewise, a Chiso, Ventura, was stated to be a chief, as his father had been before him (AHP 1704Ab). During the absence of the Cabeza chief, Santiago, his brother, Bartolomé, had taken over (AHP 1673Ab), and these may have been the same Bartolomé and Santiago who were cited as Cabeza chiefs some fourteen years later (BL 1693b). Alegre told of a chief at Parras who had referred to his right of birth and deeds of war (Alegre II 1956: 149–150).

One ex-captive indicated the importance of kinship in leadership as well as the role of age. He told of a gentile chief called El Julime (said elsewhere to be a Chiso or Julime) who was "married to an Indian woman relative of El Tecolote and that because of this he is the one who virtually governs (*manda*) all and who is obeyed more because now not so much attention is given to El Tecolote since as an old man he cannot govern so strongly (*tan resio*)." El Tecolote was judged to be about fifty years old at this time. (Possibly, El Julime was Lorenzo.) Another ex-captive also noted the decline of El Tecolote's authority because the people "no longer pay attention to him because he is only a talker (*tatolero*) and a coward" (BL 1693b).

In 1692, Lorenzo, the then head chief of the Cocoyomes, recounted how he had come to hold this position. "He said that it is true that Don Francisco Tecolote was always the governor of the said Cocoyome nation and as such he commanded all of those belonging to it and later as soon as the declarant was at a competent age the said Don

Francisco Tecolote made him his assistant in the governing (*govierno*) and in recognition that the said Don Francisco is a man of many years (*mayor de edad*) all of those of the said nation began to obey him [Lorenzo] and he held them under his charge up until now, and on attempting to make peace and the declarant having worked for this and done everything possible on his part the said Don Francisco, seeing that he had his people reduced, retired saying that now everyone obeyed him [Lorenzo] and he should come as governor to make the peace." Later, "he told the declarant that he was [now] the governor of the Cocoyomes and that he should come with them because he [Francisco] was now an old man" (BL 1693b).

In an earlier testimony of a mestizo ex-captive of the Jojocomes, it was stated that "although Don Francisco Tecolote is named [as governor] he does not have as much influence as the two Lorenzos [one the chief of the Jojocomes], as these men have it with much prestige (*credito*) with these nations [Cocoyomes and Jojocomes]" and regarding difficulties of coming to an agreement concerning peace among these peoples, "not withstanding that everyday they are admonished by Don Lorenzo [which one?] not to do any damage or to steal horses" (BL 1693b).

Arlegui stated, possibly somewhat exaggeratedly, that the people would treacherously kill their chiefs in order to get out from under their yoke (1851: 142). Another ex-captive of the Cocoyomes said that he had heard during discussions about making peace with the Spaniards that El Tecolote had said that the rest could surrender but that he would not (BL 1693b). This and Arlegui's statement may be indications of the limited authority of the chiefs; Arlegui's comment may also point to a certain amount of "fear" that chiefs may have instilled in their followers. Some chiefs, at least, possessed supernatural power, as noted subsequently for the Cocoyome chief, Juan de Lomas. Governor Castillo wrote the Viceroy of the reputation of "El Tecolote [who] because of the great fear and in order to carry out his wizardry (*hechiserias*) with which he took advantage (se *aventajava*) a great deal of all of the others, always went off from the others in order to sleep alone" (BL 1693b). One chief of the Yrbipias was reported to have been a witch (*echisero*) (Portillo 1887: 86).

Warfare

Warfare-and-raiding was one of the major activities of the Tobosos and other desert tribes during Colonial contact times. The early writers characterized some of the aspects of warfare for the people of the general region. In precontact or early postcontact times wars were said to have been endemic, although they took place particularly in the dry season when fighting would occur over water and other resources (e.g., the fish the lakes might contain). Alegre noted that these wars were somehow connected with the practice of cannibalism, attributing the latter to the lack of food at these periods (Alegre II 1956: 235; Pérez de Ribas II 1944: 289). Seasonality was also noted for the raiding activities of later times.

Arlegui described the central plateau tribes in the same way—each nation lived in a continual state of war with its neighbors and they would kill anyone, Indian or Spaniard, who did not belong to their tribe. He noted also, however, that alliances took place frequently among "some" bands for particular battles, but that they would quickly disintegrate for the slightest cause and the former hostilities would reemerge. Trespassing into a neighboring territory to gather, hunt, or fish was sufficient cause for war (Arlegui 1851: 138, 147–148, 150; AHP 1654Ad).A more succinct description, made of the peoples around the Río Grande, probably Coahuileños and possibly including some Chiso speakers, noted that there was much discord among these groups and they had the custom of killing and eating each other and of capturing each others' children (BL 1674). Even under missionization deaths between bands caused enmity (AGN 1607c). Mota y Escobar described the Laguna peoples as very skillful in the art of war, which they practiced with more order and better stratagems than other nations in the area (1940: 169).

Revenge was an important immediate cause in maintaining hostile relations with neighbors (BL 1676). In one case it was reported that after the Salineros and associated Spanish Indian allies had defeated and killed many of the "Tobosos," four of these bands joined together. Of two Salineros who had been living (married?) among them for years, they killed one in revenge. The other escaped to the Cíbolas. Then the "Tobosos" pooled their efforts "to make munitions in order to make their last effort in [wreaking] their vengeance," planning first to attack the Cíbolas, and later the Salineros and Spaniards (AHP 1653Ad). In another instance a Gavilán leader (El Mapochi?) refused to return to Atotonilco until he had revenged the deaths of his relatives, for which he claimed he would die fighting (AHP 1654Ac). The Salineros and Cabezas were reported to have said in 1673 that they were fighting to avenge deaths the Spaniards had inflicted on them (BL 1649–1700).

Analytically, besides the revenge motive, killing the enemy for prestige and ceremonial reasons was no doubt important (e.g., AHP 1715a; AHP 1722Ab; BL 1709–1715). The Acoclames fought with the Sisimbles and Chisos over a woman, although they soon became friends again (AHP 1704Ab). In one instance a note of collective responsibility for killings emerges. This occurred in the testimony of Sisimbles in Durango in 1748 when it was stated that no particular individual was to be blamed for any of the specific killings committed but that all were responsible. At the same time, however, they said that they had killed two women—one because she was old and the other because she had refused to accompany them. Other killings were carried out by members of the same group in order to steal the clothing worn by their victims. Their own descriptions indicate that specific murders were committed because the victims had become angry (*enojados*), that is, they had put up resistance. In one case the attackers had not killed because the people had given their clothing without becoming "angry." The killing of some Apaches, however, had been in vengeance (BL 1748). The Spanish military and administrators recognized and used this actual and potential enmity in dealing with the various Indian groups. This practice was largely responsible for their success in employing Indians as auxiliary troops. The Europeans knew that latent hostile relations could be fomented into open conflict by getting one group to attack and kill members of another. Although this method often worked, it was not completely foolproof (Arlegui 1851: 138, 166–167; AHP 1716Aa).

Reports from the period concerned here are replete with accounts of raids and attacks by the desert Indians. No attempt has been made to summarize the events of the individual skirmishes, except some of the principal characteristics of the warfare-raiding complex and the results of the general culture contact in this sphere of activity. The size of raiding parties ranged from small groups of six to twelve men to large forces of well over one hundred warriors for mass attacks (e.g., AHP 1652Da; AHP 1655Ab; AHP 1656Aa; AHP 1715Aa).

War party organization was somewhat more complex than this, however. Informants in 1654 stated that only some of the warriors of a band would go out at any one time and that often such parties would then later be divided into smaller squads (AHP 1654Ac). Some raiding parties that stayed out for considerable periods of time were accompanied by women who helped the men keep camp (AHP 1655Ab). One unidentified group, operating in the general Cuencamé region, had the women and children along to make arrows for the warriors (AHP 1669Ba). On one occasion it was reported that a large composite group (of El Mapochi and others) had planned to stay in an area for a rather long period—until the rainy season began—and had taken the women and children with them (AHP 1655Ab).

For attacks, large war parties would often be divided into two or more squads, and both mounted and unmounted warriors (cavalry and infantry) were reported. It is not certain when these groups began using the horse, but it was no doubt very early. Enemy Tobosos, Nonojes, and "other nations" in the spring of 1643 were said to be all mounted (CD 1643a; also see Forbes 1959b). The adoption of certain Spanish forms seems to have occurred over a period of time, a trend that began farther south in the sixteenth century when the Spaniards started their penetration northward (see Powell 1952: 40, 45–47, 49ff, 174). This is not surprising since not only could the Indians see how the Spaniards organized large groups of men when they were in battle, but many individual Indians, if not groups, at one time or another fought as auxiliaries on the Spanish side. Furthermore, Spaniards were favorably impressed when their allies demonstrated good military discipline. On one occasion Salineros and Cabezas arrived in Parral with "a great deal of order," carrying a red (*colorada*) banner with a cross on it and a pole with the Toboso scalps they had taken in battle (AHP 1653Ad).

Occasionally information on the organization of attacking Indian parties occurs in the sources.

One group, poorly identified, but with men nude and painted, divided into two squads to carry out its assault, and each squad carried poles with scalps attached (AHP 1654Ca). Father Castillo reported that on one occasion the group of Tobosos and Salineros he was with divided their squad into six lines (*hileras*) of twenty-five men each (AGN 1667). Another time, Tobosos and Chisos attacked a wagon train in three squads (AHP 1684Aa). The Cocoyomes and Coahuileños made a raid on El Charco in the Parras district divided into four squads, two mounted and two on foot (AHP 1722Aa). Banners (*banderas*) were often reported carried by the raiders. Sixty Indians operating near Cerro Gordo flew five banners (AHP 1715Aa).

The most Spanish-sounding attack (largely described elsewhere but repeated here) was one that occurred at the presidio of San Francisco de Conchos. A large force, later judged by witnesses to have consisted of over 100 men on horseback plus those on foot, attacked some twenty-five soldiers guarding the presidio's horses. The enemy came in carrying three different banners, sounding both fifes (*pifanos*) and drums (*tambores*). The tactics employed in this case apparently were effective, as, in the midst of the shouting and the dust, the Spanish soldiers never had a chance to regroup themselves for a counterattack and the entire herd was lost. Several of the soldiers later stated that this attack procedure was something never seen in this area before. However, somewhat previous to this, some fifty to sixty Indians had made an assault in the vicinity of Cerro Gordo with three banners, a fife, and much war whooping (AHP 1715Aa; AHP 1718Ac).

One of the main defensive tactics of the Indians when surrounded by Spaniards was flight under the cover of night, often under truce, when negotiation for some kind of a peace settlement was being begun (e.g., BL 1649–1700; BL 1694–1698; BL 1709–1715). One ex-captive stated that he had heard the Indians say a number of times that they often agreed to peace in the battlefield in order to get out of tight situations, such as when the Spaniards had them corraled on the top of a hill or mountain (BL 1693b). Defensively, at least, rocks were of some importance. During the Nonolat battle it was stated that there had been danger from the showers of arrows (*flecheria*) and stones (*galgas*) (BL 1649–1700). In such defensive situations the women also participated by throwing stones.

Offensively, when the Indians were attacking Spanish holdings, their express purpose of fighting was to steal animals (usually "*caballada*") and clothing (*ropa*) and to kill Spaniards (e.g., AHP 1715Aa; AHP 1722Ab; BL 1709–1715). Of course, many other material goods were stolen and many nonrebel Indians were killed during offensive operations. Animals that could not be run off efficiently (e.g., cattle and sheep) were often killed on the spot. One Concho leader was overheard telling his men to kill all the mules so that the Spaniards would have no mounts to ride on.

The Spaniards felt that there was much wanton killing and cruelty, and destruction—such as the burning of buildings that destroyed the supplies and sometimes the people inside. A number of atrocities were reported. During the 1644 Revolt, the Tobosos cut off the head and other parts of the body of a man near Parral, and they beheaded another Indian near the Florido River (DHM 1645). The arms and heads of victims were amputated in an attack in the Parras area (AHP 1662C). In the Santa Barbara mountains it was reported that "there was found the dead body of a woman between two rocks with many arrow wounds, the stomach opened up, the intestines taken out and the stomach filled with stones, the scalp removed, and many other atrocities committed" (AHP 1655Aa). Chisos were reported to have cut the genitals off of their victims (AHP 1684a). In the flight after one raid, a woman captive was tied to the tail of a horse when Spanish troops began to gain on the enemy. The Indians then shot an arrow at the horse so it would start up with a leap, but the animal was hit in such a fashion that it died immediately. The woman was picked up by the pursuers (BL 1709–1715).

A number of other examples exist of the raiders' offensive behavior. Bodies discovered after raids often had been mutilated in some form—heads and bodies smashed, mangled by rocks, and chopped to pieces. An Indian woman and two children at Atotonilco were burned alive inside a hut, and another child was literally cremated in a box. A mixed band of Salinero and Concho (?) holed up some other Salineros in a cave, piled up wood and grass at the entrance, and set fire to it to burn them out. In one instance the

Acoclames and Cocoyomes cut the ear off of one dead soldier and the genitals from another (AHP 1651A; AHP 1652Ba; AHP 1653Ab; AHP 1653Ad; AHP 1653Ae; AHP 1654Aa; AHP 1654Ab; AHP 1655Aa; AHP 1655Ab; AHP 1656Aa; AHP 1657Bb; AHP 1667Aa; AHP 1673Ab; AHP 1715Aa). Atrocities were not committed in every case, however, as when the Acoclames and Cocoyomes denuded some women without harming them (BL 1709–1715). As a note of interest, Father Rodrigo del Castillo reported that the Cabezas and Tobosos who had captured him washed the scalp and another trophy (*pedaso de aldilla*) they had taken from their victims after battle, as well as washing the blood from themselves (AGN 1667).

There was a rhythmic character to the Indian raiding pattern. Attacks were particularly frequent around the time of the full moon each lunar period. A Spaniard testifying in 1710 stated that for many years not a single full moon had gone by without the Indians committing a number of murders and robberies (BL 1709–1715). Coupled with this was seasonality, noted by the earlier writers. The Tobosos were reported to retire to the most inaccessible parts of their territory during the rainy season. This was the time when local natural resources were the most plentiful, and raiding activities would noticeably diminish. As soon as the dry season set in, the Indians would come forth again to plunder and murder. Berroterán, after the extinction of the "Tobosos," wrote that campaigns had been made regularly into their country during the months of September and October, the beginning of the dry season, for many years (DHM 1748). This dry season activity, however, was of particular detriment to the Spaniards who had great difficulty in campaigning when water was scarce, largely because of their horses (it is unknown to what extent the Spaniards utilized plant resources for moisture as the Indians did). The problem of water for the animals may have been much less of a drawback to the wild Indians who probably often ran their stolen animals to death, or killed them for food at camp (AHP 1654Ac; AHP 1656Aa; AHP 1709Ab; AHP 1708b; AHP 1724Ab; DHM 1645). Indeed, the Spaniards probably would not have been as successful as they were had it not been for their Indian allies. These knew the land and could get along better in it than could the non-Indians in the Spanish forces, and consequently they were greatly valued as scouts and trackers, as well as soldiers (see also Arlegui 1851: 166).

Captives were frequently taken by the Indians during raids and taken back to camp. Young children were often adopted into the group, and there were several references to non-Indians raiding with and speaking the language of the Indians (e.g., Ventura, the mestizo, and the mulatto and Negro, all with the Cocoyomes). Female declarants toward the end of the period (1715) stated explicitly that they captured and kept young children because these could be educated in the ways of the Indians (a practice that possibly intensified as their population declined but that no doubt existed in precontact times). Older captives, however, were generally killed, particularly at ceremonies, since the Indians realized they could not re-educate them. Nevertheless, not all older people taken as captives were killed. Some were put to work (at least until they were killed) doing menial chores such as fetching water and firewood and getting mescal. Some were traded or ransomed (AHP 1651A; AHP 1653Ad; AHP 1704Ab; AHP 1715Aa; AHP 1716Aa; AHP 1718Ab; AHP 1720Aa; AHP 1720Ab; BL 1709–1715). A few were reported simply living with the natives in the back country (AHP 1724Aa).

In 1692, one ex-captive of about 17 years of age said that when very young he had been taken prisoner by the Cabezas. Later when these people made peace (apparently at Parras) he had been given to a Jojocome "who had kept him with him and treated him well, calling him 'brother' and treating him as a son, not even letting him walk on foot nor that any other person mistreat him" (BL 1693b). Most captives seem to have "belonged" to men. One, however, definitely " "belonged" to a Cocoyome woman, and when her Cabeza husband left her permanently to settle with his band at Parras, the captive, because he was a boy, remained with the woman and the Cocoyomes, although the Cabezas had wanted to take him with them (BL 1694–1698). This evidence, of course, indicates that these young captives probably tended to be treated as any other "adopted children," although this is merely a guess. One other case suggests adoption, but there is a lack of supporting information that might disclose what it actually was an example of. One Acoclame testified that he was not the son of the person he lived with (El Ratón), as the Spaniards had thought. It was true, he confessed, that he lived with El Ratón as if the latter were his father, and El Ratón had raised and educated him. However, he admitted that on one occasion he had told the Spaniards that El Ratón was his father (AHP 1704Ab).

Religious and Ceremonial Life

Some of the characteristics of the ceremonialism of the peoples of the Greater Bolsón area were dancing, ceremonial killing and cannibalism, self-sacrifice or blood-letting, and the use of the narcotic peyote. This ceremonial behavior was associated with a number of different activities, including warfare, hunting, sickness, and the formalization of interband peace and alliance pacts. Although not specifically mentioned, "ceremonialism" could reasonably be assumed to have taken place at the annual meeting mentioned by "Toboso" deponents in 1715 (AHP 1715Aa). The Toboso governor of Conchos stated once that it was the Toboso custom to have dances (*mitotes*) during conferences and talks (BL 1693b), and the same was noted for the Cabezas and other "Coahuileños" around Nadadores in 1688 (Portillo 1887: 208). For the people of Nuevo León, Alonso de León stated that dances and mitotes were carried out on all occasions of war, peace, and general celebrations. These occurred at any time of the year but particularly in the summer when food was more plentiful, which concords with the 1600–1602 *Anua* for the Parras area (García 1909: 43; BL 1600–1602).

Dances

Dances at Parras, according to the *Anua* of 1604, were held for war and as celebrations for happiness or sadness. Such a dance "lasts at times eight consecutive days and nights, some entering and others leaving, and occasionally it occurs that some dance night and day without stopping" (BL 1604). Pérez de Ribas gave one description of the dances of the Parras missions. These were generally at night, performed by a large group of people in a circle around a fire. There was "some division between men and women but [the dances] were not free from abuses," including drunkenness. These dances usually lasted until sunup the following day (Pérez de Ribas III 1944: 248). Other sources confirm this description and include other features; singing or chanting, cannibalism, and the use of peyote, often ground and mixed with water and sometimes with the powdered bones of a victim, were common throughout the north Mexican area (García 1909: 42–46; Pérez de Ribas III 1944: 248, 252, 263; AHP 1652Ab; AHP 1653Aa; see also Arlegui 1851: 146, 154, who adds some details—including snake dances, beliefs about owls, a reverential attitude toward fire, and the like—but it is uncertain to what group(s) these pertained). The *Anua* of 1598 recorded that dances in the Laguna district were ordered by the devil, and included drunkenness, peyote taking, and child sacrifice (DHM 1598).

At the missions, native dancing was continued but reoriented toward the divine (*a lo divino*) (Pérez de Ribas III 1944: 255–256). In 1607 it was reported, however, that the Indians would dance all night on Saturday night, and would be so tired the following day that they were unable to attend Mass (DHM 1607). By 1614, the *Anua* of this year stated that the dances, during which many offensive things occurred, had now been eradicated. Nevertheless, after one had been prohibited at a certain rancheria, the old people (*viejos*) managed to carry it out in the dead of night, including a very "solemn" inebriation with peyote (BL 1614).

The *Anua* of 1600–1602 reported that in the days of "*vendimia y agosto*" "for these people which is the time of the most copious and famous harvest that they have [during] the year, the Lord grants it in this desert of mezquite and *tuna*." Everyone would go to this harvest, from which cakes (*panes*) and wine would be made in abundance. Many bands (*rancherias*) would get together, each inviting the other by sending bows and arrows as a sign of peace and alliance. They would drink peyote, paint themselves in their own style, and carry out great dances and drunks, as well as go fishing, as the lagoon was close by. Hardly a single person would remain in the valley (of Parras?) who would not attend these *fiestas*, to which they would go as happy as if they were going to a wedding (BL 1600–1602).

Some Tobosos and Coahuileños—specifically Cabezas and Conianes were mentioned, although this no doubt referred to other groups of the Nadadores area—also held dances at the time of the tuna harvest. In 1688 it was learned that ". . . after the tuna was finished they would try to cement friendships during the *mitotes* that they hold when they are harvesting it" (Portillo 1887: 202). Possibly the annual meeting of the Cocoyomes, Acoclames, Chisos, and Sisimbles mentioned by women declarants in 1715 was also a ceremony for the harvest of desert fruits, although it was said to be held during the dry season (possibly at the end of the summer rains) (AHP 1715Aa).

In another place, with regard to the Irritilas and other peoples around Parras, it was reported that from 100 to over 200 persons would dance at a time, adorned with the variegated feathers of parrots (*guacamayos*) and other birds, with arrows in their hands. They would sing their songs, no longer barbarous (i.e., after missionization). The verses (?—*motetes*) were sung "with the tone and pause which they use, the way that with organ music (?—*canto de órgano*) the song is stopped and repeated [with] short verses" (Pérez de Ribas III 1944: 265; DHM 1598).

A ceremonial dance that took place in the area of Mapimí appears to contain a good many facets of the dance ceremonialism. Reference to it occurs in the *Anua* of 1607, Alegre, and Pérez de Ribas, although the description here is taken mainly from the latter, which is the most detailed. The occasion concerned the appearance of a comet, which the natives considered a source of danger. A plague also occurred about this time, and such astronomical phenomena were definitely associated with sickness and disease.

Several "rancherias" participated. The people came out to dance in pairs, and included males and females from 7 to 100 years of age. Each person carried a little basket in his right hand while holding an arrow with the obsidian (*pedemal*) head placed against his heart with his left. Bringing up the rear were four or five old men who were painted. Each one had a hide whip (*azote de cuero*) in his hand (the letter of Father Pangua in Alegre stated "little fans" or type of *aventador*). The baskets were filled with dates (*dátiles*), *tunas*, and mescal or mesquitamal fruit, and dead mice, *tuzas*, rabbits, fish, and snakes. Some people wore feathers; others wore mountain lion, wolf, or coyote tails, because they believed that the tail of the comet was similar to either bird plumage or animals' tails, and each person mimicked the animal that to him the comet seemed to resemble.

In the center of the dance ground (*plaza*) in the middle of the pueblo was a large fire into which all of the baskets and their contents were thrown as a burnt sacrifice. This was done so that the smoke would rise to the comet, which would then have something to eat and would therefore do the people no harm. As the smoke rose the old men began to lash out with their whips (*cimbrar*) or fans, in rhythm on the four sides of the fire, ordering the smoke to go directly to the comet. It so occurred, however, at this time that a breeze came up and diverted the smoke. Apparently (from Alegre), with this the participants set up a noisy crying. The old men, that is, the shamans, took this breeze as indicating a bad omen to the effect that the comet was angry. In order to handle this contingency, the hair of six maidens (*doncellas*) (in Alegre only one girl is mentioned, around nine or ten years old) was cut off at the roots. The old men then began to scratch themselves with combs (*peines*) or spines (*espinas*) so that blood began to flow. The rest of the people followed suit, even the newborn infants being subjected to this sacrifice. The blood was collected by the oldest shaman in some large jugs (*jícaras*) or platters (*plato o escudilla*) (and from Alegre, was mixed with an equal part of water; or with some water, according to the 1607 *Anua*). The old men (or man), using the girls' hair as a wand (*hisopo*) sprayed (*rociaban*) the blood in the air—at the same time giving forth with horrendous cries (*bufidos*; *bramidos*)—three times in each of the four directions. Finally, they threw the remaining blood into the fire and again began to beat the smoke from the fire, which now, because the breeze had died down, went straight into the air. Thus ended the ceremony (Alegre II 1956: 151–152; Pérez de Ribas III 1944: 273–275 ;DHM 1607).

The gentile Indians of the hinterland of the Parras area during the plague of 1624 were said to have carried out "great dances and *mitotes*" in order to placate the pestilence. These were held for three or four days and nights without the participants eating a thing. This was done before an idol from which the devil would appear to the Indians. At the end of the period they would fall to the ground "some dead and others fainted" from exhaustion (AGN 1624).

Alonso de León described a Coahuiltecan ceremony in which both sexes danced in one or two circles around a fire. The words to the songs they sang had no meaning, only harmony, but so much in unison it seemed like a single voice. Sometimes there would be over 100 persons in the group. In this particular ceremony, peyote, ground and dissolved in water, was drunk until the Indians lost their senses and fell on the ground as if dead. They also drew large quantities of blood by scratching themselves with the "beaks of a fish called *abuja* (*aguja*)" and smeared it over their bodies (García 1909: 44–45). Arlegui cited the scratching technique—with sharp pieces of obsidian or ground-up maguey leaves—as a cure for tiredness (*pencas*) (Arlegui 1851: 140).

War Ceremonies

Most references to ceremonies associated with war cite celebrations occurring after battles, although there were also pre-battle ceremonies. Arlegui describes a general pre-war, pre-hunting ceremony in which an all-night circle dance was performed around a deer skull with the antlers still intact. At the end of the ceremony the skull would jump and immediately the Indians would sally forth in the direction in which the cranium had indicated (Arlegui 1851: 146–147). Deerheads, with the antlers attached, were believed to have special power, such as to grant good hunting, and for curing (Pérez de Ribas III 1944: 248, 262–263; BL 1604).

During the ceremony, when the people were drunk, an old woman who was held as an oracle would get up and remind them of their ancient liberties and of the evil the Spaniards had wrought upon them. She would exhort them to join in squads and to go forth and destroy everything they could. She would also send them against their neighbors to avenge deaths committed on their own group and would incite them by calling them cowards (Arlegui 1851: 146–147).

A Spaniard, held captive for five years by the Cocoyomes, testified that Cocoyome women, especially the old women, had the worst character (*mal natural*) regarding peace and war. Once they had said, when many of their own people had died, that it would be a good idea to make peace until their children had grown so that they would have more people—presumably to fight the Spaniards (BL 1694–1698). Another ex-captive of the Cocoyomes (1691) stated that the old women contradicted any word (*vos*) suggesting peace "and that the indignation that the women have against the Spaniards is so great that when they [the men] sally forth to kill and rob, some women go in their company desirous of killings" (BL 1693b). The *Anua* of 1600–1602 noted that the older the women, the worse they were (BL 1600–1602).

Shamans were often involved in armed resistance to the Spaniards, and there exists one more interesting reference to a female concerned with this. During the Tepehuán Revolt, it was reported that among the old people (*viejos*) at Parras an undercurrent of talk concerned a certain old mountain lady who was held in great veneration. The lady was angry because her people had accepted the Spanish priests. Attempts to pacify her with clothing and other gifts did not mitigate her ire (BL 1616).

Post-battle ceremonies seemed to have included dancing with the head, scalps, or other "items" belonging to the enemy, as well as the eating of captives. It is less certain what the pre-battle ceremonies involved. Both types of ceremonies did occur, however, and one Diego de Estrada, who had been a captive of the Acoclames and Cocoyomes for fourteen years, recounted a number of dances connected with hostilities. After a raid near Indé "the said Indians went to Poso Hediondo and divided up all of the theft among the Acoclames and Cocoyomes, and they danced their *mitote*, they split up, some in the direction of Mobana and others toward Sierra Mojada in the Sierra of Tagualiloncate [Tagualilo], and having danced their *mitote*, they sallied to commit deaths and robberies." Again on "another occasion they convoked the Chisos who were at the Sierra de Chocamueca, and they came, and all having danced—Cocoyomes, Acoclames, and Chisos—they came to attack San Antonio," and after another raid "they went and came together and danced and they divided up the theft, and the Chisos left them and they returned to Chocamueca" (BL 1709–1715).

Another witness, also an ex-captive, testified that on one occasion the Acoclames and Cocoyomes met at "Sierra Mojada and they carried out their dances and decided to go out and kill and rob" (BL 1709–1715). On one occasion when the Gavilanes received word that a Spanish force was on the march to meet them in battle, they "celebrated" the news by dancing (AHP 1688Cb). Again, Cocoyomes, Acoclames, Sisimbles, and Suniyoliglas "after their dances (*bailes*) and merry-making (*guelgas*) that they carried out, they divided up into squads for different areas" (BL 1709–1715). Another time, after a number of "Toboso" women had escaped from prison at one of the presidios, their arrival was celebrated, and then "challenged" squads (that is, the men had been exhorted to go out and fight their enemies) went off to raid (BL 1694–1698).

Some of the post-battle celebrations were more detailed. On one occasion the Chisos and Tobosos got together and danced with the head and clothing of a Spaniard they had killed (AHP 1655Ab), and at a later date the Chisos threatened one person with cutting off his head and dancing with it (AHP 1684Aa). Once the Spanish military located and attacked a large gathering of Indians after the latter had just held a great, all-night dance (*mitote*) celebrating the arrival of a raiding party that had brought back to camp a number of horses and mules (AHP 1653Ad). A Sisimble woman in 1748 recounted that after killing Spaniards the warriors brought their *cueras* (Spanish leather military jackets) and then held a *mitote* (BL 1748).

Another time the Cocoyomes took an adult captive to the place where they danced. "Several Indian men and women [were] dancing, and one woman with a pike wounded him several times and another [woman] beat him with a stick until they had killed him, having many laughs at the sight of the movements he made in order to die." The following day, the witness to this, who had also been held captive at the time, while fetching water found the head of the victim but did not learn what had been done with the body (AHP 1716Aa). This appears to be a fairly good example of the role of women in the warfare ceremonial pattern, which seemingly began when the prisoners first arrived at the Indian camp. A Sonora Indian, taken captive by some Cocoyomes, was beaten with clubs and sticks by the women when he and his captors arrived at the camp at Sierra del Diablo (AHP 1686Bc). Another time, at the arrival of two prisoners, the women came out and beat them with clubs (*garrotes de quiote*) (AHP 1724Aa).

On another occasion, Chiso women (*viejas*) killed a little captive Spanish girl, who was later eaten. This was the group of Santiago's at the Peñol de Santa Marta, and it is possible that the event is the same as noted in another place (BL 1695a) where a captive Spanish girl was killed and eaten by the women of a combined Chichitame and Sisimble, and possibly Guesecpayolicla, group (Hackett 1926: 332—apparently also referred to by Marin, p. 396). The circumstances of the next reference are not clear, but the Cabezas and other groups once killed, roasted (*en barbacoa*), and ate the children of a Spanish woman—all captives (AHP 1652Dc). The Cabezas of Don Pedrote would get together with the Quechales of the mission of Nadadores and dance with the scalps of those they had killed (Portillo 1887: 195).

The torture, killing, and eating of one's enemies—although not captured in actual battle—was also practiced and supports Arlegui's statement of the perpetual state of war in which these people lived. When Dieguillo, the son of El Ratón, was at the Suniyoligla camp, according to the Suniyoligla testifying in 1713, the people of the latter place "did not let him leave for any place, and the whole day and night he spent crying and also he became ill from the mistreatment that his relatives [of the Suniyoligla testifying] had given him" (BL 1709–1715). The *Anua* of 1604 told of a messenger sent to the hinterland who was simply killed and eaten by one of the nations he encountered (BL 1604). Don Baltazar, the Chiso, who was killed by the Sisimbles when he went to persuade them to make peace, was knocked down by one Indian with a pike, and the others there finished him off. Then, "they cut off his head, legs, and arms, and they cut off pieces of meat, they roasted them and they ate them up" (BL 1709–1715).

The same Suniyoligla told of another incident where an "outsider" (?) (that is, there is no information on kinship or other ties here) was killed apparently for reasons of "social solidarity." A certain Pedro Gabriel, some kind of "Chiso," fled the Conchos pueblo and joined a group of Sisimbles. The Indians then stole some horses, but the soldiers from Conchos took them back, and "as soon as they arrived back at the [Sisimble] camp, the said Pedro Gabriel was accused of evil disposition (*mala dispocision*) with which he had taken the horse herd for which reason they immediately took his life" (BL 1709–1715).

All the foregoing references concern "enemy" or "rebel" Indians. However, the Spaniards permitted their Indian allies to carry out their war ceremonies and actually fostered the taking of scalps, heads, and hands (AHP 1653Ad; AHP 1654Ac; AHP 1657Bb; AHP 1658Aa). Two instances were reported of the enemy picking up its dead and taking them off. It was felt that this had been done in order that the Spanish auxiliaries could not dance and perform their own rites with them (AHP 1655Ab; AHP 1657Bb). Arlegui also noted similar practices by the Spaniards' Indian allies (1851: 167), and he stated in his general description of warfare practices that the Indians committed unbelievable atrocities upon the bodies of those they killed. They pulled out the intestines and hung them in trees (possibly referring here to the murder of a Franciscan that occurred sometime before 1715 near Durango, when the Indians draped his intestines over a mesquite tree; BL 1709–1715). They would eat the meat, "human bodies being for them the tastiest of morsels, removing the skin from the skull in order to drink from it with joy and as a sign of victory" (Arlegui 1851: 138, 167).

Petroglyphs

Pictures or petroglyphs were no doubt connected with several facets of the native religion, but because two of three references to them mention warfare they are noted at this point. They were reported by one of the early missionaries in the general Laguna district as "characters and letters made in blood in a place and location so high that only the devil could have drawn them" (Pérez de Ribas III 1944: 263; BL 1604). In 1715, the Spaniards, while inspecting a camp of over seventy huts (*jacales*) at the water hole of Acatita, found on a rock (*peñasco*) nearby "many and various pictures, very lively done (*a lo vivo*) of the deaths that they had committed " when they had murdered an ensign in one attack on the Spanish military as well as when they had killed the captain and some others at Mapimí, "showing in them the person of the said captain and that of the priest Don Carlos on his mount" (AHP 1715Aa). Berroteran was apparently referring to petroglyphs of some type at Acatita La Grande which depicted an attack on a party of which the Bishop of Durango, Don Pedro Tapis, had been a member (DHM 1748).

Other Ceremonies

Some kind of "ceremonialism" often took place at intergroup meetings, although the evidence is sketchy, and some of the references given herein perhaps better fit with pre-battle ceremonies.

Once the Ocomes invited the Tobosos to dance. The latter went to Río Angosto where they met and danced with the Ocomes, Gavilanes, and Nonojes (AHP 1653Ad). A meeting between "Tobosos" (generic or specific?) and Cabezas was celebrated by a great *combite* at the camp of the Tobosos, who had many cattle with them. Afterward they went off to raid together. A great dance was also held when "Chisos" and "Tobosos" were contracting a war alliance (BL 1693b).

Another time, the Cocoyomes and Coahuileños spent a night dancing together (AHP 1722Da). Sometimes the back-country people were said to have danced with settled Indians. Three Cocoyome messengers spent three days with the Babozarigames and Coahuileños at the presidio of El Pasaje dancing *mitotes* (AHP 1716Ab). Another time the Cocoyomes and others danced *mitotes* with the Indians living at Parras (AHP 1722Aa).

Less complicated customs were also reported when people of different groups met. Bows and arrows were exchanged (AHP 1654Aa). In one instance, two Coahuileños, gave the Acoclames a pinch (*manojo*) of tobacco when they visited the latters' camp (AHP 1704Ab). Arlegui stated that messengers would take an arrow and lay it at the feet of the chief of the host group. If an alliance was cemented, the instigating group would get together an abundance of food and drink (alcoholic) to receive their new friends (Arlegui 1851: 148).

A more elaborate ritual was once reported, involving some kind of interband peace pact. One group, apparently Tobosos and Salineros, exchanged a boy (muchacho—apparently prepubertal) with another group composed of Babozarigames and Baborimamas. Each group killed the boy it had received and then cooked and ate him. Afterward the bones of the boys were ground into powder, mixed with peyote, and the potion was drunk. Those present then "embraced" each other and departed on their separate ways (AHP 1652Ab; AHP 1653Aa).

One description from the 1690's indicates a certain amount of fusion of Colonial and native elements in ritual behavior. One mestizo ex-captive who had been with the Jojocomes (Ocomes) a number of years reported the ceremonialism he had witnessed among these people and the Cocoyomes. This was centered on a banner (*bandera*) the Spanish governor had sent them as part of peace negotiations. He stated that "before setting it [the banner] up (*enarbolarla*), word was sent to all of the nations that they meet together to see it and to kiss it as the insignia of the King, Our Lord, and that when all had come together it was put up and that the governors and captains went first passing underneath the said banner kissing it consecutively. After them, all the men and women, young and old, did the same, and they carried out dances (*mitotes*) with great pleasure, saying that that sign (*señal*) was true peace and that by means of it they had the assurance of the promise of pardon, and that against this [the peace] he did not hear a single thing." Later, when two Franciscans went out to visit them, the Indians "lined up in the style of war with their banner which they waved (*la batieron*) to the priests and then one by one they went to kiss their habits and hands" (BL 1 693b).

Shamans, Curing, and Supernatural Power

Shamans, or curers, were reported to attend the sick in the Parras district, although there is little information on specific curing procedures. A fire was "usually" kept burning at this time, and apparently more than one medicine man could attend at one time. One report stated that the patient was surrounded by the heads of deer with the antlers still intact. Various items, such as large obsidian knives (*navajas de pedernales*), dead hawks (*gavilanes*), or their claws, were hung on the doors of huts to keep sickness out. This was done after the shamans had seen visions of various supernatural figures (Alegre II 1956: 151; Pérez de Ribas III 1944: 261–262, 269–271, 291; BL 1600–1602). One sick person was said to have hung a snake (*víbora*) at his head (*a su cabezera*) (BL 1605).

The sacrifice of a newborn infant presumably prevented the death of, and would cure, a sick person. One case that occurred soon after the beginning of missionization was that of a woman who had dreamt that her relatives were going to die. When she awoke, she strangled (*ahogó*) a child who had just been born, thus preventing the deaths of the others. Infanticide for this reason was said to be common.

Large dances were held to turn the tide of plagues. Visions of supernatural beings at this time—in the form of fire, deer, serpents, or a figure armed to the teeth (*de punta en blanco*)—would threaten the natives with illness because they had become Christians. The way to placate such spirits (i.e., the "devil," according to the missionaries) was to dance, the dances lasting three or four days and nights, the participants performing before an idol without eating until they would fall to the ground. Alegre stated that the old men involved in these ceremonies were both the sacrificial priests and doctors (Alegre II 1956: 151; Pérez de Ribas III 1944: 261–262, 269–271, 291; DHM 1598; DHM 1607). For Nuevo León, Alonzo de León mentioned old men as curers and the practice of child sacrifice to avert disaster (García 1909: 47, 49).

Specific characteristics of diseases were not mentioned, although deaths due to smallpox (*viruelas*), measles (*sarampion*), and *cocolixtli* (probably usually smallpox) were often referred to. In one instance some Chisos at Ocotán were reported to be afflicted with *mal de ojos* (evil eye?) (BL 1695a).

Once in the Mapimí country when disease struck (and despite the previously described performance of the ceremony regarding the comet), an attempt at child sacrifice was also made. When one of the chiefs became ill, his relatives tried to obtain a newborn infant. They went to the mother with deer skins, jugs (*jícaras*), gourds (*tecomates*), and strings of beads and bones (*sartas de cuentas y huesos*) to exchange for the child. The woman, at night, fled some three leagues from the pueblo. The others armed themselves and followed her but encountered resistance from her relatives, and a skirmish ensued. The mother then escaped to Mapimí. Meanwhile her now-frustrated enemies burned alive one of her child's (and hers?) elderly relatives who was sick in a hut. They then threw his ashes to the winds, saying that the plague would now cease (Pérez de Ribas III 1944: 275).

Another reason for child sacrifice was given in the *Anua* of 1606. Two children (*niños*) were strangled (*ahogados*) upon birth because the old men had dreamt of wars and disturbances and had persuaded themselves that these children were going to grow up and be troublesome and the cause of much harm. The chief told also that a son had been born to him a few days before and that afterward he had some very vivid dreams that convinced him that he should listen to the old people, although he did not carry the sacrifice through (BL 1606). The sacrifice of the firstborn was also reported (DHM 1598). The *Anua* of 1596 noted that the "superstitious" killing of children left the Indians less encumbered in their rovings (DHM 1596).

Shamans were involved in resistance to the Spaniards. During the Tepehuán Revolt, a medicine man at Parras tried to whip the people there into rebellion (BL 1616). Just prior to this, the 1615 *Anua* reported a medicine man some twenty leagues from Parras (direction unstated) who had a vision in which he apparently received a message, connected with the Tepehuan Revolt, for the people of the Parras-Laguna district. It is uncertain if he was a Tepehuán or not, although he had a relative living at Parras who had learned of this "plot" at a dance. The vision involved a great lord (*Señor*) who had appeared to him several times in the form of a human being, a deer, or other wild animals (*fieras*). These supernatural manifestations seemingly had told the medicine man that this "lord" was coming from the east to kill all of the Spaniards, Tlaxcaltecos, and (Indian and other) laborers (*gente laboria*), thus freeing the Indians from them. However, for this, the natives would have to take his message westward in order that all of the nations living in this region (*en esta derecera*) would recognize and obey him. The old medicine man gave his Parras relative a bow, which he claimed belonged to this great lord. All of the old Indians (*viejos*) of the Parras area revered this bow, and they kept it with much veneration in a house, because, they said, he who did not venerate it would die. A Tlaxcalteco learned of this, went to the house, took the bow and stamped on it with his feet, causing a great deal of wonder among the elders when he did not perish immediately (BL 1615a).

Some years earlier, a medicine man from the Nuevo León area—as reported in the 1600–1602 *Anua*—managed to incite the people at Parras. He sent some bows with a message "in which he said that everyone should be prepared (*se apercibiessen*) because those bows spoke in such a way that hearing them caused fright and astonishment, and that smoky (*fumosos*) winds were going to arise that would cause great evil so that a time would come in which the men would turn into women and vice versa, and other things of lesser consideration (? *partonas*)." One priest went out to stop this, and "coming one day along one of the streets of the town, he met an old Indian medicine man . . . who was carrying in his hand some bows and arrows of a very large size with some rattlesnake rattles (*caxcaueles*) and feathers and a piece of deer fat (*unto de venado*) and a hunk of half-burnt wood (tizón), and he was going from house to house boasting (*haciendo alarde*) of these insignias"(BL 1600–1602).

As previously noted, at least some chiefs presumably possessed supernatural power, and some may also have been shamans. On one occasion Indian declarants reported that during a *mitote* the Cocoyome leader, Juan de Lomas, performed a ritual in order to communicate with the supernatural. He filled a gourd container (*calavazo*) with water and covered it with a large piece of cloth (paño). Holding this in one hand, he took a cross with the other and announced to the rest that God had just come down from the "most high" and spoken with him. The message was for the Cocoyomes and Coahuileños not to surrender to the Spaniards at this time but to flee, as the latter were planning to kill them (AHP 1722Da). One instance of rebel Indian war magic was recounted by a Spaniard, who took it as an example of how the master of the underworld assisted the Indians. On an occasion when the Indians were being pursued, they invoked the devil, repeating the word "fog" (*neblina*). Immediately, a bank of fog had come up between them and the pursuing Spaniards (BL 1709–1715). Alegre cited a chief who communicated with a supernatural in the form of a woman (Alegre II 1956: 149).

The early missionaries reported many occurrences of visits by, and visions of, supernatural beings, which they considered to be manifestations of the devil. Some of these beings let themselves be seen in daylight. They were said to be "horrible" figures—sometimes a black man who shot fire from his eyes or expelled blood from his mouth and ears, or other times a wild beast that caused dread, terror, and fright.

One figure was in the image of a woman who would talk to people. The commands of these beings were backed up by the threat of sickness or death (Pérez de Ribas III 1944: 248, 286; BL 1605; BL 1614; BL 1616). On one occasion at La Laguna "two horrible black men with small, sunken eyes" preached to the natives that they should not let themselves be baptized because they would die of *cocolixtli*. Dreams among the Laguneros and Zacatecos were considered by them to be caused by the "devil," according to the missionaries (DHM 1598; DHM 1607). One sick woman was reported to have dreamt of a fierce and misshapen figure (BL 1606).

During the 1624 plague when many dances were performed to stem the tide of illness, the devil appeared in several forms—as fire, in the figure of a deer, in the shape of a snake (*serpiente*), or "armed to the teeth" (*armado de punta en blanco*) with an angry and enraged face. He threatened the natives that he would send another pestilence if they did not dance (AGN 1624). Tobosos, who sent messages to the Cabezas at Tizonazo around 1666 in an attempt to get the latter to uprise, had had a repeated vision that sanctioned their hostilities. This was "in the figure of a Spaniard, spewing flames from his mouth, and he would assure them in his exhortations that they would succeed in everything that they attempted" (BL 1649–1700). One Mataraje was disturbed by the devil in the figure of a black man who, however, was dispelled when the Indian was baptized (AGN 1622). Alegre told of Indians from the valley of Coahuila who arrived in Parras in 1669 saying they had had visions of "wonderful things" which included a figure suspended in the air who taught them to cross themselves and pray (Alegre III 1956: 298). For Nuevo León, Alonso de León mentioned that the people there had previously, but no longer at the time of his writing, experienced visions during dances (García 1909: 46).

One holy place or shrine was discovered by one of the missionaries when he followed a native, said to be possessed by the devil (*energúmeno*), to a place where supernaturals dwelled. These had the forms of a snake (*serpiente*) and of a priest of small stature so fierce and frightful that with his glance (*vista*) he had killed many people. Here the supernatural beings seemingly often made their appearances and spoke to the Indians. The location was full of human skulls and bones over which the natives had thrown rocks in order that—so it was reported—the deceased, who had killed so many people simply by looking at them, would not come out and appear before the natives. There were many petroglyphs on the higher rocks at this place. The aforementioned native who was followed to this place was said to be a shaman (Pérez de Ribas III 1944: 263–264; BL 1604).

The 1606 *Anua* recounted that the chief of the De la Peña group took a missionary to a large rock (peña) and removed a stone that covered a hole. This he showed to the Father, stating that before he and his people had become Christians the devil had destroyed (*despeasaba*—sic) many people at this place, disappearing later down this hole (BL 1606).

Pérez de Ribas reported one story of a supernatural appearance in particular which is strongly suggestive of a guardian spirit or *nagual*. This concerned a youth whom a supernatural being (*demonio familiar*) constantly accompanied. The being seemingly would appear to the boy (*mozo*) in various forms and would help him in many ways (Pérez de Ribas III 1944: 284). The *Anua* of 1624 speaks of a similar case (very likely the same one, judging from the language of the description). This being would sometimes appear in the form of a calf (*vecerro*); he would give the Indian everything he needed and could inform him of events in distant places.

A certain Indian woman was reported to have been accompanied by a demon who for six years had kept her terrified "day and night" in such a manner that she would lose consciousness because of his terror and threats (AGN 1624).

Arlegui mentioned the *nagual* specifically; he said that possession by a guardian spirit was customary among the people of the south in the mountains apparently meaning the Tepehuán or their neighbors (Arlegui 1851: 145). An old woman in the Laguna district reportedly kept a lizard (*lagarto*) in a cage (*enjaulado*). When asked why she watched over it with such care, she answered "that it was her God whom she adored and feared a great deal." The priest attempted to demonstrate to her that this was not true, when he threw the lizard into the fire and it was consumed by the flames (DHM 1596). Another woman from the same mission was gravely tormented by the "devil," who every day would raise her from the ground over an *estado* in height, whirl her around in the air, make her froth at the mouth, and also make her face become twisted (AGN 1626).

Death and Burial

Some instances of death and burial exhibit a certain amount of religious syncretism of native and Christian elements. The dead were usually buried, although Gonzalo de las Casas reported cremation for a the Chichimecas to the south (Las Casas 1935). Alonso de León reported both cremation and burial for the people of Nuevo León, as well as endocannibalism and the pulling out and cutting of hair in mourning (García 1909: 42, 57). Aside from burial, hair cutting and the destruction of property seem to have been customary features. Tobosos were reported to have killed a Spanish woman captive they were holding just before they went to the Spaniards to make peace. They buried her and put a cross on her grave (AHP 1652Dc).

In another case, nine enemy graves of Cocoyomes and their associates were discovered at Pozo Hediondo. The deaths were thought to have been caused by sickness (AHP 1716Aa). On one occasion a Salinero discovered many dead and rotting bodies of the enemy, apparently Tobosos, in a cave at a peñol near the scene of a battle, assumed to have died there of their wounds (AHP 1653Ad). With regard to hair cutting, many locks of hair (*melenas*) were discovered at a rancheria that had been abandoned because of sickness (AHP 1716Aa). Another time Acoclames and Cocoyomes cut off locks of their own hair (*un poco de cabello*) because of grief resulting from the death of their comrades (AHP 1704Ab).

In 1652 Indian scouts discovered an abandoned camp, apparently belonging to the Salineros and Cabezas, out in the Acatita area. They recounted that "they found many utensils (*trastes*) with which they [the enemy] served themselves, and very scattered, and many locks of hair that, it seemed, belonged to women, which they had cut (*tusado*) and with that demonstration they let their great sorrow be known of the many people [killed] and the loss that they had suffered in the battle of Acatita" (AHP 1652Ab). An Indian camp, apparently abandoned because of plague, revealed many locks of hair thrown about, many *guacales*, "and many broken ollas and there was [also] found destroyed in the said place arms, quivers, deer skin bags (*costales de gamuza*), *lienzos de cria* and others, Cholulan and Mexican cloth (*paño*), cloaks (*capotes*), overcoats (*gabanes*) and *almellas*, and the said dead bodies which were recognized to be of both sexes, were wrapped (*amortajados*) with the above-mentioned items, some with crosses placed [on them] and others without them and at the heads (*cabezeras*) *reales* and other things were piled (*agregados*)" (AHP 1716Aa).

A mourning wail was also reported. Following a skirmish with the Cocoyomes in which eight of the latter had died, the women at the top of the mountain at Sierra Mojada were heard crying (AHP 1715Aa). After another battle at Sierra Mojada, the women were heard wailing (AHP 1716Aa). After the Gavilán band was decimated, when the Cocoyome camp heard the news, the women put up a great wailing (1693b). Another time Spanish troops burned alive some of the enemy when they fired the brush (*monte*), and the mourning wail was later heard (AHP 1656Aa).

Indian scouts reported after they had visited the Peñol de Nonolat that "they saw a large number of enemy Indians who were all crying over the dead at the said peñol and they had broken the crosses and disinterred Don Gerónimo and [had] chopped him (*echolo*) into pieces and [they had] buried many of their own" (AHP 1653Aa).

Other sources refer to the extraordinary wailing of the Laguneros. Friends and relatives of the deceased would get together at the grave, with their faces painted or blackened, and then the men and the women would wail their sorrowful tune. Singing and dancing were part of mourning activities, and women friends and neighbors acted as mourners (cryers, *lloraderas*). The qualities of the deceased—his deeds, bravery in war, prowess in hunting, ability as a provider for his children, as well as the hardships his absence was going to cause them—would be sung (Pérez de Ribas III 1944; 262, 282; BL 1614 DHM 1598). Wailing was also practiced by the Nuevo León peoples (García 1909: 57). The Chisos settled at San Francisco de Conchos in 1713 were reported to have held a dance because of the sentiment they felt over the death of a Batayoligla (BL 1709–1715).

A rite involving deerheads, often with the antlers still attached, seems to have had some kind of mourning significance. This may have been one of the exceptional (*celebres*) ceremonies that were performed at various times of the year. The heads were reverently kept in memory of the hunter who had killed the animal. A head would be taken out for the ceremony. After the dancing had begun one of the old men who presided over the affair would throw some pieces of deer bones and antlers into the fire. When the flame grew larger with this new fuel, he would "persuade" the people that this was the spirit of the deceased which was coming at this call to communicate to them the skill and prowess he had had during his lifetime as a hunter. His sons and relatives would be given some of these bones powdered in drink which would transfer to them the swiftness of the deer so that they could better pursue them while hunting. When one of the missionaries went to burn the deer heads employed during a curing ceremony the shamans said they would die if the smoke should reach them (Pérez de Ribas III 1944: 262–263; DHM 1598; DHM 1607).

Alegre gave a description of the same or a similar rite. The kinsmen of the deceased would keep the deer heads, and at the end of a year all would leave the house of the deceased at dusk, singing a sad and mournful song. An old woman would follow them with the head of the principal deer in her hands. She would put it in a fire on top of some arrows, but apparently out of reach of the flames, and around this the entire group would remain the night—she would cry and the rest would sing and dance. At dawn, the head would be thrown into the fire and when it had turned into ashes "the memory of the deceased would remain buried" (Alegre II 1956: 108; BL 1694–1698).

Little information is available about attitudes toward the dead. With regard to kinsmen, a Salinero woman declared that her people were happy to surrender and to return to Tizonazo because they had all their relatives buried at the church there (AHP 1652Dc). Attitudes toward the dead enemy can be inferred only from the ceremonial behavior. In one case, however, the Acoclames and Cocoyomes were said to have deposited the clothing of some priests, two of whom they had killed, in a cave on top of a framework (*tapeste*). They were afraid to wear these clothes lest they die, and a previous case in which this had occurred was reported (AHP 1704Ab).

One group or band (*parcialidad*), the Pachos of the Laguna district, believed that all of those who were present at the time a death occurred would also die. Therefore, anyone whom they considered to be in the last throes would be taken to the grave (*sepultura*) to die there or be buried alive so that the rest would not be present when it happened.

In another place is related the case of a boy who was kicked in the head by a horse. His relatives quickly assumed that he was dead and set up a wail that lasted all night. This premature beginning of mourning may be an example of the above-mentioned belief. However the boy was much recovered by the following day. His relatives killed the horse in retaliation (Pérez de Ribas III 1944: 262, 282; BL 1614; DHM 1598).

The *Anua* of 1600–1602 describes the burial and mourning of an Indian woman in the Parras area. The old men and women were seen "to throw themselves forcefully upon the ground, to beat themselves, to dance and sing together, bewailing and crying over the deceased, and coming to the burial to inter with her all of the things (*trastos*) and trifles (*baratijas*) she possessed, and the old mother of this deceased woman buried herself alive with her dead daughter and she was covered up with earth with her, and she remained buried thus all day until the afternoon, when coming back to finish [the ceremony?—*bolviendo acabar*] she was found alive, which is a thing of admiration that she was not accidentally suffocated" (BL 1600–1602).

Other Beliefs and Customs

Other customs relating to the supernatural are reported mainly in the published literature. In the Laguna district, birth involved a five or six (Alegre) or six or seven (Pérez de Ribas) day abstention from eating meat or fish. This was on the part of the father who remained indoors, according to the *Anua* of 1604, for five to six days. This abstention was to prevent the game animals from becoming "contaminated," in which case they would retire to the mountains or to the deepest part of the rivers and the lagoon. At the end of the period an old man, a shaman, would come and lead the father out of the hut (Alegre II 1956: 107; Pérez de Ribas III 1944: 247–248; BL

1604).

Arlegui described a ceremony for the firstborn son of a father. This description is not repeated here with any detail, as there is no way of determining for which group it applies, although Arlegui leads one to believe that it was common throughout "Zacatecas" (that is, the Franciscan province). It should be noted that the ceremony involved a one-day fast for the father, after which he was given peyote to drink. Kinsmen and others would seat him on some deer antlers out away from camp (*en el campo*) where with sharp bones and teeth they would scratch him. The amount of suffering the father could withstand would indicate the bravery the son would enjoy (Arlegui 1851: 144–145). The same author cited a rite involved in the formation of fictitious kin (*parentesco*), which contains a number of similar elements (Arlegui 1851: 149).

Whirlwinds (*remolinos*) were also connected with the spirit world. Pérez de Ribas reported that the people who saw these would throw themselves on the ground, saying to each other, *Cachinipa*, "the name which they gave to the devil or to whom they feared, and revered in that whirlwind, because they did not know how to explain who it might be" (Pérez de Ribas III 1944: 248). The 1598 *Anua* made reference to whirlwinds, stating that the people believed that the devil, named *Cachiripa* (in another place simply *Chiripa*, and another *Cane*), was inside and that they would prostrate themselves so that they would not die (DHM 1598).

Arlegui stated that spirits were connected with natural phenomena and objects such as rivers, springs, and trees (an instance of the latter is cited for the Sierra de Colotlán) around which rites and beliefs were focused. He also mentioned beliefs about heavenly bodies influencing or controlling sickness and health (the rite performed at Mapimí) (Arlegui 1851: 152–153, 157).

The attitude held toward a deceased priest's clothing in one instance has already been mentioned, apparently a fear of the magic power the clothes might contain. Father Rodrigo del Castillo reported the great reverence Tobosos and Cabezas had for him when they captured him, as well as a request from one of the chiefs for some Holy Earth that Castillo had with him (AGN 1667).

Arlegui characterized some of the food beliefs for the central plateau, some of which may be pertinent here. Horses and mules were favored for consumption because these were swift animals, and some of this characteristic was believed to be transferred to the consumer of their flesh. Conversely, the flesh of cattle was looked upon as a liability. The Indians also ate the flesh of their own people in order to acquire whatever special traits the deceased might have possessed, such as healing powers or hunting skill (Arlegui 1851: 138–139).

It is possible that the bezoar stone (*piedra bezal*) was of generally high estimation in the region. One Simón de Echevarría wrote from Parras to the Indian governor of Santa Rosa de Nadadores, Don Diego de Valdez, a Quechale, in 1692, requesting such a stone (BL 1695a). While it is not certain that the stone was used by the local Indians, Mota y Escobar wrote that in the Saltillo area that the bezoar was found in a certain kind of *ciervos* called *comicabras*. The local natives constantly hunted them for the stone because of the great demand for them among the Spaniards. They traded these and others they made from a certain kind of earth and *betún* (tar, wax?) to the Europeans (1940: 163).

Games

Slight information has come to light regarding two games played by the Indians. The Acoclames and Cocoyomes specifically were reported to have played *patole* and *pelota* (AHP 1704Ab). Both games were described for the general area by Arlegui.

Patoli (*patole*) consisted of six small sticks of the same size with different marks on them, used as dice. These were thrown together to the ground, and wins or losses were calculated according to how the sticks landed. When the dice were thrown the player(s) would beat themselves on the chest, the one hitting himself the hardest being considered the strongest.

Pelota, which Arlegui called *hule* (i.e., *pelota de hule*), was played on a large plain, three or four leagues long. Equal sides would be chosen and a final goal line determined. The players had sticks of *encino* with which they would hit the ball. Eventually one side or the other would get the ball to the goal line, although this might take several days, the spot where the ball rested at the end of each day marked so that play could resume there the next. Betting was common, and much drinking and shouting went on during the games (Arlegui 1851: 148–149).

The Spanish captain, Martín de Alday, of El Pasaje Presidio, mentioned both *pelota* and horse racing being played while he was negotiating peace with the Cocoyomes during a campaign in the back country. He wrote, "and to the said Indian Alonso I ordered given a horse from those of my *silla* and they ran (*corrieron*) the game of *pelota*, the Coahuileño Indian auxiliaries with the Cocoyomes, betting clothing, and the said Cocoyomes won." The next day the Babozarigame auxiliaries came out in defense of the Coahuileños, but the Cocoyomes won again. The Cocoyomes immediately made a match with the soldiers for a horse race, the soldiers winning on this occasion. Then horses were traded for cloaks (*capotes*) and *justacores*. On another occasion three Cocoyome messengers footraced with a soldier at the presidio of El Pasaje (AHP 1716Ab). The reference to horses connected with the game of *pelota* seems to evince cultural fusion, but unfortunately no description of the game is given. Betting was probably common. One ex-captive of the Cocoyomes reported (1710) that Ceja Blanca's band went to the camp of the Cocoyomes, taking some spoils "which they went to gamble (*jugar*) at the said rancheria" (BL 1709–1715). Again, there is no description of the game.

Counting

Small stones or grains of corn were employed as an aid in counting when fairly large numbers were involved, at least in front of Spaniards during interrogations, and one Sisimble counted on his fingers (AHP 1653Ad; AHP 1704Ab; BL 1748; CD 1650a). Years were reckoned as *aguas* (rainy seasons) and months as "moons" (*lunas*) (AHP 1704Ab; AHP 1716Ab; AHP 1720Aa; AHP 1724Aa). Notched sticks may have been common for sending certain types of messages. The Salineros showed the Spaniards such a stick which recorded the number of enemy they had killed (AHP 1653Ad), and the Chisos did the same with a notched bow (*arco rayado*) (AHP 1655Ab). Smoke signals were also used for communication (AHP 1716Aa; AHP 1722Aa).

Language

Information regarding the various languages and dialects of the Greater Bolsón area is extremely limited, and broader linguistic relationships and individual language boundaries for the most part remain obscure. Much of the documentary evidence is inconclusive and confusing, although some of it does suggest a few rather definite conclusions. However, some of the problems that contribute to the inconclusiveness and ambiguousness of the evidence should first be mentioned.

Real progress will not be made in unraveling the linguistic complexities of this area until adequate, substantial data can be compiled in the form of vocabularies and grammars. The information offered here is believed to be the best available at present. For the purpose of this discussion, it is assumed that negative evidence—that is, statements referring to dissimilarities between languages—carries more weight than does information indicating likeness.

One of the principal problems stems from the fact that considerable bi- or multi-lingualism existed on the north Mexican frontier in the sixteenth, seventeenth, and eighteenth centuries, although no doubt it diminished as time progressed. Some bi-lingualism must have existed even in precontact times, owing to the practices of intermarriage with and the capturing of children of neighboring bands. With the Spanish conquest of the area and the greater movement of peoples and contact among different groups, multi-lingualism probably increased, and a considerable amount of dialect leveling undoubtedly occurred.

Early observers of the general region noted a great number of languages, although it may have been that some of the differences assumed to be on the "language" level were merely dialectal. Alonso de León wrote that there were a great number of languages in the neighboring area of Nuevo León (García 1909:32). The 1607 *Anua*, speaking of the Parras-Laguna district, referred to the "very great variety of tongues that there are among them and none of the tongues so general that it was used among all, of which their ministers might make use" (DHM 1607). Mota y Escobar about this same time contradicted this somewhat, stating for the people of Parras that although they comprised distinct nations and languages, the Irritila tongue was understood by all (Mota y Escobar 1940: 164). While no statements have been found that refer specifically to Tobosos, Chisos, and Coahuileños, it is reasonable to assume that some dialectal variation may have existed in the languages of these groups also.

At the same time, the use of the Mexican (Nahuatl) language was widespread in the region; it was employed as the daily operating language on many haciendas and other Spanish holdings, and it was also used as a *lingua franca* where Indians of different tongues got together. Its use was noted by the Jesuits in the earliest days of their penetration into the Parras-Laguna area. Arnaya in 1601, and the 1600–1602 *Anua*, stated that the Mexican language had been learned by the Indians when many had been away working for Spaniards (BL 1600–1602; DHM 1601). In 1598, the *Anua* noted that *mexicano* was of general use in this district, and the most *ladino* of the people prided themselves in speaking some, although they did so "barbarously" (DHM 1598). Mota y Escobar made virtually the same observation (1940: 164), and Tello noted the common use of Mexican among the Chichimecas farther south, although they also spoke their own languages (Tello 1891: 776).

The use of Nahuatl was so extensive, especially in the seventeenth century, that many Spaniards knew the language. Although no attempt has been made here to document its use thoroughly, a few examples are cited. In one attack the enemy was reported to have spoken Concho and Salinero, as well as fluent Mexican (*ladinamente*) (AHP 1657Bb). Two Indians speaking Mexican were judged by a native speaker of the latter to be Salineros because of their accents (AHP 1657Bb). In an attack upon some Tarahumaras, Conchos spoke to them in Mexican (AHP 1653Ae). A *borrada* Indian woman, fluent in the Mexican tongue and who also knew Salinero, stated that while a prisoner she had overheard the enemy (unidentified), who did not speak Salinero, to the effect that, "by some words that she heard from the said three Indian women in Mexican, she learned that . . ." (AHP 1654Aa). A number of hacienda workers were said at one time or another to speak *mexicano* (e.g., AHP 1685Da).

One interesting statement exists regarding the quality of this Mexican spoken in the north. An edict was published in Nahuatl in 1684 at the time of the *residencia* of an official. One recipient of this edict at San Juan y la Concepción stated in his acknowledgement of receipt that "el lenguaxe mexicano que por aca se estila esta tan adulterado quanto basta para no entender la perfecta lengua mexicana q es la del Edicto"(AHP1684Ab).

Interrogations of Indians were carried on either in Spanish (more frequently as time went on) or in Mexican, although the native tongue of the questioned was not Nahuatl, or an interpreter in Mexican was appointed along with one in the native language, in which case three languages—Spanish, Mexican, and the native—were employed (e.g., AHP 1658Aa). This use of *mexicano* also shows up in a number of places, bands, and personal names—for example, Ocotán (Ocotlán), Acatita (Acatitlán; Martínez del Río 1954), Cocoyome, and El Tecolote.

It is for these reasons, as well as because most native terms that occur in the sources do so with no stated meaning, that the aboriginal words and names collected during the course of this study are of little value. Moreover, it is dangerous and fallacious to rely to any degree upon the tribal or band identity of persons who interpreted for natives during interrogations, because usually, after the interpreters were appointed, it was not stated in what language the questioning actually was carried out. Sometimes this questioning was entirely in Mexican and Spanish, as a number of the back-country Indians knew some of one or both of these languages, learned during the short periods they were under mission control or while working for Spaniards. Nevertheless, in lieu of better evidence, a few instances of the kinds of interpreters employed are given for what little value they contain. At the same time, statements about language made by Spaniards should be held highly suspect, as usually it is not clear if and when they possessed any real knowledge about the Indians.

There seems to be little doubt that the Tobosos, Nonojes, Acoclames, Ocomes, Cocoyomes, and other "Toboso" groups spoke basically the same language. In 1654 it was stated that "the Tobosos . . . had joined with Casa Zavala and with the Nonojes and Acoclames because of being companions and of the same language." Prisoners who belonged to the Tucumuraga, Mamorimama, Ocomite (Ocome), Coyote (Cocoyome?) nations were questioned apparently by the same interpreter on one occasion, but the language employed was unstated (AHP 1654Ac). In 1645 it was reported that one Cristóbal "served as interpreter because he understands the tongue of the said Tobosos and other said nations and Castillian"—the other said nations here being Nonojes, Acoclames, and Ocomes (AHP 1645Aa). In 1692 three Tobosos were chosen as interpreters for the "Toboso, Cocoyome, and Gavilan language" (BL 1693b). A year later Governor Pardiñas wrote that the Gavilanes, Cocoyomes, and Jococomes (Ocomes) spoke a single language (BL 1694–1698). In 1715 and in 1720 that language was explicitly noted as "the Acoclame and Cocoyome language" (AHP 1715Aa; AHP 1720Aa).

The Chisos apparently spoke the Concho language. In 1684, when Conchos and Chisos were interrogated, the same person interpreted for both groups. This interpreter was said to use "la lengua chisa y Concha," and this was later referred to "En el dho Ydioma" (AHP 1684Aa). One witness, in support of his identification of attackers while testifying in 1710, stated that "he knows the Acoclames very well, ever since they were settled in peace at Atotonilco . . . and that also he recognized that there were Chisos because these speak the Concho language which the Cocoyomes and Acoclames do not speak and he heard them [speak] the Concho language which the witness understands very well" (BL 1709–1715). (See also: Kroeber 1934; Sauer 1934.)

Chiso and Toboso seem definitely to have been distinct languages. Moreover, interpreters interrogating some supposedly Toboso children, who were actually Chisos, stated that the declarants could not understand "Toboso" (AHP 1655Ab). Another instance, quoted here at some length, indicates the difference between Cocoyome (Toboso) and Sisimble (Chiso). For the interrogation in the case against the Sisimbles in Durango in 1748, a Spaniard, Francisco Páez, who had been a captive of and virtually raised by the Cocoyomes, was chosen as interpreter. With the first confessant, the Sisimble leader Juan Nepomuceno, it was reported that "having spoken in a language that the said interpreter stated was that of the Cocoyomes, the said Indian became astonished (*suspenso*), without answering him, and having questioned him again, he continued in this uncertainty . . ." still with no answer. With this, "the said Indian was made to understand by signs and words if he was a Cocoyome, to which he responded with only this word, 'Sisimble,' indicating with his head that he was not a Cocoyome, with which demonstration and other words that he uttered in his language the interpreter said that what the Indian was speaking was not the language of the Cocoyomes which he understood, because he had understood nothing of what was spoken to him" (BL 1748).

However, this evidence does not necessarily mean that Toboso and Chiso belonged to entirely different linguistic stocks. One statement made by an Indian of unstated ethnic affiliation may indicate that the two languages were related and somewhat similar, and that a person with a certain amount of linguistic sophistication or experience who spoke one of the languages could perceive similarities and fairly readily learn at least to understand the other. During the interrogation proceedings of this ex-captive of the Cocoyomes, it was stated that "since the confessant knows the Concho language and it is somewhat similar to that which the Tobosos speak, he understood very well what they said" (BL 1693b). Also, the governor, Francisco Bautista, of the settled Tobosos at San Francisco de Conchos, often interpreted for Chisos together with another Toboso (BL 1693b), but again this constitutes extremely flimsy evidence.

On the basis of nonlinguistic evidence the Cabezas, Salineros, Mayos, and Babozarigames were Coahuileños (BL 1674; BL 1676; BL 1722). This probably also included the Matarajes, Baborimamas, and even the Cíbolas from Coahuila. However, most of the information that might hint that the Salinero-Cabeza language was similar or different from others of the area is quite vague and inconclusive.

"Salinero" was apparently definitely different from Tepehuán and Concho alike. In 1650 it was stated that the Salinero language spoken at the missions of Tizonazo and El Zape was distinct from Tepehuán (AGN 1648–1649), and earlier Tepehuán was said to be different from both Zacateco and the language of Mapimí (Irritila and/or "Salinero"?) (AGN 1607c). With regard to Concho, it was stated on one occasion that "the Cabezas spoke to the enemy according to the Concho who did not understand them because their language is different from his" (AHP 1654Ac). Witnesses, testifying about another attack, distinguished between the Salinero and Concho languages that were used by the enemy (AHP 1657Bb).

The evidence is somewhat more confusing with regard to Toboso and Salinero, although apparently these were distinct (mutually unintelligible) languages. Once, when Salineros and Tobosos were being questioned, when it came the Toboso's turn, a new interpreter had to be chosen. His name was Juan Concho, although no tribal affiliation was given, and it is questionable how much his "surname" can be taken to indicate this (although from another source it appears he might have been a Salinero or Cabeza; AHP 1653Bb). At this time it was stated that "inasmuch as there is no one in the camp who understands the Toboso language, and there is no other except Juan Concho friendly Indian who [can] declare to the interpreter of the government in Mexican" (AHP 1652Dc). Again, a woman who had been held by rebels at Acatita claimed she could not understand the language they spoke as they were not of the Salinero tongue, which she apparently understood; her husband was a Salinero. Apparently, the group she referred to was "Toboso," but this is a pure guess (AHP 1654Aa). Another time, some Salineros indemnified a group as speaking both Toboso and Concho, and one of these enemies had spoken to the Salineros in Mexican. This might indicate a difference between Salinero and both Concho and Toboso, although it is not stated whether the Salineros were spoken to in any other language (AHP 1655Ab).

There is some evidence that contraverts this, however. A Tarahumar was reported to have declared that "during the time of the battle he recognized that they were speaking the language that is common to Tobosos, Gavilanes, and Salineros" (AHP 1657Bb). Once, for the interrogation of a Toboso prisoner, two interpreters were appointed, one for the Mexican language and the other, Francisco Mama the Salinero "for his own native tongue" (*para la suya natural*) (AHP 1653Ad). In both of these cases there is no assurance that either the Tarahumar or the Spaniards -could actually recognize the difference between Salinero and Toboso, if there were any. At later dates, a Cabeza acted as interpreter for the Cocoyomes (AHP 1704Ac) as did a Babozarigame (AHP 1722Ab; BL 1722); the language of the interrogation was not stated.

One shred of evidence indicates that "Lagunero" (Irritila?) was distinct from "Salinero." A "Lagunero" telling of a meeting between Coahuileños and Cabezas in Parras stated that he did not understand the language they spoke (AHP 1722Ab). Presumably a Lagunero would at least recognize, if not understand, Spanish, his own language, and Mexican—the latter owing to the Tlaxcaltecan population resident at Parras. It is also possible, of course, that the language of this "Lagunero" was Zacateco or Cuachichil.

For the greater Parras-Laguna district, early missionaries reported that they employed the Zacateco language up close to the district itself. Father Ahumada claimed that the major portion of the Nazas River was Zacateco-speaking, and he added that the language had the widest use in "all of this mission" (of Parras?) (AGN 1607c). The Jesuit Arista states that the catechism at Parras had been put into two languages, but he gives no hint as to what these were. The 1598 *Anua* said that one language was Irritila, which belonged "to this valley" (apparently of La Laguna), and the other was Mexican (Pérez de Ribas III 1944: 251–253, 256; DHM 1598). Ahumada also stated that the language of a great many of the Indians of Mapimí was Tepehuán; but, unfortunately, he does not say what the language of the remaining people was (AGN 1607c). Decorme divides the general area into three languages: Zacateco along the Nazas River and south westward; Irritila at Parras, Patos, La Laguna, and Mapimí; and, Toboso north of the latter region—but it is not clear on what this classification is based (Decorme II 1941: 17).

The Cocoyome language apparently was different from Tepehuán. A Tepehuán woman stated that she could not understand the language of the Cocoyomes (BL 1693b).

Only six native terms with meaning have been located during the course of this investigation. Two are Chiso, one is Toboso, one is Salinero, and the other two are from an unidentified language or languages from the Parras-Laguna district—this may have been Irritila, if in effect it was a distinct language.

(1) *Chiso*: *sibalba*, "agua del zorrillo" or "skunk water," and *bayacabam*, "donde se acaba la corriente," or "the place the stream terminates." These were names for two water

holes picked up by General Juan de Retana in a campaign of 1693 into Chiso country. The route went roughly eastward from the town of Julimes (BL 1695b).

(2) *Toboso*: *cable cable*, "*soy sacerdote*" or "I am a priest." This is apparently "Toboso," although it could be "Cabeza." The writer of this letter, Father Rodrigo del Castillo, while a prisoner of a combined group of Tobosos and Cabezas, stated that he went toward the Capitan General who led them, ". . . fuime para el diciendole, *Cable Cable* que en su lengua quiere decir Soy Sacerdote . . . vino luego otro Toboco . . ." (AGN 1667).

(3) *Salinero*: *Baturi, Baluzi, Baluri*, "Pies de Liebre" or "rabbit's feet" (Alegre III 1959: 37, 40; DHM 1645).

(4) *San Pedro de la Laguna*: *naboya*, said to be the name for the *balsas* used at San Pedro de la Laguna (BL 1605).

(5) *Parras*: *noas*, a kind of mescal described for the Parras district (Mota y Escobar 1940: 170).

14. Cultural Affiliations of the Seven Rivers Sites

The geographic proximity of the project sites to the Brantley Reservoir invites the placement and discussion of the sites within the Brantley cultural sequence (Katz and Katz 1985a). Katz and Katz's (1985a:396–402) interpretation of their sequence suggests that, during the various Archaic periods (up to about AD 750), the inhabitants of the Brantley locality focused their subsistence efforts in the Pecos River Valley and its immediate environs. Like the Brantley projectile point assemblage, the few Archaic points recovered from the Seven Rivers sites represent a number of types that are characteristic over broad areas in most directions and provide no specific indications of cultural relationships with other regions. Not surprisingly, most of the Seven Rivers project specimens are duplicated among those recovered by the Katzes from their Brantley sites. One surprise, however, is the absence of the San Pedro type in the Seven Rivers assemblage.

In the first pottery-period phase, the Globe phase (AD 750–1150), the Brantley occupants appear to have shifted their subsistence efforts to emphasize upland plant communities to either side of the Pecos Valley (Katz and Katz 1985a:403). In the Seven Rivers project assemblage, one piece of evidence for this shift is the prominence of Livermore-style points in the projectile point assemblage. Although the Seven Rivers assemblage is small and therefore potentially subject to statistical problems, it should be noted that this point type as a major component of assemblages is common in caves and open sites in the Guadalupe Mountains, foothills, and the intervening Indian Basin (Applegarth 1976, 1977; Roney 1995). This has been known for some time, for, as Applegarth (1977:7) states, "The projectile point types which are most common in the sites west of Carlsbad are Livermore and Harrell." Phippen et al. (2000) also recovered large percentages of these points from sites along Cornucopia draw, 20 km *west* of the Guadalupes.

Outside of the Guadalupes/Cornucopia region, this type of arrow point generally occurs only occasionally and then only in small numbers in most assemblages. Once in a while, individual sites outside this region are found to have large numbers of Livermores; the Neff site, on the Rio Felix, 50 km north of the Guadalupes, is one example (Wiseman 1971). Given this emerging pattern, it therefore seems likely that Livermores are the work and marker of a particular ethnic group. The territory of this group evidently included the Davis Mountains region of the Texas Big Bend country, where the Livermore phase and point style were first defined (the Davis Mountains are 250 km south of the Guadalupes).

The dating of Livermore points is not well established. Estimates include AD 800 to 1200 (Lord and Reynolds 1985) and AD 900 to 1400 (Turner and Hester 1993). Katz and Katz (1985a) use a much shorter period, AD 1000–1150, for the Brantley locality, at least in part on the strength of two radiocarbon dates, AD 1135 ± 50 and AD 1140 ± 55 (Wisc-577 and -578, respectively), from Ellis shelters 1 and 3 (Applegarth 1976:123), a group of small shelters west of Carlsbad along the middle reaches of Rocky Arroyo.

15. Addressing the Data Recovery Questions

1. What types of features and artifact assemblages are present at the project sites? What types of tools and manufacture debris are present? What are the relative abundances of the various types? On the basis of the features and artifacts, what types of activities were performed at the sites? How do these assemblages compare with those from other sites in the region?

LA 8053 (Honea's Site)

Most of the excavated features at LA 8053 were the remnants of campfires or hearths. The larger (1–2 m diameter) burned-rock concentrations might have been small, on-ground baking facilities (Black et al. 1997), probably for family-size commensal units. Storage pits and structures indicative of long stays and/or base camps appear to be absent.

The artifact assemblage is small, but tool types and manufacture debris are fairly diverse: 2 manos, 1 metate fragment, 8 arrow points, 2 dart points, 2 end scrapers, 17 flake tools ("utilized flakes"), 1 graver tool, 1 Pecos Valley Diamond or double-terminated quartz crystal, and 128 potsherds representing perhaps as few as 14 vessels. Stone tool manufacture by-products include 16 whole and fragmentary roughouts (first-stage bifaces), 2 fragmentary fine (or second-stage) bifaces, and 3,270 pieces of debitage (cores, flakes, shatter). All of these items suggest plant-food processing, hunting-kit refurbishing, hide processing, food preparation and consumption, and perhaps a few other tasks of limited scope. The Pecos Valley Diamond could have been a curiosity, a child's toy, or perhaps something useful in the religious/curing realm. From all of this, I postulate that LA 8053 served as a base camp.

The types of features and artifact assemblage, plus the low artifact frequency, suggest short-term occupations, probably lasting several days to a few weeks. The presence of grinding equipment and hunting paraphernalia indicate the presence of men and women and therefore, probably, children. At least three and possibly four occupations are suggested by dart and arrow points, pottery, and the radiocarbon dates.

An oval arrangement of five excavated and two unexcavated burned-rock thermal features in the West Block suggests a purposeful arrangement of facilities that was used simultaneously by a single group of people. Another aspect of this arrangement, suggesting cohesiveness of the thermal feature oval, is a dense concentration of lithic knapping debris within the oval. A sixth thermal feature, a nonrock hearth, was used much later and therefore could not have belonged with the other thermal features in the oval even though it rounded out the symmetry of the oval. We suspect that a sixth rock thermal feature belonging to the oval lies in the unexcavated area north of the nonrock thermal feature, TF 6.

A second, smaller thermal feature group at the north end of the East Block had two rock thermal features, one on either side of a concentration of knapping debris. Confounding interpretation, two nonrock thermal features lie within the limits of the lithic concentration. Since the lithic concentration suggestively skirts but does not abut the two burned-rock features, it seems likely that the rock thermal features and the knapping debris are part of the same occupation. Such an association is buttressed by the relationship of the lithic pattern associated with the thermal feature at LA 112349. There, the thermal feature is surrounded by a space devoid of artifacts, indicating that lithic debris was not generally allowed to accumulate immediately adjacent to in-use facilities. Thus, further doubt is cast on an occupational association between the nonrock hearths and the lithic concentration at LA 8053.

LA 38264 (South Seven Rivers Site)

Although the excavations conducted at LA 38264 were more limited than desired, the number and types of features found are fairly diverse. No structures were found, but that does not mean that they do not occur in unexplored sections at this site. The documented features are all heating/cooking facilities, including small burned-rock features (campfires), small nonrock features (campfires of a different sort), small burned-rock on-ground baking facilities, small pit-baking facilities, and a communal baking facility (or "midden circle").

The artifact assemblage contains a fairly wide variety of mostly fragmentary tools and much lithic manufacture debris. The assemblage consists of 6 manos, 8 metates, 20 dart points, 4 arrow points, 2 conjoinable fragments of the same beveled knife, 6 end scrapers, 2 side scrapers, 2 end/side scrapers, 1 large flake knife, 1 large flake tool, 124 flake tools ("utilized flakes"), and 37 potsherds representing perhaps as few as three vessels. Stone tool manufacture by-products include 30 whole and fragmentary roughouts (first-stage bifaces), 12 whole and fragmentary fine (or second-stage) bifaces, 8 miscellaneous biface fragments, 1 arrow point preform, and 14,942 pieces of debitage (cores, flakes, shatter). These items indicate plant-food processing, hunting-kit refurbishing, butchering, hide processing, food preparation and consumption, and perhaps other tasks of limited scope.

The types of features and artifact assemblage, plus the low artifact frequency, suggest short-term occupations that probably lasted a few days to a few weeks. Grinding equipment and hunting paraphernalia indicate the presence of both men and women and therefore, probably, children. At least eight occupations are indicated by the dart and arrow points, pottery, and the radiocarbon dates. Unfortunately, we have no way of knowing whether the full range of activities represented by the artifact assemblage was engaged in during each occupation.

Initially, the arrangement of thermal features in the excavated part of the site suggested a rather tidy activity organization focused on the communal baking facility, TF 4. Next to TF 4 lay a zone devoid of features, suggesting that it was here that the users of TF 4 stockpiled the fuel, heating elements (rocks), and foodstuffs to be cooked. Next to that, a grouping of campfires, small baking facilities (for individual families?), and a major density of knapping debris suggest a main camp. Beyond that, facilities and artifactual debris were more widely spread, creating a zone believed to be for peripheral activities.

However, the radiocarbon dates and the artifact analyses did not support this zone idea. The problem was that although not all of the features could be dated, the dated features and their positions relative to one another indicate that this site was occupied only by small groups many times over a long period. Since the communal baking feature, TF 4, dated early in these occupations, all subsequent occupations had no obvious reason to focus on that facility. The "main camp" area apparently saw the use of only one or perhaps two features at a time, negating any sense of clustering originally postulated for the zone. Over time several features were built, used, and reused in that area, and the archaeological remains suggest that this zone was the center of activity during most occupations in this part of the site.

The zone originally believed to have functioned as a preparation area for TF 4 was used by a group of knappers at an undetermined time for reducing cores and fabricating bifaces. The debris, especially the bifaces and biface fragments, form a clear circular pattern, indicating group rather than individual activity.

LA 112349 (River Crossing Site)

Our work in the prehistoric component of LA 112349 was restricted to point-provenience mapping, collecting surface artifacts, and excavating one of the two thermal features noted from surface indications. The unexcavated thermal feature, which lay outside the project area, is sufficiently large to suggest that it may be either a small on-ground or pit-baking facility. Like the surface artifacts, burned rocks not directly associated with features were few in number and widely scattered across the site. The surface artifacts include 1 end scraper fragment, 1 fragment of a possible end scraper, 1 manufacture biface fragment (roughout), 1 mano fragment, 2 potsherds, and 62 pieces of knapping debris.

During the Brantley Project in the 1970s, an archaeological team from Southern Methodist University collected a couple of dozen surface artifacts and excavated a test pit at LA 112349. However, we did not attempt to access the SMU records, nor did we include their surface collection of lithic debitage in our analysis.

Since the surface sands of LA 112349 are shallow and the artifacts were widely scattered, it can only be said that prehistoric peoples used this site on at least two occasions. The first use occurred between 1315 and 975 BC (late Avalon or early McMillan phase), when someone baked unknown foodstuffs in a small pit-baking facility. This date and feature type are very similar to the dates of small pit-baking facilities studied at nearby LA 38264. Perhaps the LA 112349 feature is part of that occupation.

The other use of LA 112349, as documented by two brown ware potsherds, was for unknown purposes during the late Brantley (AD 500–750), Globe (AD 750–1150), or Oriental (AD 1150–1450) phase.

The limited artifact inventory from LA 112349 suggests that hide-working (scrapers), plant-food grinding (mano), food preparation and consumption (pottery), and projectile point manufacture (?) were conducted at the site.

Discussion

Each feature type and most artifact types found at the project sites have been reported from surveys and excavations throughout most of southeastern New Mexico and adjacent parts of Texas. However, as far as we are aware, no other project to date in southeastern New Mexico has reported intrasite patterns like those at LA 8053 and LA 38264 East, clearly the result of the minimalist approach archaeologists usually employ in southeastern New Mexico sites. First, spaces between features are not excavated, precluding the recovery of the majority of artifacts and the discovery of patterns and relationships they might demonstrate. Second, when areas between and among features are explored through excavation, the work is usually accomplished with heavy equipment in an effort to locate more features and expedite the work. The artifacts found in these spaces are not systematically collected or provenienced.

One of the more important findings of this and other projects conducted in southeastern New Mexico over the past couple of decades is the nonrock thermal feature. These rather subtle fire pits rarely are seen from surface indications, yet they are commonly found where pottery is present and sufficient surface scraping is conducted. Although our dating results are not without their ambiguities, these features appear to date primarily, if not solely, to the Late Prehistoric and early historic periods in southeastern New Mexico and west-central Texas (Wiseman 2001b; Boyd et al. 1997:458-461). Both Wiseman (2001b) and Boyd et al. (1997) found that these features most often dated between about AD 800 and possibly as late as 1900.

Originally, I had suggested that nonrock thermal features that produced dates prior to AD 800 might be in error (Wiseman 2001b), but Lord and Reynolds (1985) excavated three nonrock thermal features that radiocarbon date (uncalibrated?) to the early and middle first millennium AD (Features 34, Q, and U at LA 10418). Thus, the use of nonrock thermal features in southeastern New Mexico probably dates between AD 100 and 1900, and most currently dated examples date between AD 800 and 1900.

2. What plants and animals were being processed or consumed at the project sites? What biotic communities were being exploited? Were the inhabitants of the sites exploiting all available biotic communities or only selected ones? Were cultigens being grown and/or consumed? What season or seasons were the sites occupied?

LA 8053 (Honea's Site)

Charred remains of five plant species and genera were recovered from LA 8053: sedge family, hedgehog cactus, saltbush/greasewood, mesquite, and agave. All but greasewood (*Sarcobatus*) have edible parts and probably indicate comestible use as well as fuel. Mesquite was the dominant fuelwood. TF 11, dating to the early Globe phase, produced a hedgehog cactus seed. TF 6, dating to the late Globe phase, produced a number of mesquite bean fragments and one piece of sedge family. TF 9, also dating to the late Globe phase, produced a number of agave stem, leaf, and terminal spine fragments. No cultigens such as corn, beans, or squash were recovered from the site.

Freshwater mussel shell fragments and pieces of bird eggshell are the only faunal remains recovered from LA 8053. Since mussel shell fragments are often found on sites throughout the lower Pecos valley in New Mexico and even on many sites in the sheet-sand country to the east, it is quite likely that these animals were consumed in small quantities on an opportunistic basis (see Wiseman 2002:175–178). The shells of one species, the Pecos pearly mussel (*Cyrtonaias tampicoensis*), were also used to make tools (Wiseman 2002:56–59) and ornaments. In my experience in southeastern New Mexico, bird eggshell is not commonly found in open archaeological sites. Because of this, and the fact that there is a wildlife refuge within a few hundred meters of the site, it seems probable that these eggshell fragments represent modern contaminants from nesting waterfowl.

The occupants of LA 8053 exploited at least three biotic areas—the South Seven Rivers/Pecos River riparian system for sedge and mussels, the desert scrub alluvium for mesquite and hedgehog cactus (?), and the desert scrub rocky terrain of the Seven Rivers Hills for agave and hedgehog cactus (?). These resource areas lie to the east and south within a minimum radius of 5 km of the site.

LA 38264 (South Seven Rivers Site)

Charred specimens of eight plant species and genera were recovered from LA 38264: *Portulaca*, pigweed, hedgehog cactus, cholla, saltbush/greasewood, mesquite, piñon, and rose family. All but greasewood (*Sarcobatus*) and rose family (depending on species) have edible parts and probably indicate use as food and fuel. Mesquite was the dominant fuelwood. Curiously, only two features yielded species other than those definitely used for fuel. TF 4, dating to the late Avalon phase and the Avalon/McMillan transition, produced *Portulaca*, pigweed, hedgehog cactus, cholla, piñon, mesquite, saltbush, and rose family. TF 1, dating to the late Globe phase, produced hedgehog cactus seed. No cultigens such as corn, beans, or squash were recovered from the site.

Eight species and families of fauna were recovered from LA 38264: woodrat, cottontail, jackrabbit, two species of freshwater mussels, hawk family, quail family, and the turtle/tortoise family. Other categories include unknown mammal, small mammal, small to medium mammal, carnivore, and bird eggshell. Two of the bones (quail and a small- to medium-mammal bone) and a couple of the mussel shell fragments are burned, but the rest are not.

The occupants of LA 38264 exploited at least two biotic areas: the South Seven Rivers/Pecos River riparian system for mussels and possibly turtles, and the desert scrub alluvium for all other plant and animal species except piñon. These resources would have been within 5 km of the site.

Since the few piñon specimens are wood charcoal, it is likely that they represent pieces of driftwood collected for fuel from along the South Seven Rivers drainage. Today, the nearest live piñon trees are in the Guadalupe foothills, 40 to 50 km southwest of the site.

LA 112349 (The River Crossing Site)

The only plant remains recovered from LA 112349 are fragments of mesquite and saltbush/greasewood charcoal, indicating their use as fuel in TF 1, a small pit-baking facility. These plants were used extensively at the project sites for fuel, and probably their edible parts were used for food as well.

No animal remains were recovered during our investigations at LA 112349.

Discussion

Flora

Several woody plants, especially mesquite, were used for fuel in the thermal features at the project sites. It is also probable that those plants were used for food. We also have indications that other plants contributed to the subsistence regime at the project sites. Unfortunately, these food plants have been identified for only two of the several phases represented at the project sites. However, an interesting and potentially important difference exists between the inventories of these two phases. No cultigens such as corn, beans, or squash were found in any of the samples at any project site.

The earlier phase for which we have subsistence data—the Avalon (Middle Archaic, 3000–1000 BC)—is represented by four and possibly five components (see discussion under Question 4). The Avalon/McMillan transition period (about 1000 BC) is represented by two and possibly three more components. Of these components, only the two (late Avalon and Avalon/McMillan transition) represented in TF 4, a communal pit-baking facility ("ring midden") at LA 38264, provide us with subsistence data other than that pertaining to fuelwood. In that single feature, we have evidence of the use of annuals and perennials: *Portulaca*, pigweed, hedgehog cactus, cholla, saltbush/greasewood, mesquite, piñon, and perhaps rose family (depending on species). Greasewood has no known ethnographic use as food, but saltbush does.

The later phase for which we have subsistence data, the Globe (or the early Late Prehistoric period, AD 750 to 1150), is represented by four and possibly five components among the project sites—three at LA 8053 (TFs 6, 9, and 11) and two at LA 38264 (TFs 1 and 6). All but TF 6 produced subsistence data other than that pertaining to fuelwood. The plants are perennials only: hedgehog cactus, mesquite beans, sedge family, and agave from TFs 6, 9, and 11 at LA 8053, and hedgehog cactus from TF 1 at LA 38264.

The presence of both annuals and perennials in Middle Archaic contexts but only perennials in Late Prehistoric contexts is pertinent to discussions of subsistence emphasis and change (see McBride, this volume). It is possible that the annuals *Portulaca* and pigweed are accidental intrusives into the TF 4 deposits, introduced as seeds clinging to, then dropping from, the site occupants as they used TF 4. However, we have no way of determining whether this is true and must, for the time being, consider them as aboriginal foods lost to the consumers. It is also possible that these annuals were collected and consumed during the Globe phase but not at the project sites. Rather, the collection of these foods might have taken place at other times of the year when the people were at other sites in their annual round. We have data of similar quality indicating that wild annuals were used by at least some Late Prehistoric peoples in the region, for the remains of several species were recovered at the Fox Place, near Roswell, 70 km to the north. Perennials are also well represented at the Fox Place (see Toll 2002). What other factors might account for these differences?

Both McBride (this volume) and Toll (2002) mention the possibility that surface geology and soils may be determining factors in the availability of various plant species. That is, the generally coarse-textured, rocky soils of the Chihuahuan Desert favor the xeric perennials such as the agaves and cacti. Annuals generally favor finer soils and substrates. As it turns out, the Seven Rivers drainage, of which the South Seven Rivers is a part, is at the current boundary between the Chihuahuan desert scrub to the south (but including the Seven Rivers drainage) and the desert grassland to the north (see New Mexico vegetation map in Dick-Peddie 1993).

Tony Burgess (1977; see Gallagher and Bearden [1980:22–26] for a shorter version) deduces much the same scenario in a reconstruction of the vegetation in the Brantley Reservoir area prior to Euroamerican settlement of the region. His work is based on actual fieldwork, combined with numerous factors including plant growth requirements, soils distributions, climate, and historic accounts. The resulting map shows that the Seven Rivers drainage (North, Middle, and South streams) displays a complex mosaic of communities. The immediate confines of the streams support a river complex. The terrace tracts among the streams support his savannah, grassland, and grassland and savannah communities according to the growth requirements of their key species. His xeric and savannah community is restricted to rocky uplands such as the Seven Rivers Hills, 2 km south of our project sites. He summarizes his reconstruction as follows:

> The combined effects of drouth, grazing, and erosion are thought to have brought about the removal of a substantial part of the original A horizon over most of the Brantley Reservoir. The loss of nutrients and organic matter along with continued use has reduced the potential of the area to support plants, and there has been a shift towards xeric communities and a lower successional stage. The depletion of surface water augmented this trend. Therefore it is assumed that most areas supported dominants with more mesic requirements than those currently occupying a given site. Locally this would favor grassland species over those of xeric

> shrubland. A second assumption is that the flora of the area has undergone little change, but the distributions of particular species has been altered. (Burgess 1977)

A rancher witnessed this very scenario during the early to mid-twentieth century along the lower Pecos River in Val Verde county, Texas (Hinds 1977). Although Val Verde county is 400 km (250 mi) southeast of Brantley and at a lower elevation, it still lies within the Chihuahuan Desert.

Not all authorities agree with the reconstruction of premodern vegetation community distributions as proposed by Dick-Peddie and Burgess. For instance, Kuchler (1964) saw the Seven Rivers drainage as a major vegetational divide. His Trans-Pecos shrub savannah (tarbush–creosote bush, Community No. 59) lies to the south, and his western shrub community (creosote bush–tarbush, Community No. 44) lies to the north. As the name implies, the former has a more open structure with more grass (but still a strong shrub content), and the latter, as shown by his photograph, is heavily dominated by shrubs. However, the fact that both Dick-Peddie and Burgess have conducted fieldwork in the region and directly studied southwestern vegetation communities over the years lends greater credence to their reconstructions.

In summary, two of three vegetation reconstructions for the Seven Rivers area of southeastern New Mexico posit the former existence of major grassland communities in the Brantley region. Grasslands require a certain depth of soil for survival, and that former soil appears to have largely disappeared through modern mismanagement of the land. Consequently, the reasons underlying both Toll and McBride's analysis with respect to prehistoric consumption of perennial wild vegetal foods over annual foods may be incorrect, leaving us with changes in cultural preference or some other factor(s) as potential explanations for this phenomenon. At a minimum, this possibility must be investigated further, and a much larger data base must be acquired before a full perspective can be obtained. Specifically, we must obtain data from a much larger number of sites dating to all time periods. The study sites must represent all plant communities and the full potential for plant species selection and consumption. Clearly, good vegetation and soils reconstructions must be available for the areas under consideration, though meeting this criterion will be a major challenge.

So how does all of this reflect on the selection of prehistoric plants for subsistence? In light of the previous discussion, we assume for the time being that the presence of only perennial plant foods at Late Prehistoric sites within primarily grassland habitats in southern New Mexico and especially at the project sites supports an interpretation that the Late Prehistoric peoples were, indeed, focusing on perennial plant foods to the exclusion of annuals. Thus, a shift in subsistence emphasis between earlier (Archaic) and later times—from a diet of combined annual and perennial plants to one reliant on perennials—may be accurately reflected in the archaeological record as currently perceived. But the change, instead of being caused by the nature of the soils of the area as postulated by McBride and Toll, may have been the result of some other factor. The reason or reasons for this change are elusive at the moment, but they provide a direction for future research.

This raises yet other questions. When working with a single site or a few sites in a small area, it is too easy to look to the immediate environment of that area for a reflection of prehistoric and historic subsistence practices. While this limited viewing may be more or less appropriate when dealing with horticultural peoples, it is definitely not appropriate with respect to most hunter-gatherers. True, the site or sites under investigation should reflect subsistence practices of the occupants at the time they occupied those sites, but this does not apply for the other site or sites and areas that these people occupied during the remainder of the yearly round.

What other areas and resources were the prehistoric and early historic peoples exploiting in southeastern New Mexico? How large were the overall (year-round) subsistence areas, and how were they oriented on the landscape?

After a lifetime of wandering across the southeastern New Mexico landscape, I have become intrigued with these questions. At first glance, for most modern people, that landscape looks vast, austere, and forbidding. For the most part, it is relatively flat, dry, sandy, brown, treeless, and windy. How could people on foot tramp these endless stretches in the food quest?

What size territory would have been required to sustain a small group of people throughout the year, year after year, century upon century? Thousands of known archaeological sites, and the anticipation of finding thousands more, attest to the fact that humans lived, even thrived out there.

To explore these questions, I conducted a pilot study to investigate the potential subsistence-area size required by small groups of individuals who worked together on a day-to-day basis in temperate climates (this report). These groups, assumed to be composed mainly of relatives, are referred to as local groups. A local group may be as small as a nuclear family or as large as several families plus one or more temporary or fairly permanent "hangers-on." Two or more local groups comprise the next larger unit, the band.

The results of the pilot study are most instructive. Given several assumptions, and depending on whether the local groups that occupied the project sites were centered on the Pecos Valley, west of it, or east of it, optimal use-area size would have varied from 1,000 to more than 4,200 sq km (Table 15.1). Unless the local groups were really small, say on the order of one to two dozen individuals per group, a use-area that was elongate and rectangular may have been too restrictive in lateral movement and would have required considerable longitudinal movement (lots of long kilometers to walk). Thus, I believe that the regular rectangle probably better describes prehistoric and early historic (prehorse) subsistence use-areas in the greater Seven Rivers region.

Importantly, given our assumptions, local groups that focused their livelihoods on the Pecos Valley probably had to travel long distances throughout the year to acquire both adequate variety and quantities of foodstuffs for year-round sustenance. Local groups focused to the west or the east of the Pecos Valley probably had smaller overall distances to travel through the year to achieve the same subsistence success.

Table 15.1. Estimated optimal subsistence use-area size requirements

Quadrat Shape	Location	Probable Use-Area Size (sq km)
Regular rectangle	Centered on Pecos Valley	4,200+
	West of Pecos Valley	2,000 to 3,000
	East of Pecos Valley	3,000 to 4,200
Elongate rectangle	Centered on Pecos Valley	3,000 to 4,200
	West of Pecos Valley	1,000
	East of Pecos Valley	1,000

This raises the question of whether any local groups of hunter-gatherers ever considered the Pecos Valley to be their home as opposed to merely a destination (farthest reach or a boundary) in their subsistence round. The settlement and subsistence reconstruction for the Brantley locality by Katz and Katz (1985a) suggests that at least some prehistoric peoples called the Pecos Valley home during the Archaic Avalon and McMillan phases. But, starting about the Brantley phase, their orientation (and home bases?) shifted to the uplands. In the Roswell area, to the north, once some prehistoric groups acquired cultigens, the Pecos Valley became home for some of them. This is well illustrated by the presence of Late Prehistoric farming villages such as the Henderson site and Bloom Mound. It should be noted that, as discussed earlier, no farming villages have yet been documented along the Pecos River in the Seven Rivers region or anywhere else south of Roswell.

Fauna

The presence of bone fragments in shallow, open sites always raises the question of whether they were part of the prehistoric refuse or postoccupational contaminants. The few burned fragments of bone from LA 38264 certainly represent prehistoric occupational trash. The questions raised by unburned specimens are a matter that we cannot settle at the present time. The distribution of unburned bone fragments in the site is especially interesting in that most were recovered from squares that lay immediately next to and under the lower edges of the two coppice dunes within the excavated area. Are these bones the result of the prehistoric occupations because of the deeper sand cover of the dunes? Or are the bones recent food debris left over by carnivores (snakes, burrowing owls, ferrets, foxes) that inhabited burrows in the dunes, or scattered remnants of natural burrow deaths?

The answers to these questions are further obscured by the fact that only one of the bone fragments comes from a cultural feature. However, this unburned cottontail bone was recovered from within 5 cm of the modern ground surface within the fill of TF 4 (and away from the dunes), raising the possibility that it was incidental to TF 4 and therefore does not date to the use of that feature.

Freshwater mussel shell occurs on sites throughout the Pecos Valley in New Mexico and even on many sites in the sheet-sand country to the east (Lord and Reynolds 1985). I consider it quite likely that the meat of these animals was consumed in small quantities on a regular basis (see Wiseman 2002:175–178). This is demonstrated by the regular presence of one species, the Texas hornshell (*Popenaias popeii*), the shells of which are too thin to be useful for ornaments or tools (Wiseman 2002). By way of contrast, the shells of another species commonly recovered from southeastern New Mexico sites, the Pecos pearly mussel (*Cyrtonaias tampicoensis*), were used to make tools (Wiseman 2002:56–59) and ornaments. However, because we are fairly certain that *P. popeii* was eaten by humans, it is equally probable that *C. tampecoensis* was also eaten.

In my experience in southeastern New Mexico, bird eggshell is rarely found in open archaeological sites. Because of the shallowness of the project sites and the fact that a migratory flyway and refuge is within a few hundred meters of the site, it is possible that these eggshell fragments are postoccupational, even modern contaminants from nesting waterfowl.

Having said this, it should also be recognized that the eggshells of the larger birds, such as the fragments recovered from the project sites, are rather thick and could conceivably have survived for long periods of time. After all, turkey eggshell fragments are commonly well preserved in the large, late pueblos of the Southwest (Lang and Harris 1984:97–101; McKusick 1981), though the deposits are deeper.

At our project sites, two major environmental factors would affect the long-term survival of bird eggshells: crushing into smaller and smaller fragments by human trampling and grazing animals, and an unascertained degree of solution/erosion by carbonic acid in rainwater. Carbonic acid is produced when rain falls through the air, dissolving carbon dioxide and producing a weak acid. The action of this weak acid on exposed eggshells might be the same as that on the vast exposures of San Andres limestone in the region—slow dissolution of the calcium carbonate present in both the eggshell and the limestone, resulting in further weakening of the materials and making them more prone to destruction.

We currently have no way of settling this issue, but we believe that the bird eggshell from the project sites must be added to the growing list of possible foods used by prehistoric peoples in the region. Bird eggs certainly could have been a welcome food at the lean time of the year (spring), when they were available. Obviously, this should be the subject of some experimental work.

And finally, it should be noted that although faunal remains were recovered from two of the three project sites, virtually none of them could be attributed to specific phases or periods because their proveniences in the broadcast refuse were not dated. Thus, we cannot assess their impact on prehistoric subsistence in other than general ways nor discuss them with respect to subsistence stability or change through time.

Comparison with the Brantley Settlement/ Subsistence Reconstruction

The Seven Rivers project data has permitted some refinements to the Brantley locality sequence and characterizations as proposed by Katz and Katz (1985a) and revealed through later excavation of their sites. One of the principal points of information comes from the discovery and documentation of the communal baking facility (or ring midden) that went unnoticed when LA 38264 was first recorded (Henderson 1976). In addition, while potsherds were present at LA 38264 (some of them recovered from the surface of the ring midden), radiocarbon dating showed that the LA 38264 ring midden predated the pottery period by 1,500 years or more. It is not surprising, then, that refinements to the Brantley sequence can be made under these circumstances.

In the following outline, the Brantley settlement/subsistence reconstruction (Katz and Katz 1985a) is summarized and compared to our findings during the Seven Rivers project. The phase sequence is as follows: Avalon phase (Middle Archaic, 3000–1000 BC); McMillan phase (Late Archaic, 1000 BC–AD 1); Brantley phase (Terminal Archaic, AD 1–750); Globe phase (early Late Prehistoric, AD 750–1150); Oriental phase (middle Late Prehistoric, AD 1150–1450); Phenix phase (late Late Prehistoric, AD 1450–1540); Seven

Rivers phase (ethnohistoric, post–AD 1450).

Avalon phase, Brantley locale. The subsistence pattern was primarily riverine (?), plus there was an upland component, the "specific nature" of which was unknown (Katz and Katz 1985a:398).

Avalon phase, Seven Rivers. This phase is one of the better represented ones at the Seven Rivers sites. Communal baking facilities ("midden rings") provide a partial definition of the upland component of the subsistence system. Annual and perennial plants were used. Agave was recovered from TF 9 at LA 8053 but was absent at LA 38264.

McMillan phase, Brantley locale. The subsistence pattern was riverine. Upland faunal procurement during this phase had "no counterpart in the previous Avalon phase subsistence pattern" (Katz and Katz 1985a:400).

McMillan phase, Seven Rivers. There were two separate occupations; one occurred very early in the phase (a continuation of the Avalon) and one late.

Brantley phase, Brantley locale. The "proportion of riverine to upland components remains the same," implying continuity from the McMillan phase. "The occurrence of rings [otherwise known as communal baking facilities, annular burned-rock middens, or midden circles] at the floodplain sites IW 23 and IW 29 is particularly instructive, as this is not the optimum location for this type of feature. It is well documented that rings are associated with the processing of agave and sotol, which are upland plants; and almost all rings in the region have been recorded in upland situations. The IW 23 and IW 29 features are thus contradictory, and they may very well reflect the intersection of an established settlement pattern with an innovative subsistence pattern" (Katz and Katz 1985a:402).

Brantley phase, Seven Rivers. Only one component at our project sites could be questionably assigned to the Brantley phase. It yielded no subsistence data. The communal baking facility (ring midden) at LA 38264 was not used during this or subsequent phases.

Globe phase, Brantley locale. A shift occurred away from riverine orientation towards greater settlement in the uplands. The floodplain-to-upland settlement ratio of 4:1 during the Brantley phase changes to 1:4 during the Globe (Katz and Katz 1985a:403).

Globe phase, Seven Rivers. Components of the Globe phase are well represented among the sites. The data indicate that only perennial plants, including agave, were used during this period.

Oriental phase, Brantley locale. The focus on upland resources over floodplain resources in settlement and subsistence continued (Katz and Katz 1985a:405).

Oriental phase, Seven Rivers. Only one dated component may represent the Oriental phase. It provided no data pertinent to subsistence practices.

Phenix phase, Brantley locale. Activity decreased at the Brantley locale during this phase. The focus was on animal procurement (Katz and Katz 1985a:406).

Phenix phase, Seven Rivers. No components of this phase were recognized among the Seven Rivers sites.

Seven Rivers phase, Brantley locale. The Apachean lifeway of hunting and gathering in the Seven Rivers region is seen as a continuation of the system employed by the Late Prehistoric peoples (Katz and Katz 1985a:406).

Seven Rivers phase, Seven Rivers. One component of the Seven Rivers phase was excavated, but it did not yield subsistence data.

3. What exotic materials or items at the sites indicate exchange or mobility? If present, what do such materials tell us about the directions and cultures potentially involved?

LA 8053 (Honea's Site)

Only two items recovered from LA 8053 are demonstrably nonlocal in origin. A dart point made from an earlier dart blade fragment is made of Edwards chert from central or west-central Texas. A second-stage manufacture biface appears to be made of Tecovas chert from the Texas Panhandle.

LA 38264 (South Seven Rivers Site)

Items made of exotic lithic materials are well represented at LA 38264. Most of the artifacts, including 51 pieces of debitage and 2 second-stage bifaces, are made of Edwards chert from central or west-central Texas.

Eight pieces of debitage and one arrow point are made of obsidian. Even though all are too small to permit chemical sourcing, this material was brought in from some distance. The possible source areas are northern New Mexico, southwestern New Mexico, south-central New Mexico (Rio Grande gravels as a secondary source for obsidians from northern New Mexico), and northern Chihuahua regarding the Chihuahua sources).

Five pieces of debitage are Alibates material, and a sixth is either Alibates or an Alibates look-alike material. These items ultimately derive from the Texas Panhandle or, in the case of the sixth item, from one of the look-alike sources in northeastern or east-central New Mexico (Guadalupe county or farther north). Since the look-alike source at Yeso, New Mexico, lies in the Pecos River drainage system, it is possible that the look-alike specimen from LA 38264 actually derives "locally" in the sense that it may have come to the Seven Rivers vicinity by river transport, where it was collected for use.

A single flake of black and red chert may be an example of one variety of Tecovas chert from the Texas panhandle (Brett Cruse, 1996, pers. comm.). This material is well represented at the Harrison-Greenbelt site in Donley County in the Texas Panhandle (Wiseman 1996b).

One of the more important artifact types recovered from LA 38264 is the alternately beveled or Harahey knife (Turner and Hester 1993; Hofman et al. 1989; O'Brien 1984). This type of artifact is not generally reported in the archaeological literature of southeastern New Mexico. Although these very distinctive bifaces are occasionally found in the region, they are rarely recognized because they are primarily a Plains phenomenon. When found by Southwestern archaeologists, they are usually called bifaces or knives, in the generic sense.

On the Plains and farther south in Texas, beveled knives are most often found in late Late Prehistoric and early Historic period contexts, especially in Plains Village period village sites. They seem to be closely associated with bison hunting. Small fragments of beveled knives, like the tip fragments recovered from LA 38264, have been found reasonably often in sites of eastern New Mexico, but because they are such small fragments of much larger artifacts, they do not receive the attention they should.

For many years now I have been collecting information on beveled knives found in New Mexico. The eight complete or nearly complete specimens currently in the data base are in both public and private collections and were recovered from Eddy, Lea, Chaves, and Lincoln Counties.

Finds of beveled knives are not restricted to the Plains sector of New Mexico. Several were recovered by A. V. Kidder (1932) at Pecos Pueblo (Late Prehistoric to Historic) in western San Miguel County, two were with a burial at Pueblo Alamo (LA 8, thirteenth century) in Santa Fe County (Wiseman 1999), and one was found as an isolated artifact on the northwestern outskirts of Santa Fe.

LA 112349 (River Crossing Site)

A possible end scraper made of Edwards chert is the only item made of exotic material recovered from LA 112349.

Discussion

The Seven Rivers project sites indicate that items made of imported materials commonly moved into New Mexico from Texas sources as well as from other parts of New Mexico. The two smaller sites, LA 8053 and LA 112349, produced artifacts of foreign toolstones (Edwards and possibly Tecovas) but no flakes or other debitage.

The Edwards item from LA 112349 appears to be the proximal end of an end scraper, the fine marginal retouch and general shape of which suggest that it might have been a classic tear-drop-shape. These scrapers are very common in late Late Prehistoric and early Historic bison hunting contexts of the Southern Plains and frequently occur in assemblages that also contain beveled knives.

The large site, LA 38264, produced both artifacts and manufacture debris of several imported materials, including Edwards, Alibates, obsidian, and Tecovas. Since 27 out of 51 Edwards and possible Edwards flakes are biface thinning and possible biface-thinning flakes, it appears that actual raw material units (cores) of Edwards chert were brought to LA 38264 where they were reduced for making tools on location. The biface and possible biface-thinning flakes simply reify this fact. We make this point because the presence of biface flakes of exotic materials by themselves could indicate that only tool reworking, as opposed to new tool manufacture, was taking place.

The presence of the beveled knife fragments at LA 38264 clearly shows that these types of tools were "passing through" the project sites. Thus, the people of at least one occupation of the site participated in bison hunting during the late Prehistoric and/or early Historic period or else had contacts with people who did. Since beveled knives generally date after AD 1200 on the Southern Plains (Hofman et al. 1989) or AD 1300 further south in Texas (Turner and Hester 1993), the LA 38264 specimen probably post-dates all of the radiocarbon dated Globe phase features at the site. We also suspect that it pre-dates the 19th century date from TF 7. By this time, metal knives were becoming common, and the manufacture of stone tools ceased. Do these two beveled knife fragments represent yet another use of the site in addition to those documented by the radiocarbon dates? (See following discussion for Question 5).

It should be noted that the LA 38264 beveled knife was made of what appears to be a southeastern New Mexico gray chert. Certainly, the material does not appear to be an imported one. This in itself is important, for it indicates that this style of knife was probably being made within the confines of the modern state of New Mexico and that not all such items had to come from afar. As such, it is one more piece of evidence indicating that the prehistoric peoples living in the plains and eastern Chihuahuan Desert sectors of New Mexico were participating in non-Southwestern cultural lifeways.

We feel that it is necessary to make this point because too many Southwestern archaeologists still insist that the peoples inhabiting this part of New Mexico (i.e., the area of the Eastern Extension of the Jornada Mogollon) were "Southwestern" in culture because they made some use of Southwestern pottery and their territory falls within the boundaries of the modern state of New Mexico. Had the state lines been drawn a bit differently, this would probably not be a question, let alone the perceptual problem that it is. Perhaps they were Southwesterners or perhaps they were Plains peoples. It is clear than an automatic assumption that they were Southwesterners because of their modern geopolitical location is no longer tenable.

4. What are the dates of occupation at the project sites?

LA 8053 (Honea's Site)

Only 6 of the 12 thermal features excavated at LA 8053 produced charcoal and could be radiocarbon dated. Nine radiocarbon dates were obtained for these 6 features, and 7 of those dates required use of the AMS (accelerator mass spectrometer) method (Appendix 7). More than one set of dates were obtained for 3 of the features.

Relative to thermal feature types, three dates are from rock thermal features TF 1 and TF 9, and six are from nonrock thermal features TFs 6, 7, 10, and 11 (Table 15.2). All but one of the radiocarbon dates (Fig. 15.1) fall within the Globe (AD 750–1150) and early Oriental (AD 1150–1450) phases of the Late Prehistoric period as defined by Katz and Katz (1985a) for the Brantley Reservoir locale. The one exception, from TF 1, dates to the late McMillan phase (1000 BC–AD 1) of the Late Archaic period in the same sequence.

According to the OxCal routine, the Globe and Oriental phase dates represent three separate occupations (Fig. 15.2). The earliest occupation is represented by TF 11, the earliest Globe phase use (AD 750–1000) of the dated features at the site. Statistically speaking, the two dates obtained from this feature are one and the same. TF 6 and TF 9 are each represented by two dates. Again according to the OxCal routine, all four dates represent the same statistical population. The uses of these features fall within the late Globe phase and possibly within the very early part of the succeeding Oriental phase, or somewhere between AD 1000 and 1175 (Fig. 15.2). The intercept dates and date ranges for all four samples overlap to the degree that that we cannot conclude whether TF

Table 15.2. Radiocarbon dates, LA 8053

Feature	Conventional C-14 Age (BP)	Calibrated Intercept(s)	Calibrated Ranges	Plant	Beta No.	Method
			Rock Thermal Features			
TF 1	2230 ± 40	355 BC 290 BC 230 BC	2 SD: 385 to 180 BC 1 SD: 375 to 200 BC	mesquite wood charcoal	122654	AMS
TF 9	960 ± 60	AD 1035	2 SD: AD 985 to 1220 1 SD: AD 1015 to 1170	mesquite wood charcoal	122659	standard
	920 ± 70	AD 1065 AD 1075 AD 1155	2 SD: AD 995 to 1265 1 SD: AD 1025 to 1215	mesquite wood charcoal	122658	standard
			Nonrock Thermal Features			
TF 6	1000 ± 50	AD 1020	2 SD: AD 975 to 1170 1 SD: AD 1000 to 1040	mesquite seed charcoal	122655	AMS
	930 ± 50	AD 1055 AD 1090 AD 1150	2 SD: AD 1010 to 1225 1 SD: AD 1030 to 1180	mesquite wood charcoal	122656	AMS
TF 7	860 ± 50	AD 1205	2 SD: AD 1035 to 1275 1 SD: AD 1165 to 1245	*Sarcobatus* /four-wing saltbush wood charcoal	122657	AMS
TF 10	880 ± 40	AD 1180	2 SD: AD 1035 to 1250 1 SD: AD 1065 to 1075 and 1155 to 1220	*Sarcobatus* /four-wing saltbush wood charcoal	122660	AMS
TF 11	1160 ± 40	AD 885	2 SD: AD 785 to 985 1 SD: AD 865 to 960	*Condalia* wood charcoal	122662	AMS
	1100 ± 40	AD 975	2 SD: AD 880 to 1015 1 SD: AD 895 to 995	mesquite wood charcoal	122661	AMS

6 and TF 9 were contemporary or whether they represent separate occupations at the site.

At the late end, TF 7 and TF 10 have tight one-standard-deviation ranges at AD 1165–1245 and AD 1155–1220, respectively. Although the standard deviation ranges also overlap with those of TF 6 and TH-9, the OxCal routine indicates that the TF 7 and TF 10 dates are statistically separate and therefore represent later occupations. The standard deviation ranges for TF 7 and TF 10 overlap one another considerably and, statistically speaking, are one and the same. The period of use of these features is AD 1030–1260 (Fig. 15.2). This period overlaps the Globe/Oriental phase boundary (AD 1150) as defined by Katz and Katz (1985a). The intercept dates of AD 1205 and AD 1180 (respectively) suggest that they could also represent two separate but closely spaced occupations.

Temporal Correlations and Intrasite Structure

Several interesting correlations among the features, feature types, and intrasite distributions at LA 8053 require discussion. These include a possible temporal relationship between an oval arrangement of rock thermal features in the West Block and the nonrock thermal features in the East Block.

Five of at least seven thermal features in the West Block appear to represent one feature type, the rock hearth or small on-ground baking feature (see Black et al. 1997). These features are arranged in an oval that is at least 18 m north-south by 18 m east-west. Only one of these features, TF 1, could be dated, indicating a late McMillan phase (Late Archaic) occupation. The question is whether the thermal features in this oval belonged to a single event (does our one date apply to all seven features?), or is the oval arrangement simply serendipitous? While I cannot answer this question in a definitive way for all of the features, it will be remembered from an earlier discussion that a subtle stratigraphic difference between TF 1 and TF 2 indicates that TF 2 probably predates TF 1 by an unknown period of time. It is impossible

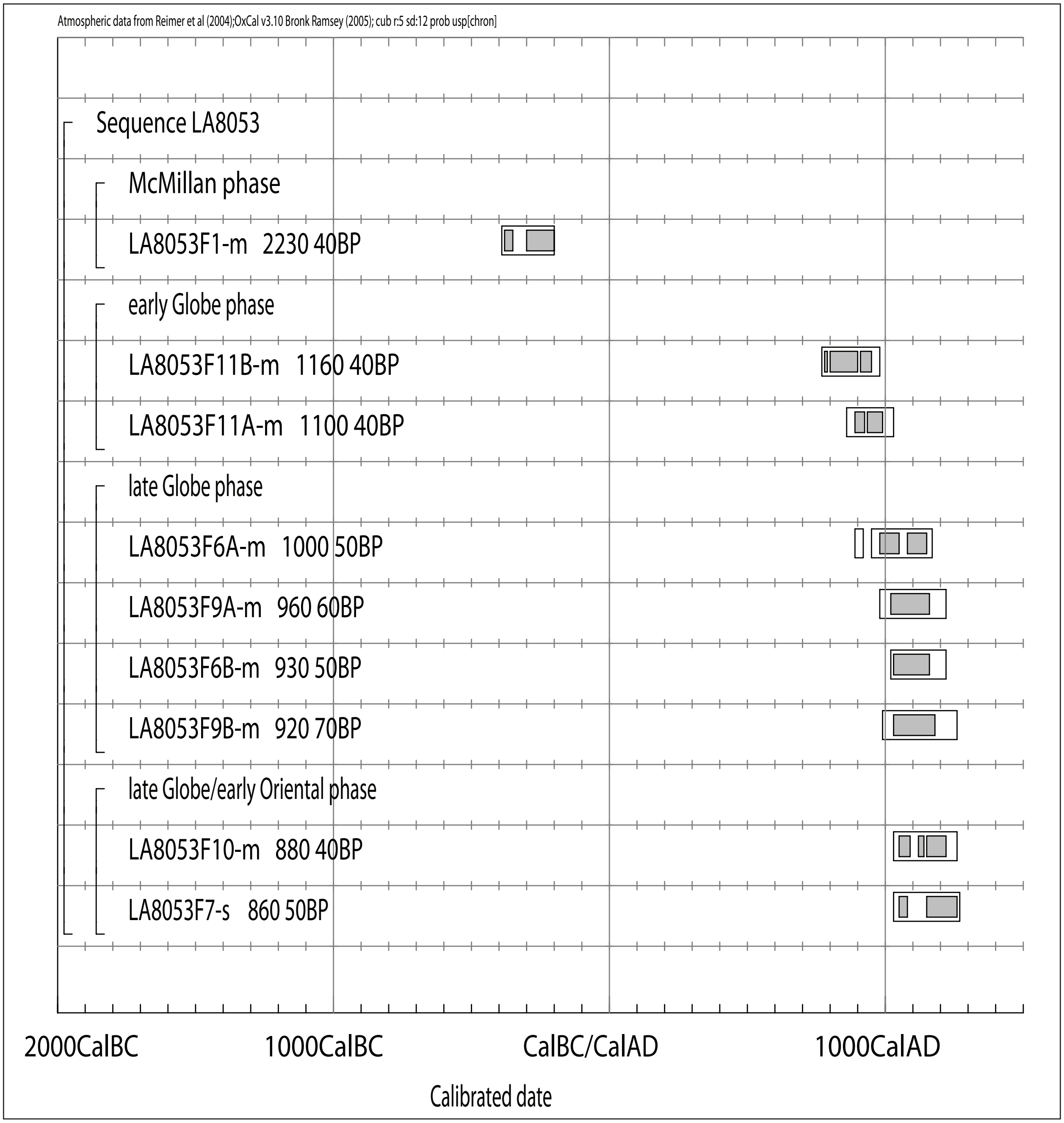


Figure 15.1. Radiocarbon dates, LA 8053; m = mesquite; s = saltbush (Sarcobatus).

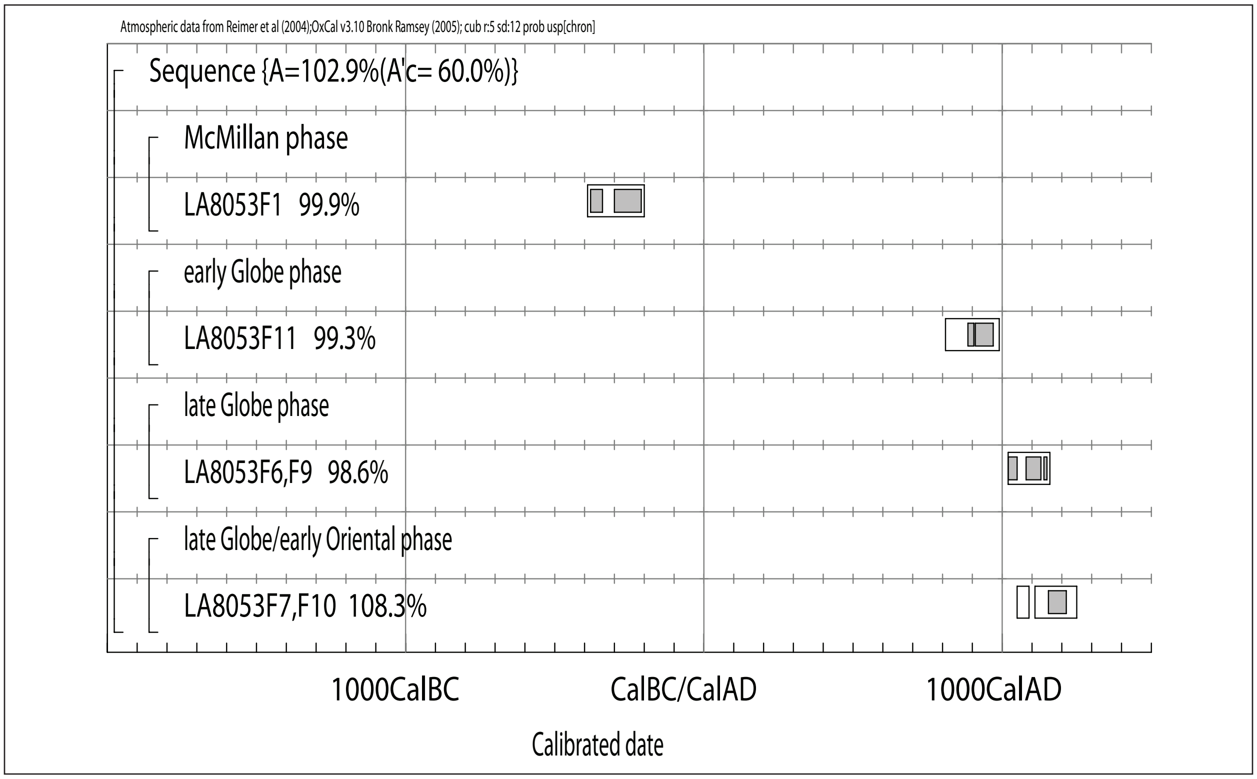


Figure 15.2. Radiocarbon dates as evaluated and pooled by the OxCal routine, LA 8053; m = mesquite.

to say how long that interval was—it could have been as short as a day or two. After all, one rainstorm could have easily built up 1 or 2 cm of sediment in and around TF 2. An eighth thermal feature, TF 6, is physically associated with the oval, but its type (nonrock) and early Globe phase radiocarbon date clearly demonstrate that it does not belong to the same occupation as TF 1.

Another intriguing aspect of this oval grouping of thermal features is the fact that a major, well-circumscribed concentration of lithic debitage lay inside the oval (Fig. 15.3). Thus, the homogeneity of feature type, the oval arrangement of the features, and the enclosure of a chipping debris midden suggest a coherent whole. If so, this oval grouping could represent an encampment of many persons who cooperated for at least a short period of time at this location. Each knapper may have camped at his thermal feature, turned inward from his fire, faced the others in the group, and made his tools, discussing the events of the day and planning future activities. If this scenario and the TF 1 radiocarbon date are correct, then this occupation dates to the McMillan phase.

The presence of a number of pottery sherds and arrow points scattered throughout the West Block (Figs. 5.28 and 5.29) confounds the interpretation of the thermal feature oval pattern just outlined. Several of the sherds came from the vicinity of TF 6, which is dated to the AD 1000s or 1100s according to two radiocarbon assays, and they could belong to the use of that thermal feature. The majority of sherds, however, were concentrated in the southern part of the excavation block. The 11 m between it and TF 6 is sufficient to raise the question of whether they belong to the same occupation. Such a relationship is not precluded, but it seems less certain than if, for example, the pottery concentration were 5 m closer to TF 6. Importantly, the sherd concentration only partly overlaps the lithic debris concentration lying within the oval grouping of thermal features. We interpret this lack of congruence between the concentrations as two different depositional episodes. The south grouping of sherds, then, probably represents a postoccupational intrusion that may or may not relate to the use of TF 6.

Six arrow points came from the vicinity of the thermal feature oval, all but one of them within 1 to 2 m of thermal features. Three are Livermore-

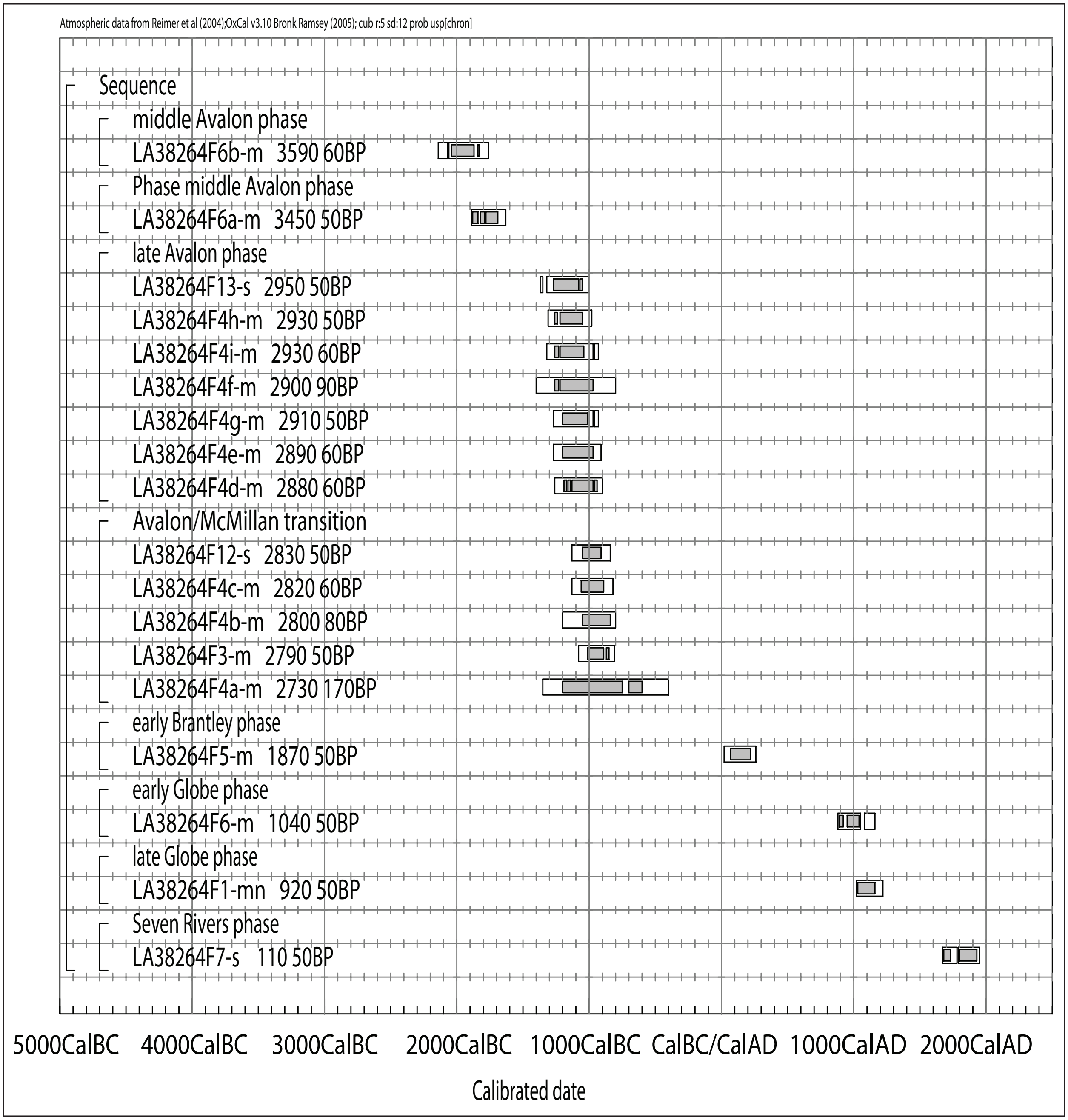


Figure 15.3. Radiocarbon dates, LA 38264; m = mesquite; s = saltbush (Sarcobatus); mn = mesquite and monocot.

like (FS 507, 720, and 825), two are unspecific tip fragments that are narrow enough to be from Livermore-like points (FS 623 and 791), and one is Perdiz-like (FS 829). The proximity of these points to individual thermal features is intriguing. They clearly belong to the Late Prehistoric period rather than the Archaic period. Three thermal features of the five in the oval are involved, which suggests that they could date to the Late Prehistoric period, rather than the Archaic period. The proximity of one of the points (FS 791) to TF 6, the Globe phase feature, does not present a problem, because the dates of the two are in general agreement.

Thus, we have contradictory information on the age of the thermal features comprising the oval configuration in the West Block excavations. While I cannot resolve this discrepancy on the basis of present evidence, I am inclined to believe that the oval configuration is a cultural/social manifestation in which seven of the eight thermal features were essentially contemporaneous. The TF 1 radiocarbon date and the stratigraphic relationship between TF 1 and TF 2 indicate that the oval configuration belongs to the Archaic period. The eighth thermal feature, TF 6, differs in feature style from all other thermal features in this part of the site. It produced a Late Prehistoric period radiocarbon date that is in general agreement with the pottery and the projectile points found nearby.

Since TF 6 does not belong to the thermal-feature oval, the north end of the oval lacks closure. Does an undiscovered eighth rock thermal feature underlie the sand dune north of TF 6 (i.e., just outside the excavated area)?

The East Block has two clusters of thermal features. The northern cluster includes two rock thermal features (TF 9 and TF 12) and two nonrock thermal features (TF 7 and TF 8). A chipping debris concentration occurs here as well, this time lying between the rock thermal features and seeming to overlie the nonrock thermal features. The depths of all four thermal features below the modern surface were 5 cm or less. This situation is reminiscent of the oval group of rock thermal features just described for the West Block.

Unfortunately, only TF 7 and TF 9 could be directly dated, and TF 7 dates *later* than TF 9. Seemingly the reverse should be true, unless we are to believe that the people who used TF 7 (and TF 8?) placed their thermal features in the middle of a concentration of sharp flakes. While we can state that some of those flakes actually overlay TF 7 and TF 8, they were surface and near-surface artifacts that could easily have been washed or kicked into their positions overlying TFs 7 and 8 during the centuries since site abandonment. Thus, we have no reason to question the validity of the dates for TF 7 and nearby rock thermal feature TF 9. Nor do we otherwise have good reason to question the implication that TF 9, TF 12, and the majority of the chipping debris predate the occupation represented by TF 7 and perhaps TF 8.

The southern cluster of features within the East Block consists of two nonrock thermal features, TF 10 and TF 11. As we have seen, the dates for these two features do not overlap at the two-standard-deviation level and therefore most likely represent separate occupations during the periods of AD 850–1000 (early Globe phase) and AD 1150–1250 (late Globe/early Oriental transition), respectively.

Assuming that the dates for TF 10 and/or TF 11 do not reflect old-wood problems, their juxtaposition with each other and with the numerous sherds from the same Chupadero Black-on-white bowl is instructive. Most of the sherds clustered around TF 11, the date of which is too early for this pottery type. Unless an old-wood date for TF 11 pertains, these sherds cannot belong to the use of TF 11. Besides, two of the Chupadero sherds were recovered from the thin layer of fill that overlay TF 11. On the other hand, the date for TF 10 falls well within the known manufacture date range for Chupadero (ca. AD 1100–1475; Wiseman 1982; Snow 1986). Thus, it seems likely that the bowl was used and broken during the use of TF 10. Once again, in the case of TF 11 and the majority of Chupadero sherds, the close physical association of a diagnostic artifact with a dated feature does not necessarily mean that the two were also temporally associated.

Summary of Occupations at LA 8053

Three and possibly four occupations are represented by the dated thermal features at LA 8053. The earliest, TF 1, belongs to the second half of the McMillan phase (Late Archaic), or sometime between 400 and 200 BC. This occupation may also be represented by an oval arrangement of at least seven thermal features that surround a communal lithic knapping area signified by a discrete accumulation of knapping debris. The second occupation, represented by TF 11, appears to date between AD 800 and 1000 (early Globe phase). The third occupation, represented by TF 6 and TF 9, took place between AD 1000 and 1200 or 1250 (late Globe phase). The fourth occupation, represented by TF 7 and TF 10, took place between about AD 1150 and 1250 (late Globe/early Oriental transition).

If our results are not biased by the old-wood effect, we have yet another example of a potentially misleading physical association of diagnostic artifacts (sherds of a Chupadero Black-on-white bowl) with a dated thermal feature, TF 11. That is, the sherds recovered from and around TF 11 must have been thrown to that area when the vessel was broken by the users of nearby TF 10. TF 10 dates to the known manufacture period of that particular pottery type. TF 11 is much older and does not.

LA 38264 (South Seven Rivers Site)

Eight of the 13 thermal features excavated at LA 38264 produced charcoal and were radiocarbon dated. Eighteen radiocarbon dates were obtained for these features, 12 of them by the AMS method (Appendix 7). Multiple dates were obtained for two of the features.

Relative to thermal feature types, five dates are from rock thermal features TF 6, TF 12, and TF 13; four are from nonrock thermal features TF 1, TF 3, TF 5, and TF 7; and nine are from the communal baking feature or annular midden, TF 4 (Table 15.3). These dates (Fig. 15.3) represent the Avalon (3000–1000 BC), Avalon/McMillan transition (ca. 1000 BC), Brantley (AD 1–750), Globe (AD 750–1150), and Seven Rivers (AD 1450–present) phases as defined by Katz and Katz (1985a) for the Brantley Reservoir locality (i.e., the Middle Archaic, Late Archaic, Terminal Archaic, Late Prehistoric, and ethnohistoric periods).

According to the OxCal routine, the LA 38264 dates represent perhaps as many as eight separate occupations (Figs. 15.4 and 15.5). Three of the occupations took place during the Middle Archaic Avalon phase. Of those three, two represent the middle part of the phase (see discussion below) and one the last part of the phase. One occupation took place during the Avalon/McMillan transition and involved three features: TF 3 (date may be spurious), TF 4 (a–c), and TF 12. The remaining occupations are represented by single dates at single features, including the Terminal Archaic early Brantley phase at TF 5 (date may be spurious), the early Globe phase at TF 6, the late Globe phase at TF 1, and the Seven Rivers phase at TF 7. As can be seen, several potential problems exist in the data.

TF 4

The nine radiocarbon dates obtained from TF 4, the communal baking feature or annular burned-rock midden, were recovered from the four cardinal directions and the center of the feature along grid lines 48N and 34W, the two main cross sections through the center of TF 4. Ideally, we strove to date two samples, lower and upper (earlier and later) from each point. Between obvious or suspected bioturbation in some areas, this ideal was not met, and the dated samples were not taken from the exact points desired. In some instances, at the peripheries of the feature, the deposits were not deep enough or sufficiently charcoal-laden to permit the acquisition of deep samples (see Fig. 6.31). The dated samples are provenienced as follows: 50N/34W, 1–10 and 20–30 cm; 48/34W, 1–10 cm; 47N/34W, 1–10 and 20–30 cm; 48N/35W, 20–30 cm; 48N/34W, 1–10 cm; 48N/33W, 1–10 and 20–30 cm; and 48N/32W, 1–10 cm. The provenience designations in the tables indicate 49N, rather than 48N, because the samples actually came from within the 49N squares but at the south limits (that is, nearly under the 48N grid string).

The purpose of dating so many samples from TF 4 was to ascertain the use-life of the feature, whether the feature was used on two or more occasions, and whether we could detect the directions and order in which the different sections of the midden accumulated. We realized the problems of trying to use radiocarbon dating for this exercise, but such studies should be attempted to better understand how these features functioned.

At first glance, the samples appear to represent a single statistical population even though the intercept dates and the two-standard-deviation

Table 15.3. Radiocarbon dates, LA 38264

Feature	Conventional C-14 Age (BP)	Calibrated Intercept(s)	Calibrated Ranges	Plant	Beta No.	Method
			Rock Thermal Features			
TF 6	3450 ± 50	1745 BC	2 SD: 1890 to 1630 BC 1 SD: 1860 to 1845 BC and 1775 to 1685 BC	mesquite wood charcoal	122666	AMS
	3590 ± 60	1920 BC	2 SD: 2120 to 2080 BC and 2050 to 1755 BC 1 SD: 1985 to 1880 BC	mesquite wood charcoal	118875	standard
	1040 ± 50[a]	AD 785	2 SD: AD 675 to 895 1 SD: AD 705 to 875	mesquite wood charcoal	118874	AMS
TF 12	2830 ± 50	980 BC	2 SD: 1120 to 845 BC 1 SD: 1020 to 910 BC	mesquite wood charcoal	118877	AMS
TF 13	2950 ± 50	1135 BC	2 SD: 1295 to 1000 BC 1 SD: 1250 to 1045 BC	mesquite wood charcoal	122874	AMS
			Communal Baking Facility (Ring Midden)			
TF 4	2730 ± 170	845 BC	2 SD: 1375 to 410 BC 1 SD: 1055 to 785 BC	mesquite wood charcoal	126922	standard
	2800 ± 80	925 BC	2 SD: 1145 to 805 BC 1 SD: 1020 to 835 BC	mesquite wood charcoal	118873	standard
	2820 ± 60	940 BC	2 SD: 1130 to 825 BC 1 SD: 1020 to 900 BC	mesquite wood charcoal	118869	standard
	2880 ± 60	1020 BC	2 SD: 1250 to 900 BC 1 SD: 1130 to 940 BC	mesquite wood charcoal	118871	standard
	2890 ± 60	1040 BC	2 SD: 1270 to 910 BC 1 SD: 1140 to 985 BC	mesquite wood charcoal	126923	AMS
	2900 ± 90	1055 BC	2 SD: 1380 to 840 BC 1 SD: 1245 to 940 BC	mesquite wood charcoal	126925	standard
	2910 ± 50	1065 BC	2 SD: 1260 to 930 BC 1 SD: 1145 to 1005 BC	mesquite wood charcoal	118870	AMS
	2930 ± 50	1120 BC	2 SD: 1275 to 980 BC 1 SD: 1200 to 1020 BC	mesquite wood charcoal	118872	AMS
	2930 ± 60	1120 BC	2 SD: 1305 to 940 BC 1 SD: 1245 to 1020 BC	mesquite wood charcoal	126924	AMS
			Nonrock Thermal Features			
TF 1	920 ± 50	AD 1065 AD 1075 AD 1155	2 SD: AD 1015 to 1235 1 SD: AD 1035 to 1195	mesquite and monocot stem wood charcoal	122663	AMS
TF 3	2790 ± 50	915 BC	2 SD: 1030 to 825 1 SD: 990 to 855	mesquite wood charcoal	122664	AMS
TF 5	1870 ± 50	AD 135[b]	2 SD: AD 55 to 250 1 SD: AD 90 to 225	mesquite wood charcoal	122665	AMS
TF 7	110 ± 50	AD 1825 AD 1835 AD 1880 AD 1915	2 SD: AD 1670 to 1950 1 SD: AD 1680 to 1745 and AD 1805 to 1935	*Sarcobatus* / four-wing saltbush wood charcoal	118876	AMS

[a] Beta 118874 seems much too recent according to the other two dates from this feature.
[b] Beta 122665 seems too early for a nonrock thermal feature.

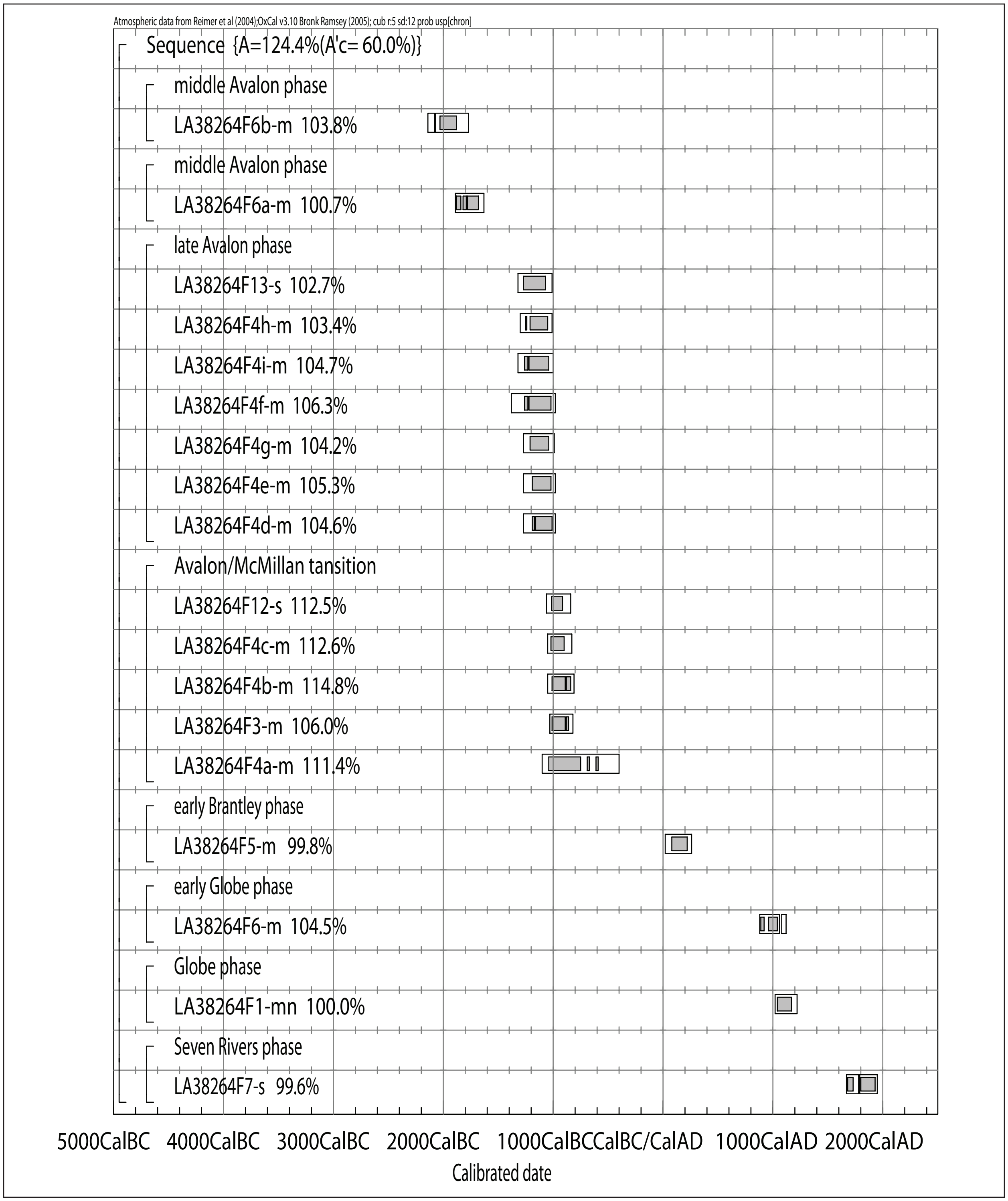


Figure 15.4. Radiocarbon dates with probability distributions, LA 38264; m = mesquite; s = saltbush (Sarcobatus); mn = mesquite and monocot.

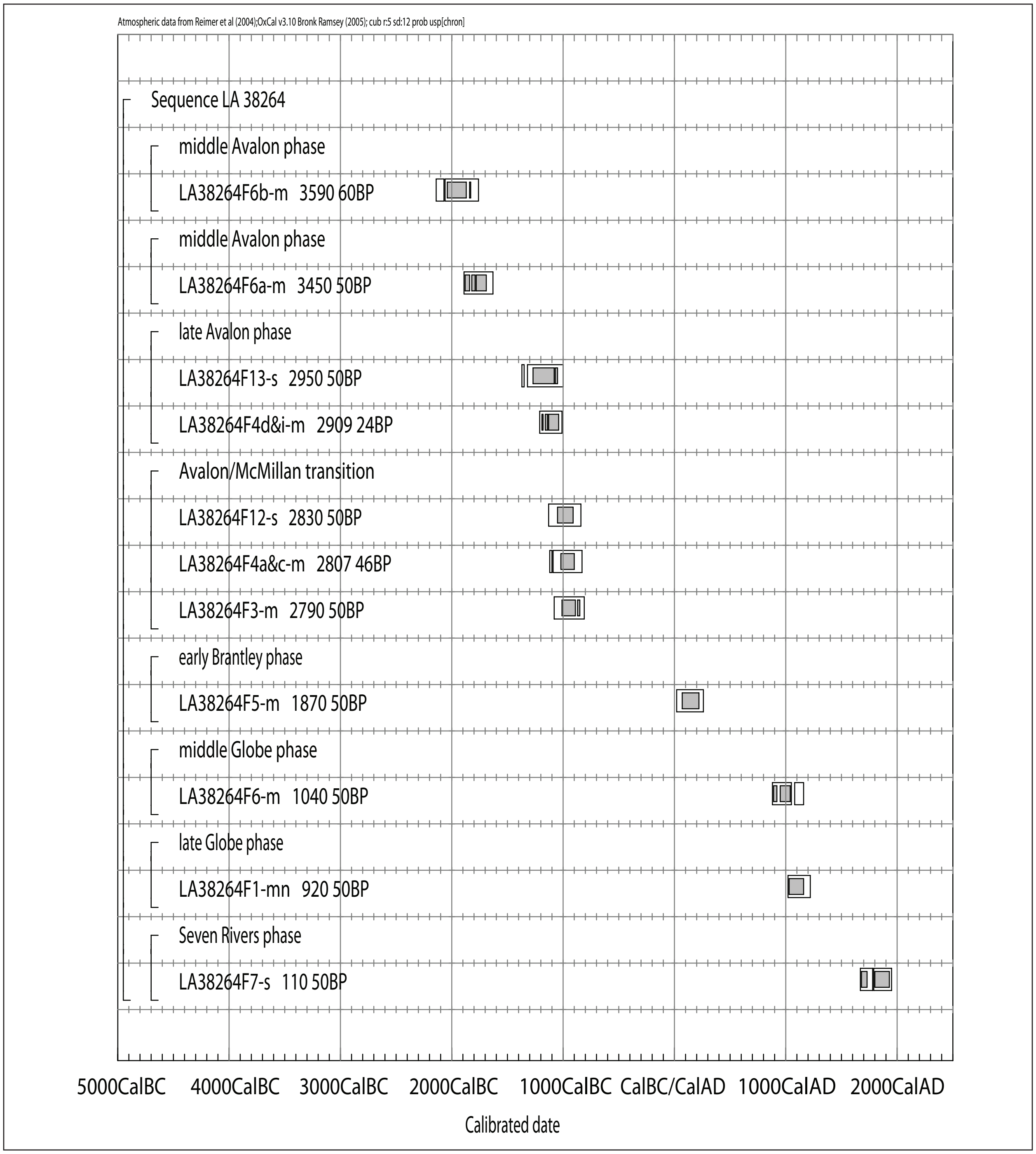


Figure 15.5. Radiocarbon dates as pooled by the OxCal routine, LA 38264; m = mesquite; s = saltbush (Sarcobatus); mn = mesquite and monocot.

ranges cover nearly 1,000 years (Fig. 15.3). The OxCal routine (Figs. 15.4–15.6), however, suggests that the dates actually represent two different and essentially consecutive statistical groups. One represents the Middle Archaic late Avalon phase (in this case, between 1200 and 1000 BC), and the other covers the Avalon/McMillan (Middle to Late Archaic) transition, or the period 1100–850 BC.

If these results are accurate, then we would ideally expect to find that the earlier dates came from the bottom-most collection points in the feature, the 20–30 cm levels. Conversely, the later dates should come from the upper

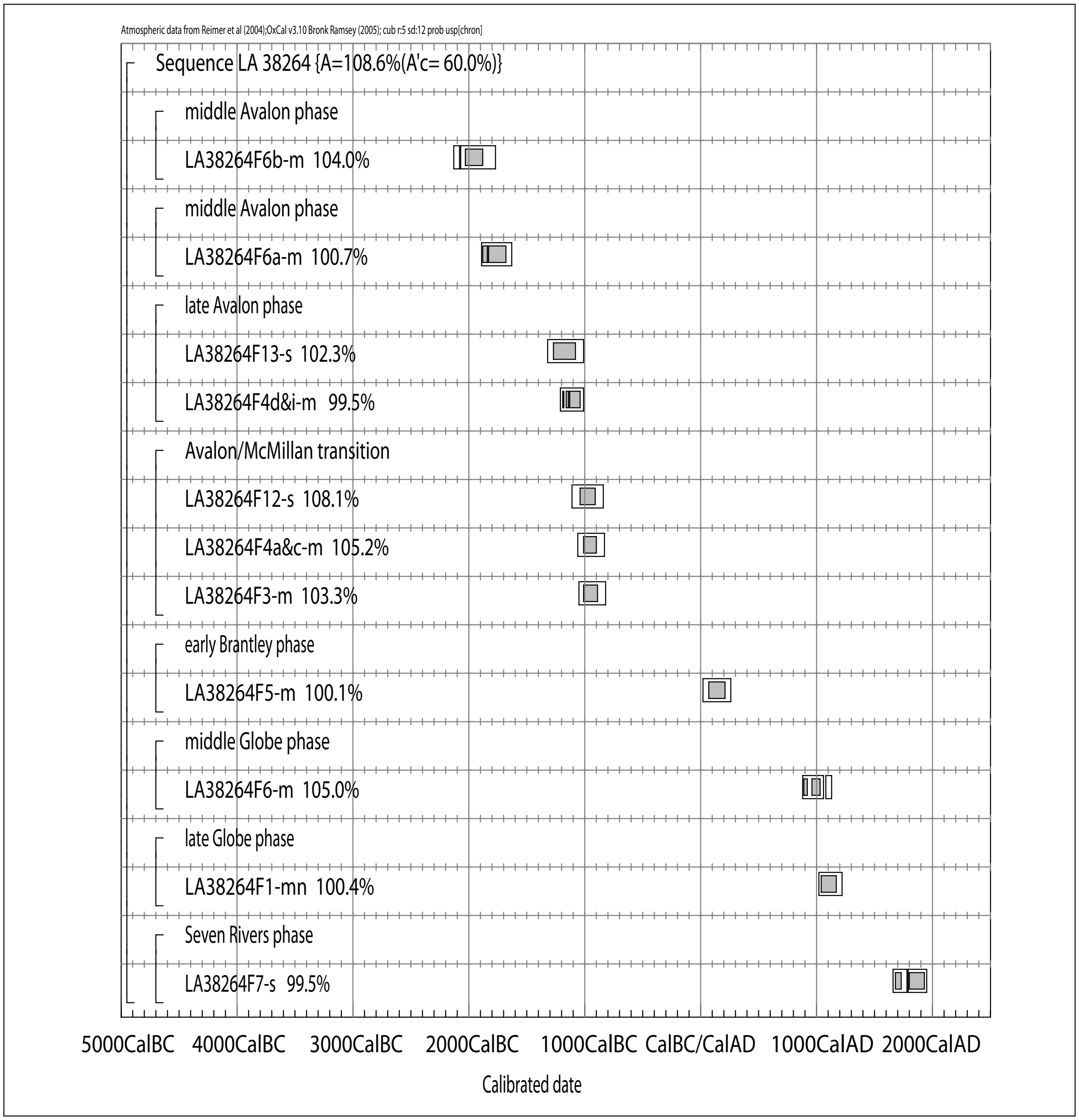


Figure 15.6. Pooled radiocarbon dates with probability distributions, LA 38264; m = mesquite; s = saltbush (*Sarcobatus*); mn = mesquite and monocot.

collection points, the 1–10 cm levels. As can be seen in Figures 15.7 and 15.8, these expectations are not met. Two of the late Avalon phase dates came from the upper levels, and one came from the lower level. Likewise, three of the Avalon/McMillan transition dates came from the lower levels, and three came from the upper levels.

At least three types of situations might give these results: (1) The problems are the result of mechanical mixing (bioturbation, postoccupational human disturbance). (2) The conditions of feature use are so disruptive that the deposits do not accumulate in a regular, predictable fashion. (3) The assumption that the two statistical populations of dates equate with two separate use-periods of the feature is incorrect. At the present time, we feel quite certain that the second situation (use-related disruption) is probably correct, that the first (bioturbation) might be correct but perhaps to a lesser degree,

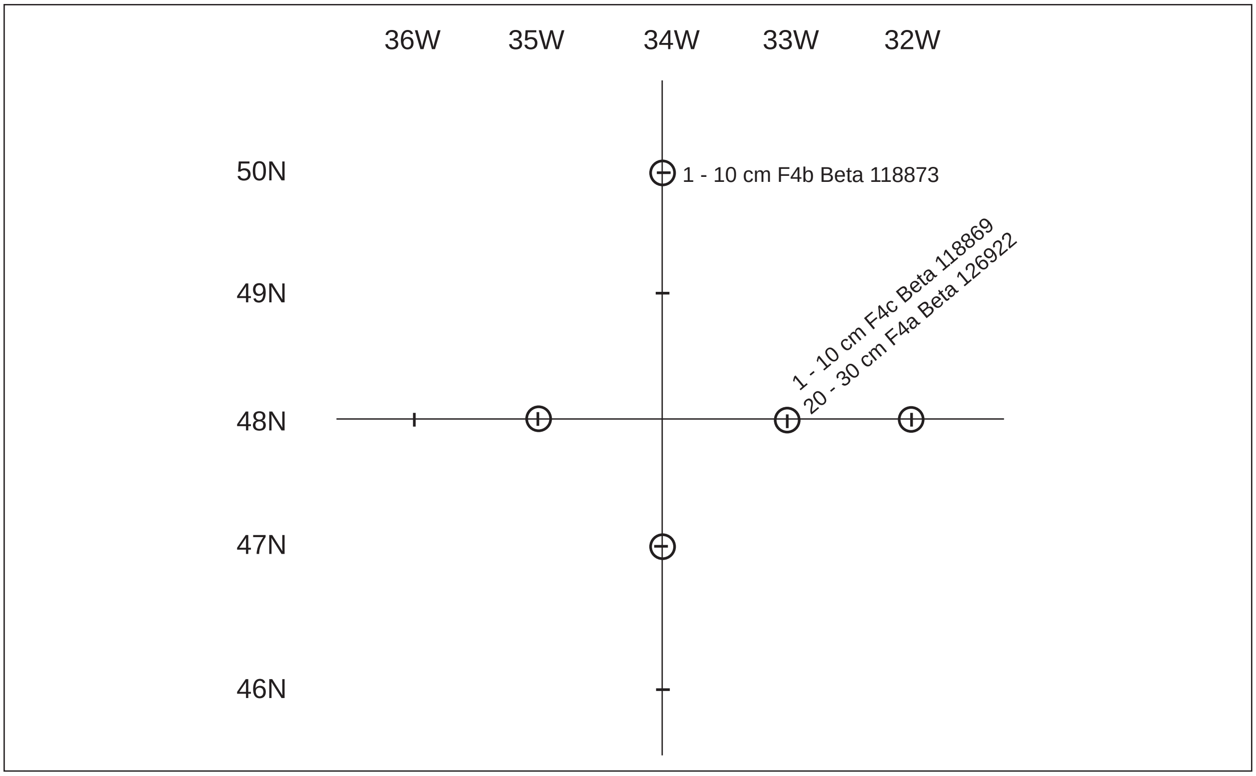


Figure 15.7. Distribution of Avalon/McMillan transition radiocarbon dates along excavation axes in communal pit baking facility (TF 4), LA 38264.

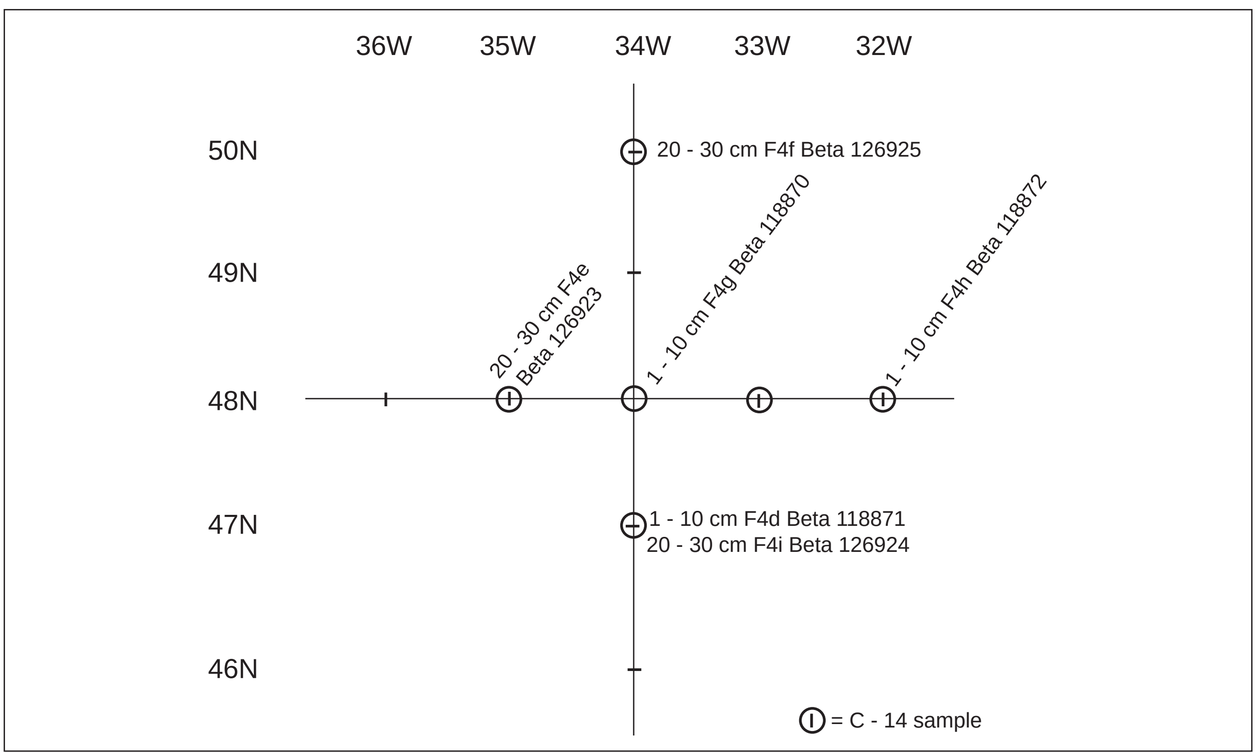


Figure 15.8. Distribution of Avalon phase radiocarbon dates along excavation axes in communal pit baking facility (TF 4), LA 38264.

and that the third is incorrect. After all, nothing is certain in terms of site preservation, nor can we as excavators unfailingly identify undisturbed deposits. Nevertheless, we did make a strong effort to recover charcoal dating samples from only what appeared to be undisturbed deposits. That is the primary reason why the actual sample loci do not correspond exactly with the preferred proveniences, the grid corners.

TF 3 and TF 5

In a previous study of radiocarbon dated features in southeastern New Mexico (Wiseman 2001b), nonrock thermal features were generally found to date from AD 800 to possibly as late as AD 1900. At the time of that study, two nonrock thermal features at LA 38264 deviated from this pattern. We believed that the dates from these features, TF3 and TF 5, were contaminated by charcoal from earlier occupations. Although contamination from deposits associated with TF 4 is still a possibility for TF 5 (calibrated intercept date of AD 135), a literature search reveals that at least three nonrock hearths excavated at the WIPP location, 60 km southeast of our project area, also yielded (uncorrected) dates in the early to mid first millennium AD. Contamination from earlier deposits or human activities does not seem likely in any of these three cases.

Between this and the results of the study presented earlier in this report, it seems clear that nonrock thermal features appeared after 1000 BC (with one possible earlier exception) but did not become common until after AD 200.

TF 6

TF 6 provides the most problematic dates at LA 38264. Three dates were ultimately obtained, the first two as internal checks, and the third in an effort to resolve the contradiction presented by the first two. As it turns out, all three dates are identified by the OxCal routine as likely representing three nonrelated dates and therefore, potentially, three separate uses of this feature.

While this possibility stretches credulity, the construction of TF 6 and its position at the site make one or more reuses plausible. TF 6 has a definite pit size and shape, because its sides and bottom are carefully lined with rocks. No other thermal feature excavated at this site displays such attention to detail. And TF 6 is in a very central position with regard to all of the other thermal features and therefore the uses of this part of the site. Since it is likely that the aboriginal ground surface lay virtually at the present-day ground surface, it is easy to see how TF 6 could be discovered and reused on one or more occasions, even if those occasions were hundreds of years apart.

While the above scenario is attractive, two other possibilities must also be remembered. The dates were taken from three separate bags of fill removed during excavation. These bags represent the uppermost fill, the middle fill, and the bottom fill. Perhaps serendipitously, the dates are partly in correct order: the most recent is from the uppermost fill. However, the middle date of cal. 1745 BC came from the bottom fill, and the earliest date of cal. 1920 BC came from the middle fill. Thus, the two earlier dates are in reverse order, and we cannot be certain whether one or both are inaccurate. Regardless, we believe that they both generally represent middle Avalon occupation but cannot be certain that they represent two separate uses of the feature, as suggested by the OxCal statistics.

Regarding the most recent TF 6 date (cal. AD 785), contamination and therefore a spurious result are possible because the charcoal was recovered from the uppermost fill. At the time of excavation, the top fill lay within 5 to 10 cm of the modern ground surface. Use of the site by numerous other people over the centuries could well have led to contamination of the upper fill. Thus, we have no way of knowing whether the AD 785 date is good, and therefore whether a middle Globe phase occupation is represented by this feature.

This raises two possibilities. Should the latest date from TF 6 have been more in concert with the two earlier (Avalon) dates, or does it represent a second reuse of TF 6? At the present time we have no way of knowing for certain which of these scenarios is correct. However, we shall proceed as though the AD 785 date does represent a second reuse of TF 6 and that the date is basically correct.

Temporal Correlations, Thermal Feature Function, and Site Structure

The radiocarbon dates obtained from the several excavated features at LA 38264 span 3,400 years starting in the Middle Archaic period and ending in the historic period. Unfortunately, while we dated all features that produced sufficient carbon, we were unable to excavate the entire site and date features with insufficient carbon. Thus, our sample of dates, while impressive in many ways, does not permit us to fully assess all features and occupations within the excavated area, much less all of the features and occupations that occurred at LA 38264. Nevertheless, we are still able to shed light on these subjects, characterize human use of the site, and suggest future research directions.

Intrasite Structure by Physical Content and Location

In the early phases of our investigation of LA 38264, particularly as we began to uncover the various features and gain some sense of how they related spatially to one another and to spaces lacking features, I began to develop a model about internal structure for this part of the site. I believed that I perceived a pattern of habitation/use zones that focused on the communal baking facility, TF 4.

However, once we obtained the radiocarbon dates for the features, this scenario seemed not to work so well. As of this writing, we cannot be certain of the viability of this model for several reasons. Not all excavated features could be dated because of an absence of carbon, not all features potentially pertinent to the model were excavated, and the subsequent occupations in the excavated part of the site and areas immediately adjacent to it are masking or otherwise complicating the overall picture.

Zone 1 is the communal pit-baking facility ("ring midden"), TF 4. TF 4 is on a micropoint of the terrace, and part of its rock concentration is on the terrace slope to the west, north, and east. The central baking locus is precisely at the micropoint. In this location, the subsurface would have been naturally well drained. TF 5, a small, nonrock thermal feature, which dates later than TF 4, is underneath the southeast edge of the TF 4 rock apron, evidently as the result of human (and modern bovine?) trampling, which scattered the TF 4 rocks over it.

Zone 2, immediately south of TF 4, essentially lacked features except for TF 5. This "blank" space would have served well for stockpiling rocks, firewood, and foodstuffs, all to be used in TF 4. The part of this zone directly south of TF 4 was also used at an unknown time as a northward extension of the knapping circle between and slightly to the north of TFs 6, 7, and 9. The northward extension of the knapping circle involved much of the biface thinning that took place in this part of LA 38264.

Zone 3, south of Zone 2, contained most of the smaller thermal features and the most obvious and concentrated knapping locus on the site. This zone is believed to have been one of the main camp locations at LA 38264, if not the only one. Zone 3 is on a slight, north-dipping slope that rises 30 cm above the level of TF 4. The top of the slope is at TF 12, a small, pit-baking facility. Judging by the surface presence of several burned-rock concentrations (thermal features), an important but unexcavated part of this zone lies a few meters east of TF 12.

Zone 4, the peripheral camp, extends south and east from Zone 3. Here the features appear to be fewer and more widely spaced. The actual size and nature of this zone could not be adequately defined or explored in the time available.

It should be mentioned that numerous other thermal features were noted at LA 38264. Several lie immediately south of TF 3 and east of TF 12, but most are east of our main north-south grid line along 0/0 to 60N/0. However, as a recurring thesis, we now know that we cannot count on all thermal features being visible on the surface at thinly sand-mantled sites like LA 38264. Nonrock thermal features such as TFs 1, 3, 5, and 7 are now being discovered by means of widespread surface stripping here and at sites throughout the region.

Intrasite Structure by Time Period

While the above conception of site structure is seemingly obvious and useful for characterizing the site, the known temporal aspects of the various features and our presumptions about feature function confuse the perception or even negate it altogether. If we look at the dated thermal features by period and function with respect to predicated social implications, we can make the following observations (Figs. 15.9–15.16).

Occupations 1 and 2. The two earliest occupations investigated at LA 38264 appear to involve two separate uses of the small, pit-baking facility, TF 6, during the middle part of the Avalon phase (Middle Archaic period).

Occupation 3. The third period of occupation represented among the dated, excavated features is the late Avalon phase (i.e., late Middle Archaic period) as expressed in the initial use of the communal pit-baking facility, TF 4, and the outlying, small, on-ground baking facility, TF 13. We believe features like TF 13 were generally used by smaller groups than those typically using communal facilities like TF 4. The quandary, then, is that if TF 4 and TF 13 were contemporary, why would two facilities of similar function be used by groups of different size at the same locus at the same time? If contemporary, does TF 4 signify cooperative baking of large quantities of some foodstuffs to be consumed by the entire (local?) group, while TF 13 was used for baking smaller quantities of different foodstuffs to be consumed by a subunit (family?) of the larger (local?) group?

Occupation 4. The fourth period of occupation among the dated excavated features is the Avalon/McMillan transition (Middle to Late Archaic). In addition to TF 4, TF 3 and TF 12 may also have been used during this period. As before, we have no clear indication which alternative—different occupations or contemporary occupations with different baking and social functions—applies here.

Occupation 5. The fifth period of occupation involves TF 5, where an early Brantley phase (Terminal Archaic) occupation is indicated.

Occupation 6. The sixth period of occupation is represented by TF 6. It appears to represent the third use of this centrally located, well-constructed small pit-baking feature. The middle Globe phase is indicated.

Occupation 7. The seventh period of occupation occurred during the late Globe phase and is represented by TF 1, a small, nonrock thermal feature that represents an individual or small-group stay of one or two days.

Occupation 8. The eighth period of occupation occurred during the late Seven Rivers phase and is represented by TF 7, a small nonrock thermal feature that probably dates to the first half of the AD 1800s. The intercept dates, which range from AD 1825 to 1915, are supported by the presence of an obsidian side-notched arrow point in the feature fill, suggesting an early- to mid-1800s date. Sufficient iron for making metal points was available starting no later than the mid-1800s. We cannot be certain how long the Mescaleros used stone arrow points, but it seems likely that these dates represent a Mescalero occupation.

Temporally unassigned features. Five excavated thermal features lacked datable carbon and cannot be assigned to an occupation period. These include two small rock thermal features (TF 2, TF 9), a small rock thermal feature and burned-rock stockpile/discard pile (?) (TF 10), a small on-ground baking facility and discard (?) pile (TF 11), and a small burned-rock ring (TF 8). TF 8 is suspected of being a short-term twentieth-century campfire that has had all of its associated charcoal and stain removed by wind action.

A chipped stone artifact concentration or work circle, represented by debitage (cores and core-reduction flakes) and manufacture bifaces, is in the space surrounded by TFs 6, 7, and 9 and to the north of those features. The primary pattern of biface thinning and possible biface-thinning flakes basically mimics the debitage and biface pattern but partly overlaps it and is partly offset to the north and east. This locus, with its partly overlapping debris concentrations, was clearly a central place for reducing cores and flakes into bifaces and, probably to some extent, reducing these bifaces into finished products such as projectile points. The work circle, as defined by the biface distribution, is about 5 m in diameter.

Discussion of Intrasite Structure

The preceding sections describe a zone model of activities based on the physical layout of cultural features and spaces lacking features. The only problem with this activity-zone scenario is that the dates obtained for some of the features do not support the interpretation. The main problem is that the only dated features that could have been contemporaneous with TF 4—TF 12, TF 13, and possibly TF 3—lie outside the main habitation zone (Zone 3) and are farthest from TF 4. It appears

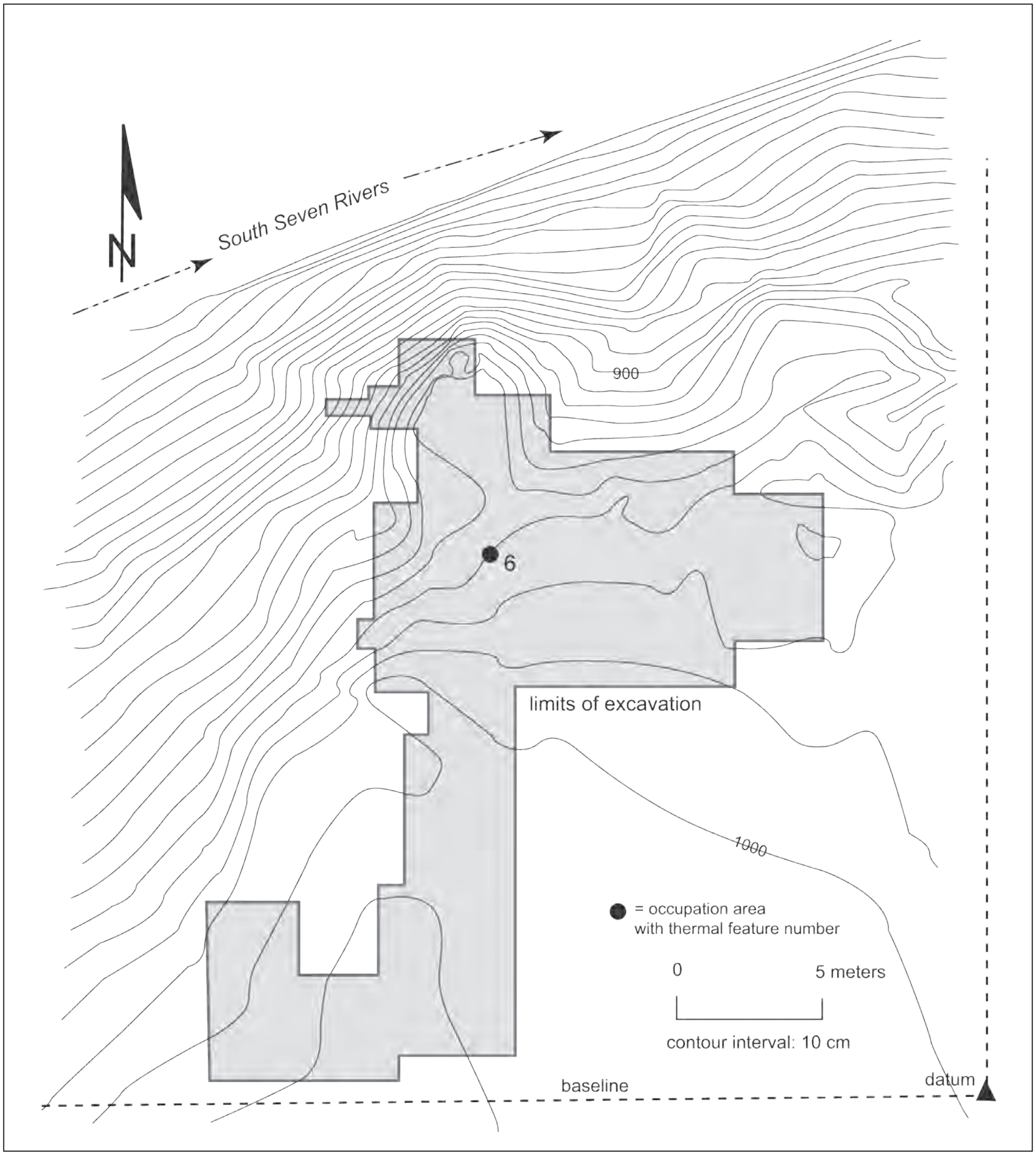


Figure 15.9. Occupation 1, middle Avalon phase, ca. 1920 BC.

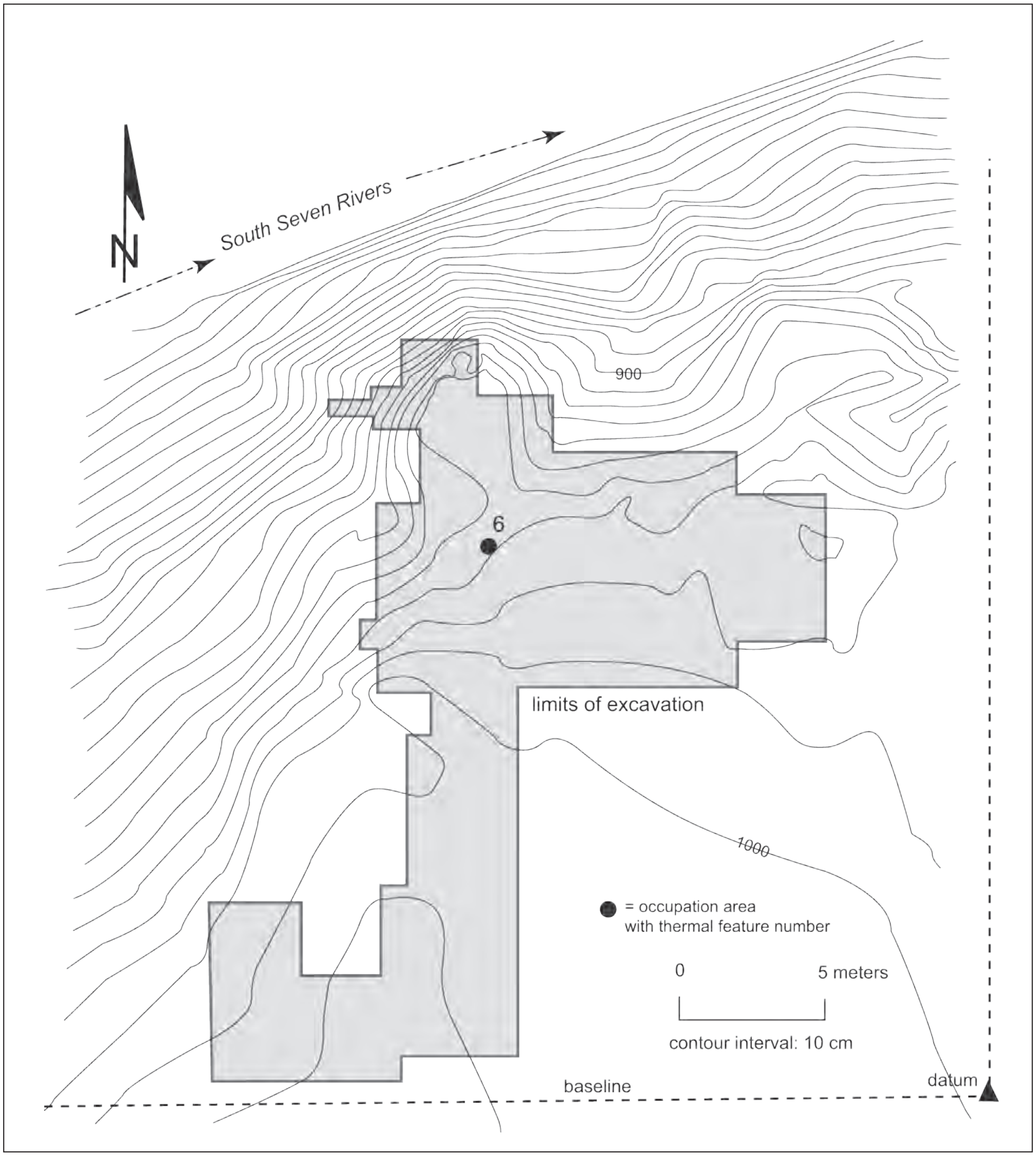


Figure 15.10. Occupation 2, middle Avalon phase, ca. 1745 BC.

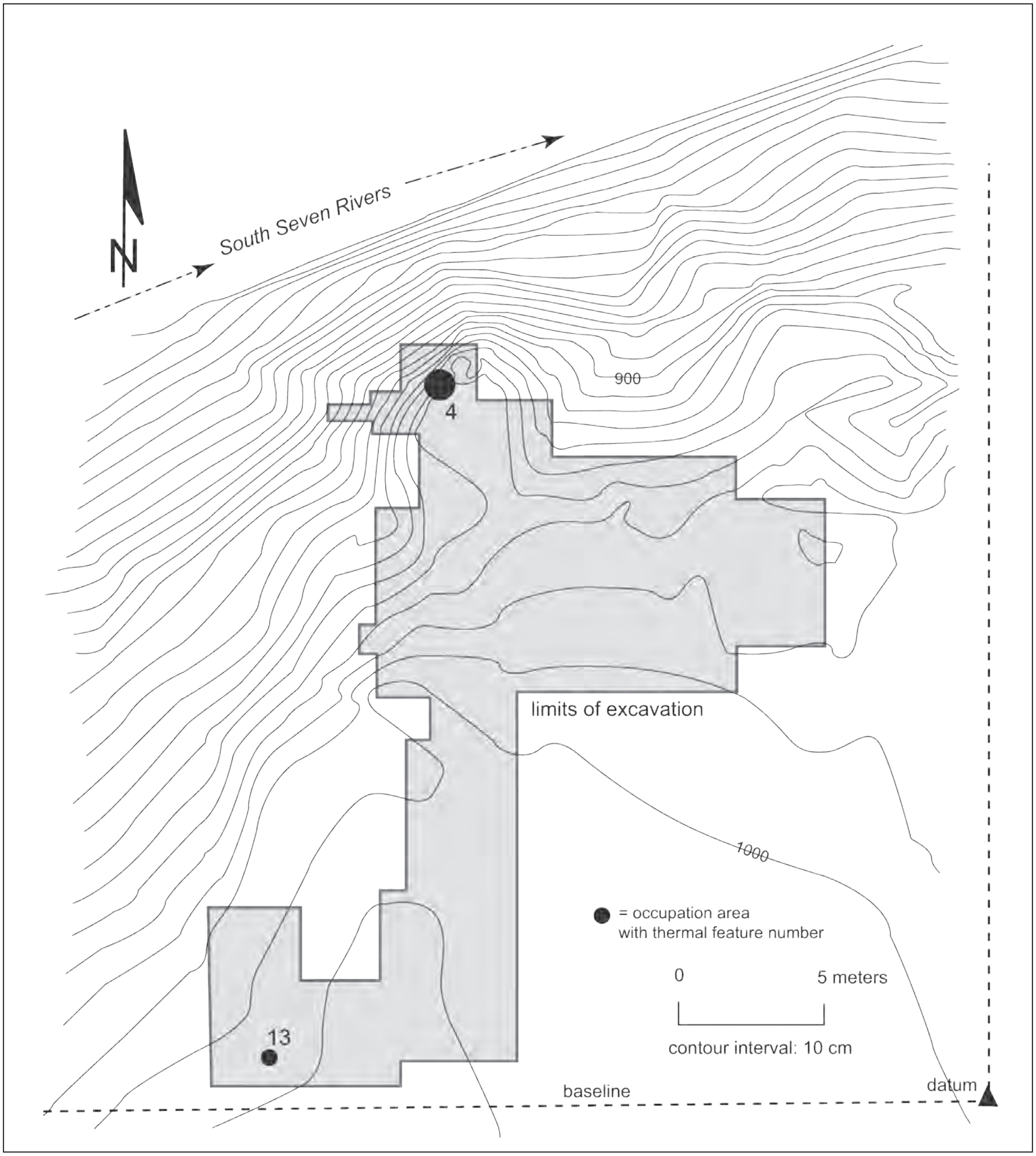


Figure 15.11. Occupation 3, late Avalon phase, ca. 1100 BC.

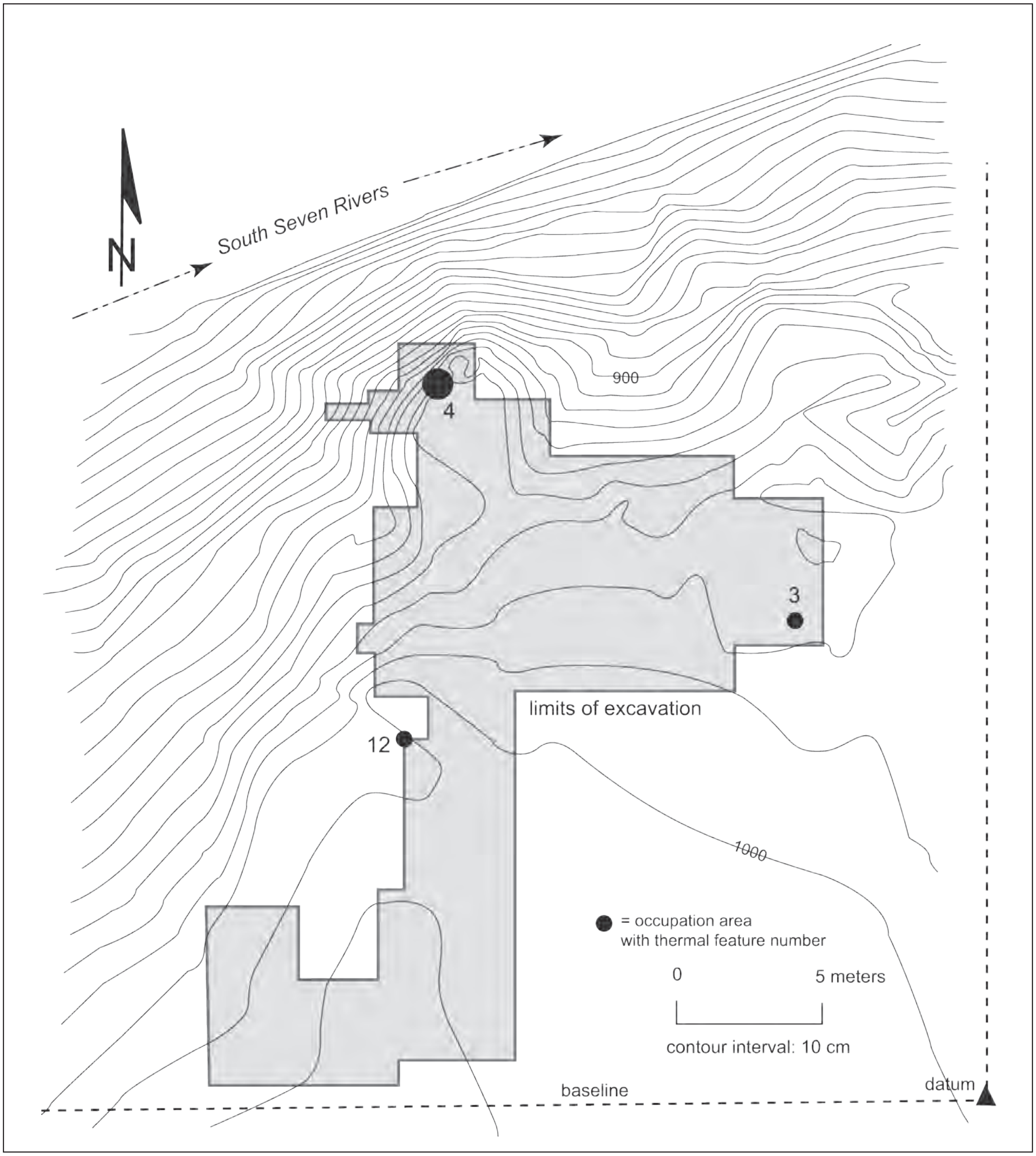


Figure 15.12. Occupation 4, Avalon/McMillan phase, ca. 1000 BC.

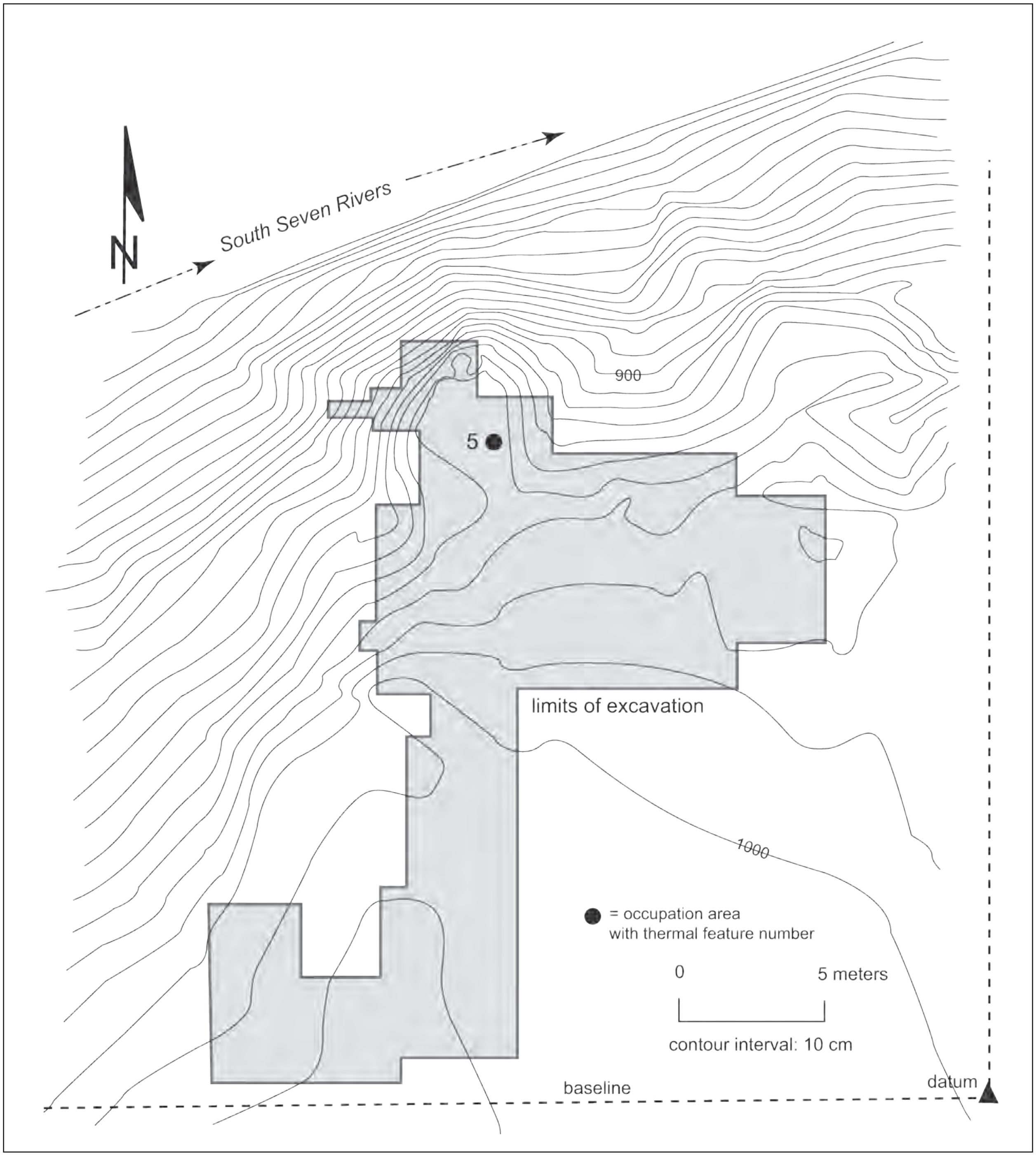


Figure 15.13. Occupation 5, early Brantley phase, ca. AD 135.

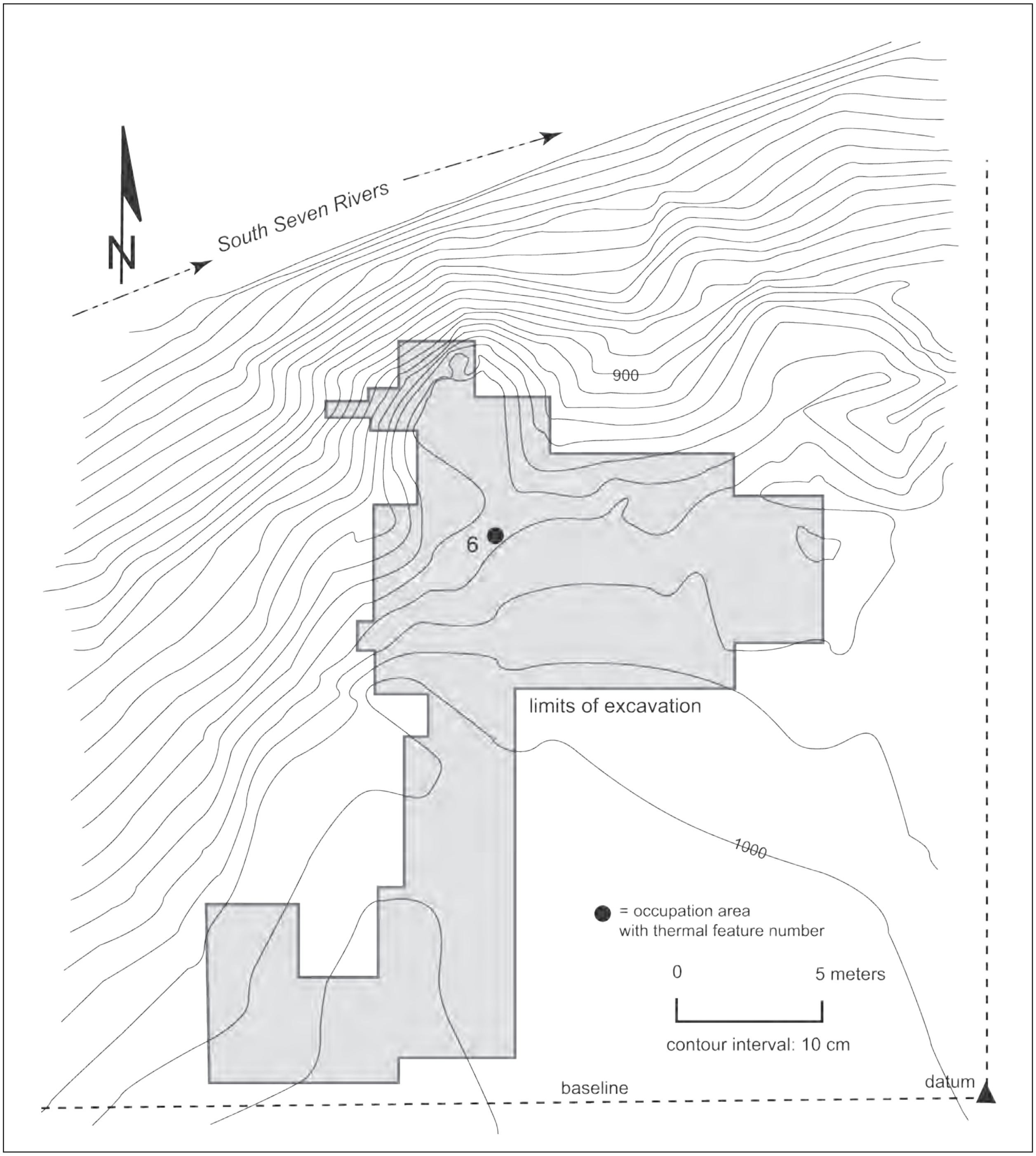


Figure 15.14. Occupation 6, middle Globe phase, ca. AD 785.

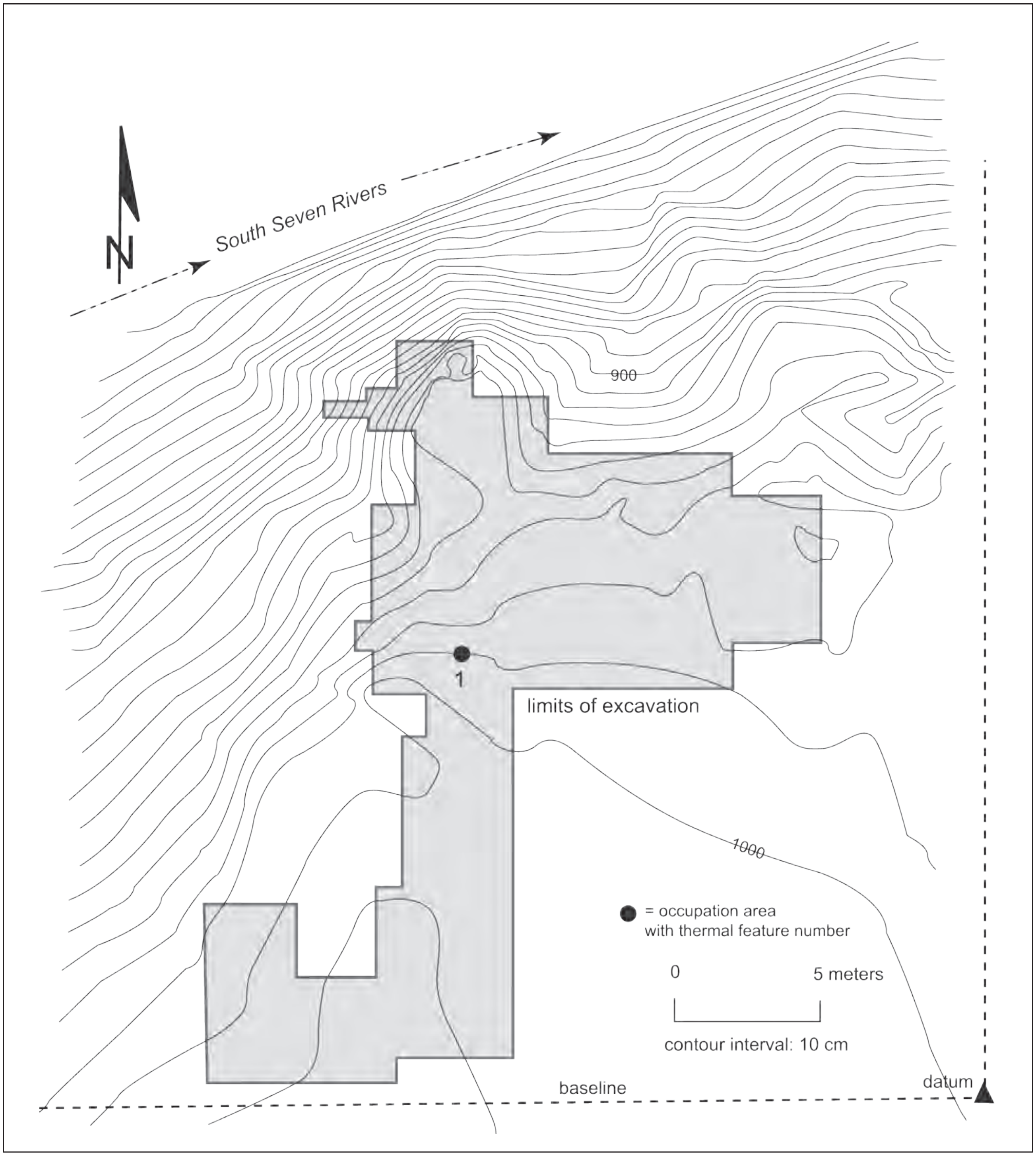


Figure 15.15. Occupation 7, late Globe phase, ca. AD 1100.

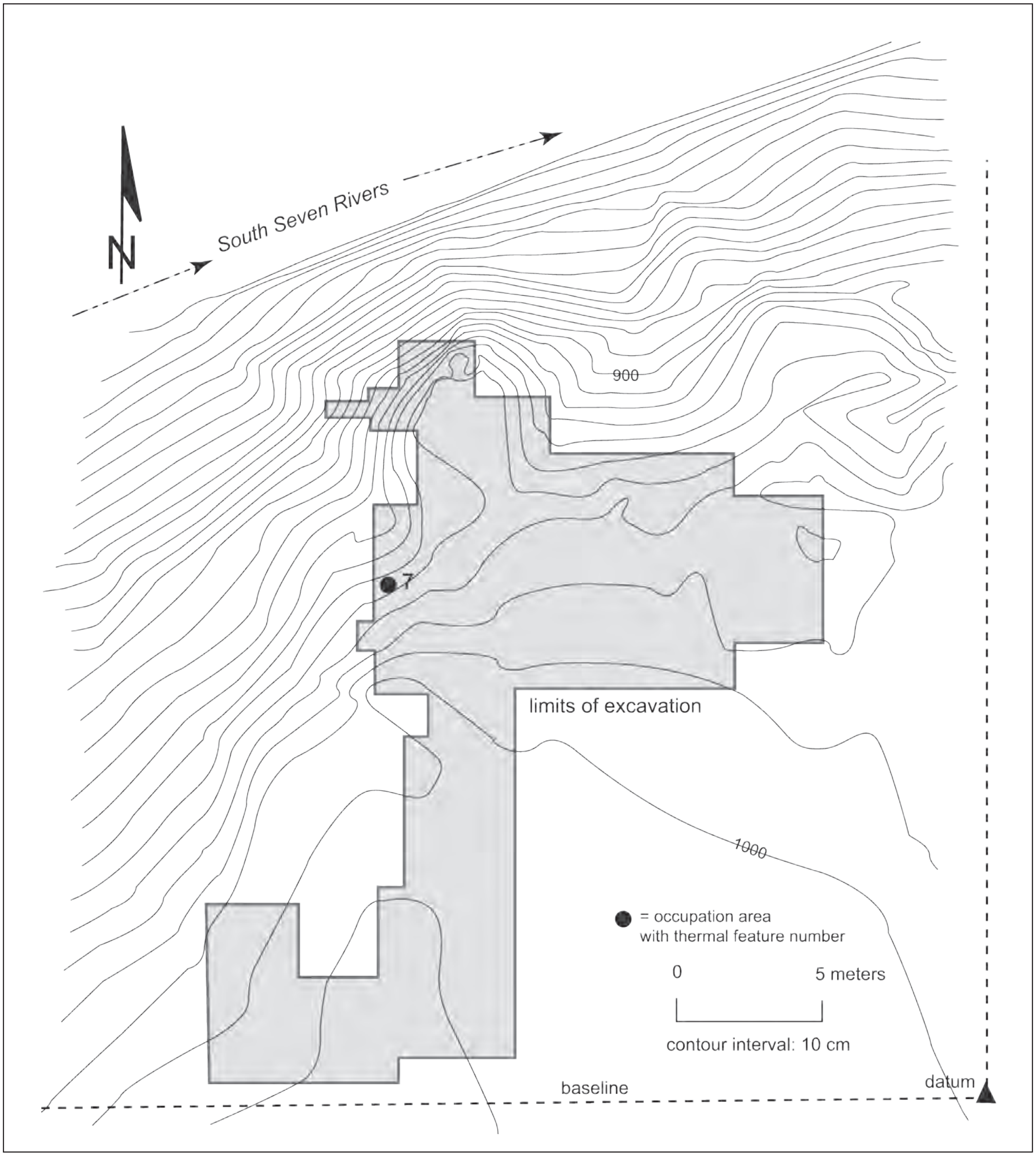


Figure 15.16. Occupation 8, late Seven Rivers phase, nineteenth century.

that the main habitation zone was used before and after, but not during, the TF 4 occupation(s). Of the dated features within Zone 3, all date to different time periods, perhaps as single feature-events. As mentioned earlier, the wild card in all of this is that not all features within Zone 3 could be dated, and not all features within Zone 3 were excavated. Some of these features might have been contemporary with TF 4.

Thus, the various dated features within the so-called main habitation zone at LA 38264 are so grouped for reasons other than a single, large group of people who came together for communal activity. Pretty clearly, the excavated features in this part of the site represent multiple occupations by small groups over a period of nearly 3,500 years. Each group may not have used more than a single thermal feature during its stay. In some instances, pit-baking facilities , both large (TF 4) and small (TF 6), may have been used on two or more separate occasions, and some of those uses were hundreds or even thousands of years apart. The occupation zone model may still be viable, but it cannot be confirmed or refuted on the basis of current evidence.

LA 112349 (River Crossing Site)

Two radiocarbon samples of mesquite charcoal (McBride, this volume) from the fill of the one excavated feature at this site yielded calibrated dates of 1045 BC (2 SD, 1250–925 BC; Beta-122667) and 1170 BC (2 SD, 1315–1015 BC; Beta-122668) (Appendix 7). These dates overlap at the level of two standard deviations, indicating a Middle Archaic late Avalon phase occupation at about 1100 BC.

The two brown ware pottery sherds recovered from the surface of LA 112349 suggest a second, later use of the site. One and perhaps both can be classified as South Pecos Brown, a poorly dated type described by A. J. Jelinek (1967) for the Middle Pecos region north of the Brantley locale. He suggests dates of ca. AD 900–1300 based on ceramic seriation. If applicable here, then a Late Prehistoric Globe or Oriental phase occupation is indicated.

Possible Intersite Relationships by Time Period

Two aspects of this project hinted at the necessity for looking specifically at potential temporal relationships among the three sites. The first was a realization that the initial site structure model for LA 38264 East—the organization of space radiating out from but directly related to the function of the communal baking facility—was not verified or refuted. The other was a realization that the hunter-gatherer use of space might not conform to our present-day definition of and assumptions about archaeological sites and their occupants. Knowing that the radiocarbon dates are similar for some of the features at the three sites, we applied the OxCal routine to pooled dates from all of the sites. The results are most interesting.

Whether we look at the calibrated dates (Fig. 15.17) or the dates manipulated through the OxCal routine (Fig. 15.18), three instances of potential contemporaneity of features among the project sites are identified. The earliest involve TF 1 at LA 112349, TF 13 at LA 38264, and the earlier use of TF 4 at LA 38264. This suggests once again that late Avalon phase peoples used two sizes of baking facilities at the same time, one for communal baking by the local group as a whole (TF 4; multifamily local group?), and the other for individual units (families?; TF 1 and TF 13) comprising the local group. The distance between TFs 1 and 4 is about 300 m. As in the case of the Mescaleros, this distance should not necessarily be considered unusual for people belonging to the same group and camp.

The second example involves early Globe phase features—TF 11 at LA 8053 and TF 6 at LA 38264. TF 11 is a small nonrock thermal feature, and TF 6 is a small pit-baking facility. This particular example is questionable because of the uncertain status of the dating of TF 6.

The final example of potentially contemporaneous intersite relationships involves late Globe phase features TF 6 and TF 9 at LA 8053 and TF 1 at LA 38264. TF 1 is a small nonrock thermal feature, TF 6 is a larger nonrock thermal feature, and TF 9 is a rock thermal feature. If TFs 6 and 9 were truly contemporaneous, it suggests that the difference between the two types of features may have been functional

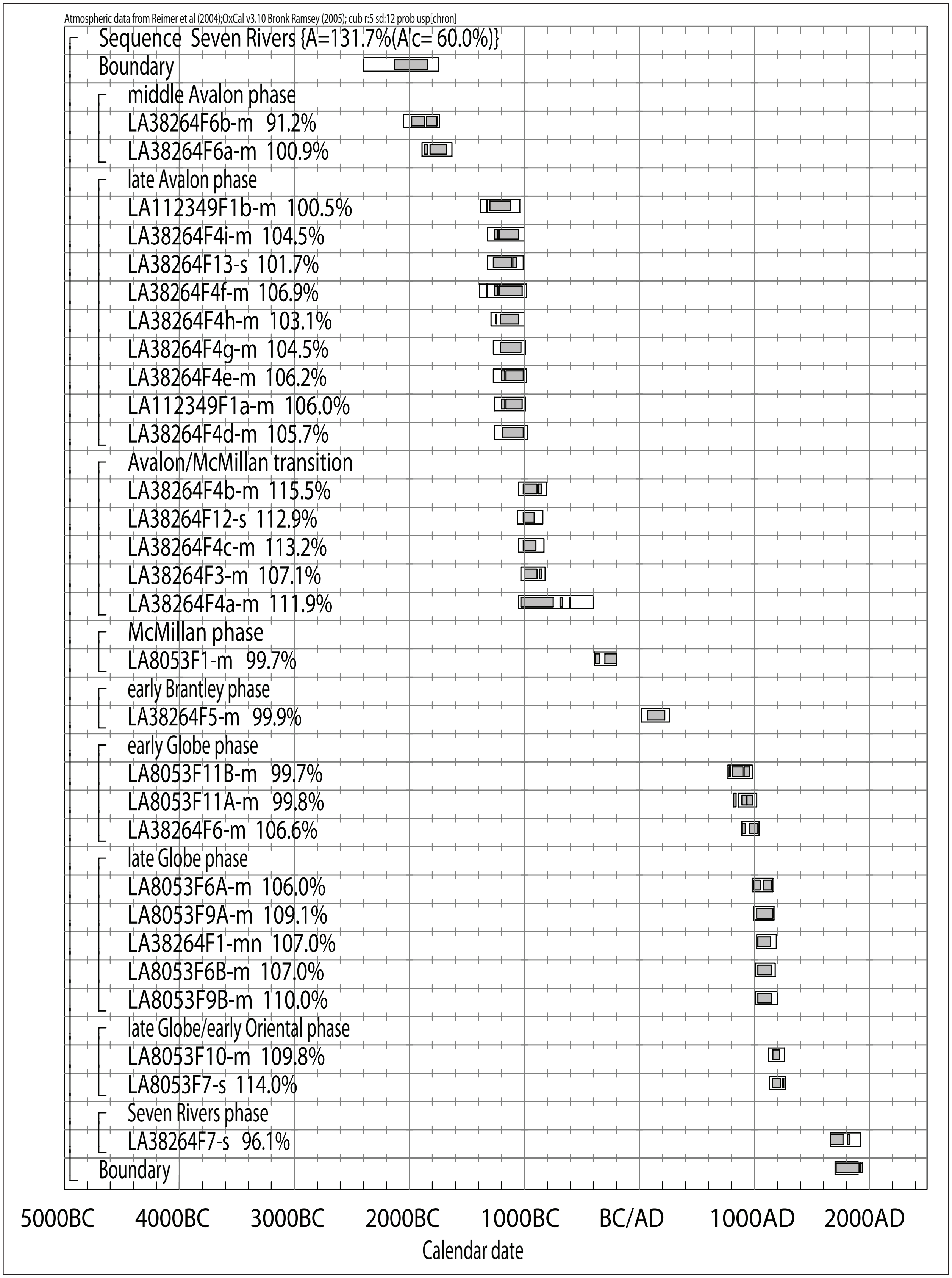


Figure 15.17. Components/occupations by phase at the three project sites.

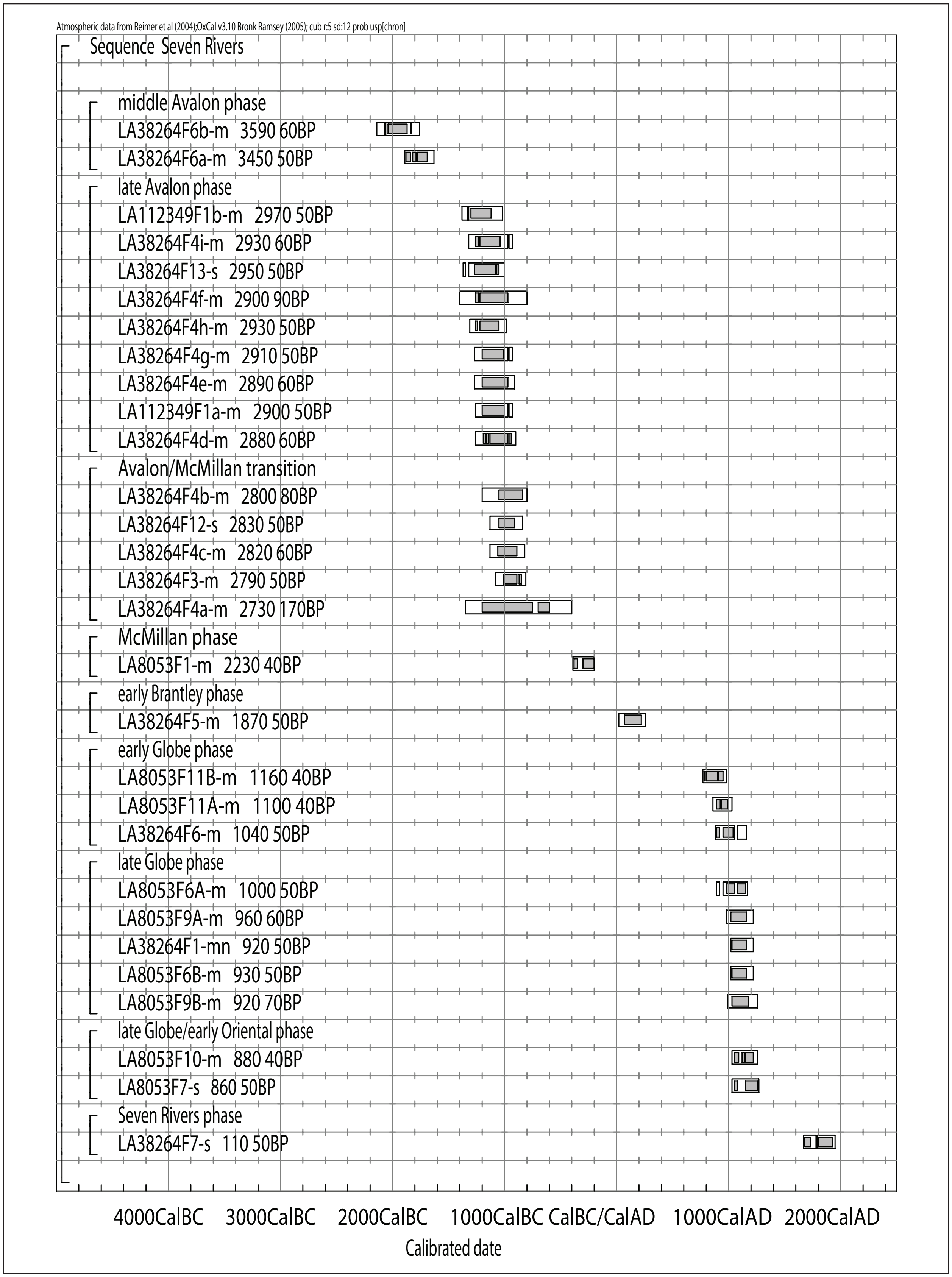


Figure 15.18. Radiocarbon dates grouped by the OxCal routine, all project sites.

and morphological. As demonstrated by the juxtaposition of contemporaneous small and large nonrock thermal features at LA 116469 near Roswell (Wiseman 2003), the contemporaneity of such features is not unexpected. The question with respect to TFs 1, 6, and 9 at South Seven Rivers is whether all three features were used by the same group. The essential contemporaneity of their radiocarbon dates certainly suggests they did.

In summary, the project sites produced three examples of potentially contemporaneous thermal features involving more than one site. The Avalon phase example (TF 1 at LA 112349, and TF 13 and the earlier use of TF 4 at LA 38264) looks to be an especially good case because of the involvement of a communal baking facility (TF 4) and only one contemporaneous feature at the same site. It is easy to imagine that other members of the group using TF 4 were spread out at some distance for what we presume to be appropriate social (privacy?) reasons. Clearly, archaeologists might increasingly look beyond the single site when discussing the spatial scale of one occupation.

Discussion

If we look at the dated components from the three sites by time period, we see that at least 16 occupations are represented, and some features had evidence of multiple uses dating to different components (Table 15.4). The Archaic period is well represented by 10 components, of which 5 date to the Middle Archaic Avalon phase, 3 to the Avalon/McMillan transition, 1 to the McMillan, and 1 to the Brantley. The Late Prehistoric period is represented by 5 components, all of which date to the early Late Prehistoric Globe phase and its transition to the Oriental phase. Other than the Globe/Oriental component at LA 8053, the middle and late Late Prehistoric periods (Oriental and Phenix) are not represented among the dated components at any of the sites. A single Seven Rivers phase occupation from the ethnohistoric period rounds out the demonstrable uses of the project sites. How many other separate components/occupations would we have defined if we had excavated the entirety of all three sites? How much more would we know about the prehistoric and early historic occupations of the area?

Katz and Katz (1985a) were required by the limitations imposed by the Brantley Dam and Reservoir project to select some sites for excavation and to ignore others. While they made a good-faith effort to get the best possible representation of the full range of the occupations in the Brantley project area, their results suggested that certain periods such as the Middle Archaic Avalon phase were poorly represented in the locality. Yet during our project, in which some sites recorded by the initial Brantley effort were excavated, we fortuitously exposed components belonging to that very period!

5. Are the prehistoric components of the project sites base camps/habitation sites, special-activity sites, or some combination of the two?

LA 8053 (Honea's Site)

Our excavations at LA 8053 involved 678 sq m in a site estimated to contain a total of about 5,600 sq m. That is, we had a good look at approximately 12 percent of the site. Given the fairly thorough sand cover of the northern half of the site, we cannot judge whether the part we excavated represents the primary occupation area, part of the primary occupation area, or a peripheral occupation area. Certainly, many rock thermal features and cultural debris were observed in unexcavated parts of the site. Thus, having only part of the picture, our assessment of the function of LA 8053 is limited.

Only one or two types of features were uncovered in the excavations. The one certain feature type is the small campfire that would have been used for cooking small quantities of food and providing lighting and perhaps some warmth at night. The somewhat larger thermal features may have served the same purposes, or they may have been used to cook larger quantities of food. Perhaps their larger size also indicates longer stays than at the smaller features. No storage or cache pits were found, and structures of any sort appear to be lacking as well. By these criteria, the occupations appear to have been of generally short duration and limited in types of activities undertaken.

Table 15.4. Cultural components by phase and site, Seven Rivers Project

Brantley Phase Sequence (Katz and Katz 1985a)	Part of Phase	Number of Separate Occupations	Feature	Site
Avalon (Middle Archaic, 3000-1000 BC)	middle	2	TF 6*, TF 6*	LA 38264
	late	2	TF 4*, TF 13	LA 38264
		1	TF 1	LA 112349
Avalon/McMillan (ca. 1000 BC)	transition	3	TF 3, TF 4*, TF 12	LA 38264
McMillan (Late Archaic, 1000 BC-AD 1)	late	1	TF 1	LA 8053
Brantley (Terminal Archaic, AD 1-750)	early	1	TF 5	LA 38264
Globe (early Late Prehistoric, AD 750-1150)	early	1	TF 11	LA 8053
	middle	1	TF 6*	LA 38264
	late	1	TF 6, TF 9	LA 8053
		1	TF 1	LA 38264
Globe/Oriental (ca. AD 1150)	transition	1	TF 7, TF 10	LA 8053
Oriental (mid-Late Prehistoric, AD 1150-1450)	-	-	-	-
Phenix (late Prehistoric, AD 1450-1540)	-	-	-	-
Seven Rivers (ethnohistoric, post-AD 1540)		1	TF 7	LA 38264

* Features with evidence of multiple uses dating to different components.

The artifact inventory generally supports this conclusion. Artifact density for the surface inventory of 3,880 square meters (about 70 percent of the total site area) is about one item per 6 sq m. Within this area, two major concentrations of surface artifacts were noted and served as the focal points for excavations. The excavated artifact density is higher, about three items per square meter, or about 18 times the overall surface artifact density.

Artifact diversity is another matter entirely. The majority of items (surface and excavated combined) are chipped stone debris consisting of flakes, cores, shatter, and manufacture bifaces. These items constitute 94 percent of the assemblage. All stages of projectile point and/or tool manufacture are present in this assemblage, with cores, shatter, and core-reduction flakes representing the initial stages, and biface-thinning flakes and manufacture bifaces representing the later stages of production.

Pottery sherds are the next most common category (5 percent). However, these 128 sherds may represent as many as 14 or more separate vessels.

The formal artifacts and other items comprise only 1 percent of the assemblage. These 18 items are scarce limited in variety—metate and mano fragments, dart and arrow projectile points, end scrapers, a graving tool, and a Pecos Valley Diamond quartz crystal (curiosity? toy? religious item?).

Seventeen flakes (counted among the manufacture debris in the calculations presented above) display use-wear or intentional retouch suggestive of impromptu cutting/scraping tasks. Counting these items, then, the "artifacts" category (formal plus informal) increases to about 1.5 percent of the artifact assemblage.

In summary, the activities conducted at LA 8053 as implied by the artifact assemblage include plant-food preparation (manos and metate, probably used by women); cooking, food service, and water transport (pottery; probably performed mainly by women); hunting kit manufacture and refurbishment (chipped stone debris, projectile points, graving tool?; male activities); hide preparation (end scrapers; female activity); miscellaneous camp tasks (informal tools); and leisure and/or religious activity (quartz crystal; presence of children?). These activities are part of everyday living. They are sufficiently varied and suggest the presence of women as well as men and perhaps children.

The preponderance of data recovered from LA 8053 leads to the conclusion that when people occupied the site, they operated as collectors rather than logistical foragers in Binford's sense. LA 8053 served as a short-term camp (but not an over-wintering base camp) during the annual subsistence round. Whether this characterization applies to all uses of the site during all time periods cannot be known because we cannot definitively tie most of the artifacts, and therefore the activities that they signify, to specific time periods.

One of the more interesting aspects of our findings at LA 8053 is that different group sizes are represented by the site features. Specifically, if our lines of reasoning and inference are correct, some of the groups that spent time there used but a single thermal feature (such as TFs 6, 10, and 11), indicating a group size of between one and three individuals. These occupations occurred during the Late Prehistoric Globe phase (in this case, ca. AD 800 to 1200) and possibly into the Oriental phase (ca. AD 1150 to 1275).

Other groups appear to have been sufficiently large (four to six people?) to require two thermal features that were placed close together (such as TFs 7/8 and 9/12). These occupations occurred during the Globe phase and the Globe/Oriental transition (AD 800 to 1275).

Then we have what appears to be a much larger group represented by the organized oval arrangement of TFs 1, 2, 3, 4, 5, and two or three unexcavated thermal features. Such a group may have comprised as many as 16 to 20 individuals. But again, the low artifact counts and variety, as well as the limited variety of features, suggest reasonably short occupations, probably of a few days at most. This large occupation group occurred during the Late Archaic McMillan phase, between 400 and 200 BC.

LA 38264 (South Seven Rivers Site)

Our excavations at LA 38264 involved 783 sq m in a site estimated to contain a total of about 20,000 sq m. That is, we had a good look at approximately 4 percent of the site. It is clear from examining the site surface that the highway project took in about one-quarter to one-third of the central, high-density site area. Most of the thermal features observable from the undisturbed surface lie within this area. However, no communal baking facilities (ring middens, annular rock thermal features, etc.) other than the excavated TF 4 are currently in evidence in the undisturbed parts of the site. But it should be remembered that TF 4 was not obvious from the surface prior to our surface-stripping activities. Since we have only a very small part of the picture, our assessment of the function of LA 38264, whether basecamp/habitation or special-activity site, is accordingly limited.

At least three types of features were uncovered in the excavations. These include small camp hearths that would have been used for cooking small quantities of food and providing light and perhaps some warmth at night. Two somewhat larger thermal features are believed to have served as family-size baking facilities. The largest discovered and excavated feature is the communal baking facility, TF 4. No storage or cache pits were found, although both they and structures could be present in unexplored parts of the site, especially east of our excavations. If storage/cache pits and structures are indeed not present at this site, then the occupations we exposed were generally short in duration and somewhat limited as to types of activities undertaken. At least one (TF 4) and possibly another (TF 6) of the excavated features indicate repeated use through time.

The artifact inventory generally supports this conclusion. Artifact density in the surface inventory of 10,632 sq m (about 53 percent of the total site area, West and East Areas combined) is about one item per 6.7 sq m. Within this area, one major concentration of surface artifacts was noted and served as the focal point for excavation. The excavated artifact density is higher, at about 19 items per square meter, or about 129 times the surface density.

Most items (surface and excavated combined) are chipped stone debris consisting of flakes, cores, shatter, and manufacture bifaces, which constitute 99 percent of the assemblage. All stages of projectile point and/or tool manufacture are present. Cores, shatter, and core-reduction flakes represent the initial stages, and biface-thinning flakes and manufacture bifaces represent the later stages of production.

Pottery sherds are the next most common category, at less than 1 percent. Based on the presence of three different pottery types, no fewer than three different vessels are represented.

The formal artifacts and other items comprise less than 1 percent of the assemblage. These 51 items are limited in variety and include metate and mano fragments, dart and arrow projectile points, end scrapers, a beveled knife, a large flake knife, and a large flake tool.

One hundred twenty-four flakes (counted among the manufacture debris in the calculations presented above) display use-wear or intentional retouch suggestive of impromptu cutting/scraping tasks. Counting these items as tools, the "tools" category (formal plus informal) remains under 1 percent for the site assemblage as a whole.

In summary, the activities conducted at LA 38264, as indicated by the artifact assemblage, include plant-food preparation (manos and metate, probably used by women); cooking, food service, and water transport (pottery; probably performed mainly by women); hunting kit manufacture and refurbishment (chipped stone debris, projectile points, graving tool?; male activities); butchering (beveled knife; male activity); hide preparation (end scrapers; female activity); and miscellaneous camp tasks (informal tools). These activities are part of everyday living. Sufficiently varied, they suggest the presence of women as well as men and perhaps children.

The preponderance of data recovered from LA 38264 is congruent with an interpretation that the occupants operated as collectors rather than logistical foragers, in the Binfordian sense. At most times, LA 38264 served as a short-term camp (but not an over-wintering base camp) during the annual subsistence round. Whether this characterization applies to all uses of the site during all time periods cannot be stated because we cannot definitively tie most of the artifacts and the activities they signify to specific periods.

One of the more interesting aspects of our findings at LA 38264 is the internal physical structure of the excavated area. Prior to receipt of the radiocarbon dates, we postulated that this part of the site was laid out relative to the communal baking facility (TF 4). This layout was seemingly composed of four zones: the communal baking facility, an area immediately adjacent to it that served as a staging area for the use of TF 4 (and therefore generally lacked other features), a third area adjacent to the second that served as the primary camping area for the users of TF 4 (as reflected by a tight concentration of other thermal features, especially campfires), and the fourth a peripheral area used only occasionally and not necessarily in conjunction with the use of TF 4.

Once the radiocarbon results were in, this scenario of site structure was placed in doubt. The C-14 results clearly showed that TF 4 was used early, and that after the early McMillan phase, it was no longer used. Several (or many?) occupations of the site occurred after that time. More importantly, the supposed primary camp (Zone 3) was used on numerous occasions during several different periods, but none of them appear to have been contemporary with the uses of TF 4. Thus, at any one time, only one or perhaps two of the thermal features in Zone 3 were in use, making it anything but the congested camping area originally envisioned. However, as discussed earlier, this occupation zone model cannot be definitively rejected.

To further complicate matters, the contemporary or nearly contemporary uses of the presumed communal facility (TF 4) and the two small, presumably family-size baking facilities (TFs 12 and 13) seem illogical. Why would a group congregate to bake some foods in one big facility, only to bake other foods in individual family facilities at the same time (if in fact, all three facilities were used contemporaneously)? One can imagine several scenarios that might account for this. One of the more attractive ones is that the communal facility was used for collective foods that required longer-term bakes, and the smaller ones were used for individually collected foods and/or foods that required shorter baking times. Another possibility is that communally collected foods were cooked and consumed communally, whereas individually collected foods were cooked and consumed individually. A variation of this last theme is discussed in some detail with respect to the earlier and later occupations of the Henderson site at Roswell (Speth 2004:420–429).

Other scenarios are certainly plausible, but this discussion definitely sharpens the focus of our suppositions, presumptions, and interpretations about feature function in a useful manner. The door is wide open for future thought, discussion, experimentation, and excavations that will hopefully provide more data about the function of these features.

LA 112349 (River Crossing Site)

Prehistoric use of this site was obviously minimal. The two or three small thermal features and extremely sparse artifact scatter argue for uses that are almost incidental to the overall use of the area and nearby sites like LA 8053 and LA 38264.

Perhaps the most interesting aspect of LA 112349 is the fact that, unlike the nearby sites, it is in a more protected position with respect to the weather at certain times of the year. Specifically, this south-facing slope would have minimized the effects of the northerly winds and maximized the warmth of the sun during the winter season. However, the near absence of artifacts indicates that the occupation was of short duration (a few days at most) and definitely not that of a winter base camp.

Discussion

The preceding paragraphs demonstrate just how arbitrarily we define archaeological sites in southeastern New Mexico. We use streams, highways, changes in topography, and modern land management lines as boundaries. But the truth is, all three of our project sites, situated on both sides of this stretch of the South Seven Rivers drainage, could have been designated as a single site. A fourth site, LA 112630, north of the South Seven rivers and north of LA 38264 East, could be added to this composite site. During these investigations we learned that individual features that may have been associated with the use of the communal baking facility (TF 4) at LA 38264 East were not grouped around that feature. Some were nearby, but others may have been as much as a few hundred meters away. Just because people cooperate in day-to-day activities does not mean that they necessarily live in a tight cluster. In fact, ethnographic studies clearly demonstrate that hunter-gatherers who have plenty of available space tend to use a lot of space for camping.

In this regard, I often contemplate Almer Blazer's (1999) account of his experiences among the Mescaleros in the late 1800s. In discussing the Mescalero tendency toward matrilocal residence of newlyweds, he mentions that the actual spacing between the wickiup of a young couple and that of her mother could be on the order of a quarter of a mile (400+ m)! Such a distance in this case may have much to do with the mother-in-law avoidance rule of the Mescaleros. Similar distances within camps have also been recorded for the Alyawaras of Australia (O'Connell 1987; also see Fisher and Strickland 1989). In both cases, other people might be, and probably were, camped in between these examples.

Elsewhere, Blazer notes that when Santana ordered his people to come in close to the agency to keep them out of harm's way, 2,000 Mescaleros still spread themselves over 60 sq mi, which works out to 33 individuals per square mile, or 19 acres per person! In considering these figures, one should keep in mind that they pertain to a period of duress imposed by conflict with whites. Presumably, in periods of reduced stress, distances among groups and subgroups could have been much greater. This situation gives yet another meaning to the concept of landscape archaeology and how we perceive the remains we study.

A ethnoarchaeological study that is especially pertinent to this subject was reported by James F. O'Connell (1987) for the Alyawaras, a hunter-gatherer group inhabiting central Australia. A major factor in the suitability of his study to our purposes here is that the Alyawara territory is "a broad sandplain, crosscut by low, linear dunes, and . . . by vast stands of tussock grass and scattered patches of scrub forest." The climate "is warm and dry; average annual rainfall is about 250–300 mm" (O'Connell 1987:75).

In the 1970s, when O'Connell conducted his study, the Alyawaras lived in groups ranging from 20 to 200 people, with an average population of 90. Settlements ranged from 10,000 to 100,000+ sq m, or 1 to 10 ha. O'Connell (1987:75–76) believed that before European contact, group sizes probably averaged more on the order of 15 to 40 people. Scaled down proportionally, the area of precontact Alyawara settlements might have ranged from 0.75 ha to 4 ha. Population densities within sites during both periods, then, were quite low.

We currently have some evidence suggesting that the prehistoric groups of the Carlsbad region of southeastern New Mexico may have been similar in size to precontact Alyawara groups (Wiseman 2000b). Regarding settlement size, the 9 ha area encompassed by our three project sites and LA 112630 (but excluding the area of the South Seven Rivers drainage that passes among them) is clearly on the same order of magnitude as the Alyawara settlements. It is possible that what we have recorded as four different prehistoric sites in our project area could have constituted a single settlement on one or more occasions. Such is not necessarily the case, but it does indicate that archaeologists must be more cognizant of the potential scale of actual prehistoric settlements or "sites."

Furthermore, individual Alyawara households within each settlement number from 5 to 35 (average of 20) and are spaced variably (Fig. 15.19). Kinship is a major but not limiting factor in settlement composition, and degree of spacing among individual households often reflects kin affiliation. This results in clusterings of households within the settlement.

As far as individual Alyawara household areas are concerned, O'Connell (1987:78) said they are "marked by a circle of cleared ground 1–20 m in diameter (3–350 sq. m; mean = 78.9 ± 84.5 sq. m). . . . Within this area, household members prepare and consume food, make and repair tools and equipment, and entertain visitors. Each household activity area contains one or more shelters and hearths, and is flanked by a refuse disposal zone" (Fig. 15.20).

Furthermore, according to O'Connell (1987:78–79),

> Main shelters are usually located on the windward side of the activity area. They vary in form depending on the season of the year, prevailing weather conditions, anticipated length of occupation, and availability of building materials. The most common types are brush or sheet metal windscreens (often rigged with tarpaulin roofs for shade or protection from rain), sheet metal lean-tos, and fully enclosed, box-like structures with stout wooden or metal frames and brush,

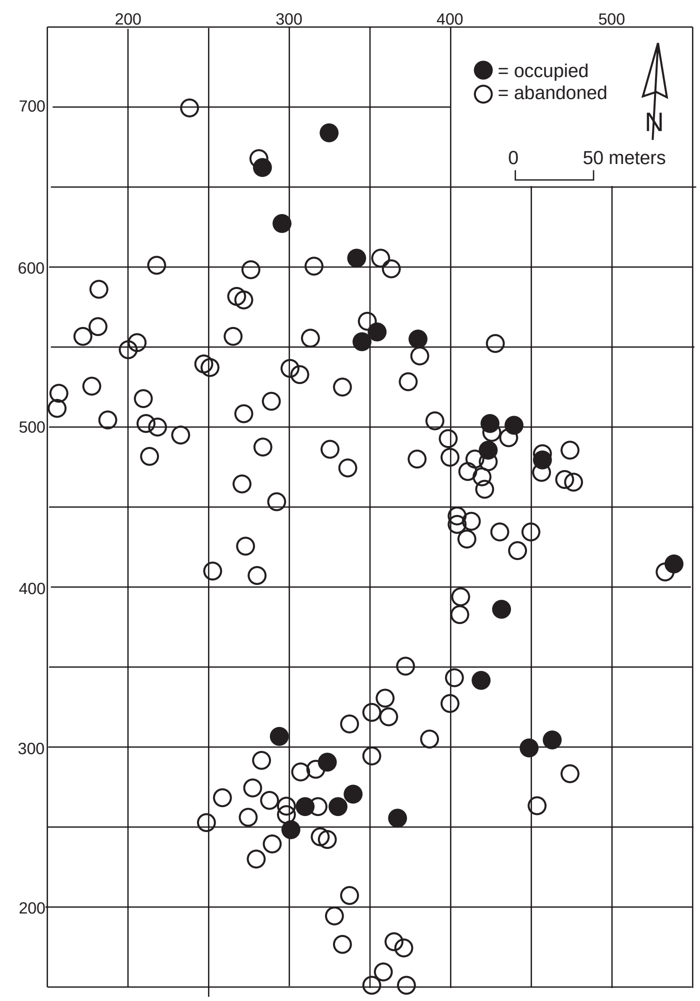


Figure 15.19. Alyawara settlement of Bendaijerum on March 26, 1975, showing distribution of occupied and abandoned households (adapted from O'Connell 1987: Fig. 7).

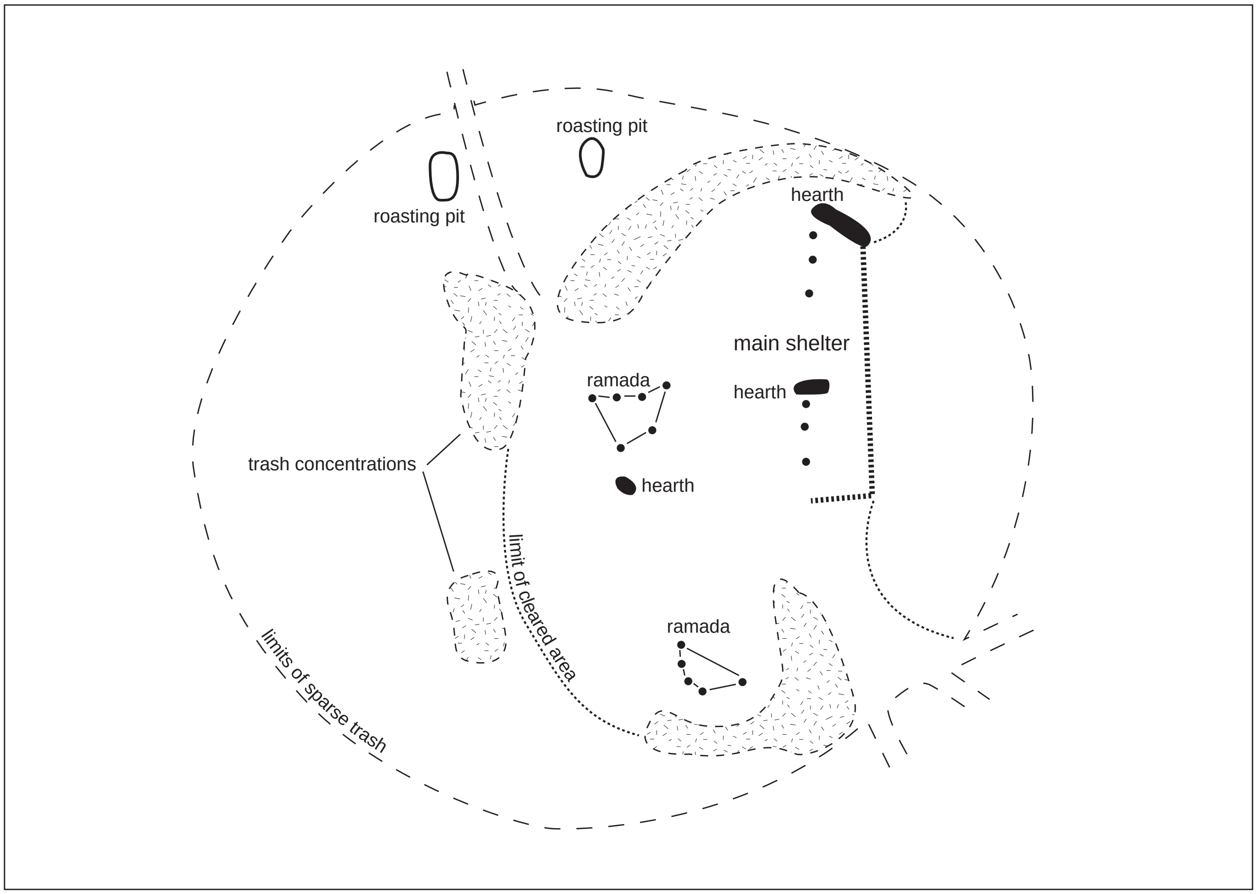


Figure 15.20. Plan of an Alyawara household area (adapted from O'Connell 1987: Fig. 1).

> grass, or sheet metal walls. . . . *Open unroofed structures* are favored in the winter months; roofed shelters are essential for shade in summer. Householders anticipating a stay of more than a few days often build a roofed, enclosed structure regardless of the season. . . . Despite differences in overall form and construction material, nearly all main shelters have square or rectangular ground plans. Total floor areas range from 2–40 sq. m (mean = 10.0 ± 6.9 sq. m). [emphasis mine]

I wish to emphasize the Alyawara use of unroofed structures, in this case during the winter. Archaeologists frequently assume that structures are always roofed and must therefore display evidence of such (e.g., postholes) among the archaeological remains. Clearly, when dealing with hunter-gatherers and perhaps some farmers as well, this assumption may not be warranted and must be used with circumspection when looking for such features.

Patterning of discarded items and refuse is very interesting and not at all in accordance with the expectations of most archaeologists when contemplating hunter-gatherer sites. As shown for the Alyawara, larger items are gathered up and tossed into a refuse disposal or "sparse trash" zone. Smaller items and charcoal and ash from hearths are swept up and discarded into "middens" ("trash concentrations" in Fig. 15.19) next to the cleared area, especially in the vicinities of shelters and shades (ramadas), where most activities are conducted. Special features such as roasting pits and automobile repair locations tend to be placed outside the cleared areas and away from the shelters and shades because they are disruptive or pose a danger.

One of the more fascinating aspects of Alyawara settlements is the phenomenon whereby households frequently abandon one location and set up another within the same settlement during the same period of occupation.

The position of households and their

associated activity areas within the settlement is subject to frequent change through time. This is best illustrated with data on the occupation histories of main shelters. On an average day in 1974–1975, the settlement at Bendaijerum contained about 125 people living in 23 main shelters scattered over an area of 76,000 sq m (Fig. 15.19). However, the record for an eleven-month period (May 1974–March 1975) shows that 43 of the 45 households present at the site for more than six days occupied a total of 135 main shelters at 133 different locations over an area of 125,000 sq m. One might suspect that the high ratio of shelters to households was the result of frequent movement to and from the site, but this is not so. Seventy-eight percent of all shelters in the sample were built by households that maintained their primary residence at the site for six months or more. Over the eleven-month period of observation, these households built 105 shelters at 104 different locations, an average of five shelters per household. For the Bendaijerum sample as a whole, on-site distances moved ranged from 2 to >400 m (mean = 96.6 ± 19.0 m). Roughly 20 percent involved slight repositioning of the main shelter relative to the activity area. In the other 80 percent, entirely new household activity areas were established (O'Connell 1987:87).

Six factors account for this phenomenon—death, domestic strife, weather, deterioration of the main shelter, build-up of refuse (O'Connell 1987:88), and the movement of household groups into and out of the settlement. Of these, death and domestic strife are readily comprehended. Accumulation of refuse is also understandable, but the fact that it is one of the least common reasons for shifting location is surprising. Deterioration of the main shelter relates to construction materials and how quickly those materials begin to fail. Grasses and leafy stems have use-lives of 90 to 120 days, especially in the dry season, when fire becomes a concern. A sixth reason for change in location is the movement of household units into and out of the settlement in search of jobs and for extended socializing.

Thus, the number of household areas in a settlement can multiply rapidly, giving the archaeological impression of either large population size, long occupation span, frequent abandonment and reoccupation of the settlement (or "site"), or some combination of these possibilities. If the author is reading the text correctly, roughly 80 percent (104 of 127?) of the abandoned and occupied household areas of Bendaijerum were created within the span of about one year. Confounding the situation, the once clear spaces within abandoned household areas can then become part of the refuse (or artifact) toss-zone of a new household area. This underscores yet another theme discussed by O'Connell and (independently) me—physical association among artifacts and among artifacts and features does not necessarily mean actual cultural and temporal association. The implications of all these factors for the study and interpretation of hunter-gatherer archaeological sites are stunning. If these same behaviors were transpiring in prehistoric southeastern New Mexico, the numerous megasites currently on record, and by implication the vast numbers of people they are presumed to represent, may be illusory.

While walking across some of these New Mexican megasites, it is interesting to compare the number and distribution of abandoned and occupied household areas that may be represented by the distribution, arrangement, and composition of burned-rock features under foot. The similarities in staggered spacing and changing density of features and artifacts are difficult to ignore.

While none of this is really new, the demonstration of it is unusual in the history of archaeological research in southeastern New Mexico. What is relatively new here is that, in the past, multicomponency has been suspected because of the presence of artifacts from different time periods at a single locus. However, since it is becoming increasingly clear that virtually all past peoples collected artifacts as they traveled around the landscape, we cannot be certain that what we as archaeologists find on sites today is truly the result of multicomponency, prehistoric artifact collecting, or some combination of both. Only numerous dated features from the same site can confirm, or negate, multicomponency and demonstrate what time periods, activities, and differences/similarities in locale use are—or are not—represented at a particular site. This provides a check on our interpretation of the artifact inventory and more reliable feedback for our studies.

The Nature of Human Use of the Project Area

Some of the more interesting aspects of the prehistoric occupation of the Seven Rivers project area are hints at differences in group size and composition through time. Admittedly speculative, the following possibilities present themselves. The reader should keep in mind the probability that these scenarios pertain primarily, or even solely, to occupants of the Seven Rivers locality. The organization and composition of these groups may have changed as they moved through the remainder of their seasonal cycles. Unfortunately, we lack direct evidence on the seasonality of the activities represented by our examples. The group sizes seem to break down according to dates of occupation: earlier (Archaic) or later (Late Prehistoric and historic).

The earliest group occupation represented in the Seven Rivers data belongs to the Avalon phase and involves the communal baking facility (or ring midden), TF 4. The size of the feature suggests the participation of numerous individuals, perhaps a local group composed of two or more families. Each family may have been composed of at least an adult male, an adult female, and one or two children. The group activity seems to have focused on a communally gathered foodstuff that was then cooked in a communal feature (TF 4). Whether that foodstuff was immediately consumed by the group or taken back to the individual family camps can only be guessed.

When it came to actual camping arrangements, each family in the local group appears to have had its own camp with its own facilities. Among these was a small baking facility, probably for family-gathered foodstuff that was cooked and consumed apart from the rest of the group. These family loci appear to have dotted the landscape, perhaps encompassing an area several hundred meters across (i.e., they were not tightly clustered in the vicinity of TF 4).

A second, similar local-group use of TF 4 took place during the Avalon/McMillan phase transition. It may have been during one of these two uses of TF 4 that the two lithic knapping circles defined immediately south of TF 4 came into being as the men of the communal group waited for the food cooking in TF 4. Or the circles may date to a later period.

Later on, during the McMillan phase proper, another type of group occupation occurred in the Seven Rivers project area. This one also involved several thermal features, arranged in an oval pattern at LA 8053. These thermal features or campfires are spaced fairly closely together (each a few meters from those on either side of it), so closely, in fact, that it seems unlikely that more than one or two individuals used each campfire. This suggests that complete families were not involved. And the knapping debris within the oval of campfires suggests that the users of each campfire sat on the inward side of the oval to make tools and socialize. If so, then most if not all of the occupants of the camp oval were men and/or boys.

Late Prehistoric and early historic occupations of the Seven Rivers project area appears to have been quite different. Each appears to have involved one or at most a few (two to four?) individuals camped around one or two thermal features. The large-group occupations of the Archaic period do not seem to have occurred during these later periods.

16. *Summary and Conclusions*

Recent excavations in southeastern New Mexico involved three prehistoric sites along the lower reaches of the South Seven Rivers drainage. This drainage constitutes the northern boundary of the Chihuahuan Desert in this part of New Mexico. Immediately to the north and east lie the Great Plains, and to the west lies the Basin and Range country of the American Southwest. The project sites, then, sit astraddle the contact zone of numerous plant species representing these three great biotic provinces. Both prehistoric and historic components were present at all three sites. The prehistoric components are the subject of this report. The historic remains are reported in Wiseman (2001a).

At the outset of the current project, the three sites appeared to be typical of sites in the region—loci denoted by vast scatters of burned rocks with definite but decidedly low numbers of lithic debitage and a potsherd or two. The ground surface, typical of terrace surfaces, was covered by a thin mantle of sand and occasional coppice dunes created by mesquite bushes. Creosote bush was and still is the dominant species on the terraces, but studies suggest that grasses were the dominant cover in prehistoric times.

LA 8053 (Honea's Site)

LA 8053 was originally recorded by Kenneth Honea during the Highway Cultural Inventory (HWCI) project performed by the Laboratory of Anthropology, Museum of New Mexico, for the New Mexico Department of Transportation in the early 1960s. No excavations or tests were performed at that time. The current project resulted in the surface artifact inventory of 3,880 sq m of site surface, the excavation of 678 sq m of site area next to the drainage channel, the exposure of 12 thermal features, and the collection of nearly 2,500 artifacts. Twenty-two samples of fill were collected from various proveniences for the recovery of minute specimens of plant and animal remains and materials suitable for radiocarbon dating. Nine radiocarbon dates, seven of them determined by accelerator mass spectrometry (AMS), were obtained from these materials.

Before excavations began, the seven burned-rock thermal features that were ultimately excavated were observable from the surface. However, none of the five nonrock thermal features were observed or suspected from examination of the ground surface; they were the bonuses of the broadscale surface-stripping program.

The dates obtained from the various thermal features demonstrate that the excavated part of the site was occupied on at least four occasions, once during the Late Archaic McMillan phase, twice during the Globe phase, and once at the Globe to Oriental phase transition. The McMillan occupation (and/or possibly a Globe phase occupation) appears to have involved a relatively large group of people who used from five to perhaps eight thermal features arranged in an oval pattern. This pattern is further validated by a distinct concentration of lithic chipping debris within the space outlined by the thermal features. The implication is that each knapper associated with the thermal features faced into the oval to knap and socialize. The later occupations were produced by smaller groups that used only one or perhaps two thermal features each. In one instance, another knapping debris concentration was defined in association with, and lying between, two of these later thermal features. All of the occupations are believed to have been of short duration.

LA 38264 (South Seven Rivers Site)

LA 38264 was originally recorded by the Archeology Program of Southern Methodist University during the early 1970s surveys for the Brantley Dam and Reservoir project of the US Bureau of Reclamation. No excavations or tests were performed at that time. The current project resulted in the surface-artifact inventory of 10,632 sq m of site surface, the excavation of 783 sq m of site area, the exposure of 15 thermal features, and the collection of nearly 15,000 artifacts. Twenty-eight samples of fill were collected from various proveniences to recover minute specimens of plant and animal remains and materials suitable for radiocarbon dating. Numerous other, smaller samples of plant and animal specimens were also collected. Eighteen radiocarbon dates, 12 of them determined by accelerator mass spectrometry (AMS), were obtained from these materials.

Before excavation began, burned rocks were scattered throughout the site area. Their greatest abundance and concentration lay where we eventually directed our excavation efforts, especially between grid lines 30N and 60N. The burned-rock density on the modern ground surface was so great between these lines that no distinct concentrations (i.e., individual features) were clearly present. What later turned out upon excavation to be TF 4, the communal baking facility or annular burned-rock midden, was denoted on the ground surface by a 2 m long stain that was partly covered by a small sand dune. None of the four nonrock thermal features later discovered and excavated were observed or suspected from examining the ground surface.

The dates obtained from the various thermal features demonstrate that the excavated part of LA 38264 was occupied on at least eight occasions: two separate times during the middle of the Middle Archaic Avalon phase, once during the late Avalon phase, once around the Avalon/McMillan (Late Archaic) transition, once during the early Terminal Archaic Brantley phase, once during the early part of the Globe phase, once during the late part of the Globe phase, and once during the historic Seven Rivers phase.

If we are right that TF 4, the annular burned-rock feature (ring midden), was used communally (by groups larger than a nuclear family), then the late Avalon and Avalon/McMillan occupations involved the largest number of people of any occupation documented at the site. All other occupations, both before and after the use of TF 4, appear to have been by smaller groups, probably by a nuclear family at most, but perhaps by as few as one or two people.

One of the more interesting facets of the artifact distribution is the delineation of a communal knapping area south of TF 4 and north of TFs 6, 7, and 9. The manufacture bifaces, both fragmentary and complete, formed a nearly perfect circle about 5 m in diameter with perhaps as many as half a dozen individual seating places indicated. Again, if our suppositions are correct, this knapping group may have been associated with TF 4. It should be mentioned in this regard that survey archaeologists have noted the fairly consistent association between fairly discreet lithic concentrations beside or short distances from ring middens in the Guadalupe Mountains region (Dorothy Griffiths, pers. comm., May 2005).

The excavations at LA 38264 were very instructive. The large block of exposed 1 m squares permitted us to find all features within a nearly 800 sq m area. It also permitted us to recover all artifacts and delineate patterns in artifact distributions. Thus, we created the opportunity to analyze the relationships among features and artifact distributions, a necessary exercise that is not permitted by the selective excavation strategies normally practiced by archaeologists in southeastern New Mexico. We also dated all features for which sufficient charcoal was collected. Many of the features produced at least enough charcoal flecks for one AMS date.

Before receiving the radiocarbon dates, we examined the intrasite layout of the features and defined what appears to be a logical set of activity zones. These areas center on the communal baking facility, TF 4, and radiate out from there. Next to TF 4 we have a space essentially lacking in features, probably a preparation area—a space for stockpiling fuelwood, rocks to be heated, and food to be cooked in TF 4. Next to that is a concentration of small thermal features that we believe constituted a main camping area associated with the use of TF 4. Beyond the main camping area lay the occasional scattered thermal feature and associated thin scatter of artifacts of a peripheral camp. The peripheral camp may or may not have been associated with the use of TF 4.

This tidy little picture proved most satisfying until the radiocarbon dates became available. Then the whole thing unraveled. Instead of being essentially coeval with the dates for the communal baking facility, the dates for the various features in the main camp represented virtually every phase of prehistoric and historic occupation for this part of New Mexico. The two features that produced dates suggesting contemporaneity with TF 4 are what we believe to be small baking facilities (like those that might be used by individual families) in the peripheral camp (TF 13) and at the far edge of the main camp (away from TF 4; TF 12). But that raised the question of why the individual families that were sharing a communal baking facility would also have individual baking facilities at their presumed camping spots. Other than suggesting that different foods were being baked in the different size facilities (denoting communal versus private foods?), we have no immediate explanation for this situation. These findings suggest that our occupation zone model is invalid. However, exposed but undated features lying within and unexcavated features lying just outside of our excavations mean that our assessment of the model is incomplete and therefore neither validated nor refuted.

LA 112349 (River Crossing Site)

LA 112349 was originally recorded by the Archeology Program of Southern Methodist University during the early 1970s surveys for the Brantley Dam and Reservoir project of the US Bureau of Reclamation. One small test was made at that time, but no on-the-ground evidence of it was observed during our project. The current project resulted in the surface-artifact inventory of about 5,250 sq m of site surface, the excavation of 95 sq m of site area, the exposure of one thermal feature, and the collection of nearly 200 artifacts. Four samples of fill were collected from the thermal feature (TF 1) for the recovery of minute specimens of plant and animal remains and materials suitable for radiocarbon dating. Two radiocarbon dates were obtained from these samples.

Before excavation began, burned rocks and artifacts were thinly scattered throughout the site area. None of these items were clustered to any particular extent other than at two obvious thermal features. Only one of two thermal features observed on the surface (TF 1) lay within the highway project area, so we directed our excavation efforts there. Excavations around TF 1 revealed a surrounding artifact-free zone, indicating to us that some care had been taken to avoid leaving sharp-edged flakes in the seating area around the features. The radiocarbon dates indicate a Middle Archaic Avalon phase use of TF 1.

The presence of two potsherds as well as other items such as a mano fragment elsewhere on this site suggest either a later occupation or materials dropped here and there across the site through time. Because of the thin, widely disbursed nature of most of the artifacts on this site, we can say little more about the use of this location.

Occupations of Multiple Sites

In some ways, the three sites treated during this project could be recorded as a single site. All are relatively small compared to what we know about hunter-gatherer use of space and the evidence suggesting that certain features among the project sites may have been used contemporaneously by members of the same group. For the hunter-gatherer, space provides privacy in lieu of the building of substantial walls, the planting of hedgerows, and the construction of other kinds of barriers used by modern day people in congested urban and suburban environments. Thus, it came as no surprise that some of the features at our three sites produced very similar dates, and they may represent contemporary use by members of the same local group.

Concluding Comments

The Seven Rivers project sites are situated among the Brantley project sites, thereby constituting an enlargement of the excavated Brantley sample. Thus, we have effectively doubled the information available for the Middle Archaic period Avalon phase and added substantially to our knowledge about the Late Prehistoric Globe phase. Of the remaining phases defined by Katz and Katz (1985a), we have also garnered information about the McMillan (Late Archaic), Brantley (Terminal Archaic), and Seven Rivers (early historic) phases. Only the Late Prehistoric Oriental and Phenix phases are not represented among the Seven Rivers project sample.

Several important lessons were learned, and in some cases reiterated, by the results of this project. The first is that broadscale excavations are necessary at hunter-gatherer sites if we are to find all of the features that are present. By obtaining datable materials from as many of these features as possible, we are better able to document the time periods and occupations that are represented at the site. The discovery of patterning among features and artifact concentrations allows us to make inferences about the size and organization of the occupying groups and whether or not they changed through time.

Broadscale excavations also permitted us to discover artifact patterns indicative of specific activities. These patterns inform us about activities and intrasite organization in a way that is not possible when we use other, more common excavation strategies. While spatial sampling is sometimes a viable scientific method, the placement of small excavation units over features observable from the surface, the excavation of other small units here and there across a large site, and the digging of a few backhoe trenches through dunes to look at stratigraphy and as a means of discovering other features often may not be the most productive way to develop information about hunter-gatherer sites. We can make stronger behavioral arguments and interpretations about the hunter-gatherer experience from the excavation strategy proposed here.

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1648–1649
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Note: A, B, C, and D following the date indicate the microfilm reel of that particular year. The first number in the citation refers to the document number on the reel.

1644
No. 13. Ynformacion que rinde Fernando Gardea [sic] para que se vea que su Hda esta muy immediata alas naciones de los indios rebeldes.

1645Aa
No. 104. Expediente formado con motivo de la paz de los yndios Tobosos por el Maestre Francisco Montano de la Cueva.

1651A
No. 104. Testimonio de los fundamentos que tubieron los Yndios para alsarse y como el Gobernador dio el correspondiente asiento de paz.

1652Ab
No. 33. Expediente sobre la guerra que se hizo contra las naciones indias alzadas.

1652Ac
N 9. Autos, sobre la recepcion de la Yndia Felipa de nacion Tobosa.

1652Ba
G-75. Expediente pa q se hagan unos pagos y continue la guerra contra los Indios Tobosos.

1652Bb
G-104. de Guerra: Diferentes declaraciones y papeles tocantes al levantamiento de los Indios rebelados contra la Real Corona.

1652Da
G-12. Criminal Contra Juan Yndio en averiguacion

de si fue de los indios sublevados.

1652Db
No. 113. Criminal contra Pablo Yndio de Sinaloa tomado participio en el alzamiento de los indios tobosos.

1652Dc
No. 77. Criminal, contra Francisco, Antonio y Juan Naturales del Pueblo del Tizonaso por haberse alzado contra la Real Corona.

1653Aa
G-101. Administrativo y de Guerra, Autos de guerra hechos por el gobernador Diego Guajardo Fajardo sobre la campana contra los Tarahumares.

1653Ab
No. 25. Autos de guerra sobre la paz de los indios retirados de los Tobosos.

1653Ad
No. 10. Autos sobre la paz de los Yndios Salineros.

1653Ae
No. 5. Autos de Guerra contra los Yndios Tobosos por Diego Guajardo Fajardo.

1653Bb
No. 4. Autos sobre la venida de los Yndios Tarahumares para la guerra de los Tobosos.

1654Aa
No. 2. Autos De Guerra hechos por el Gobernador General don Enrique Davila y Pacheco contra los indios Conchos y Tobosos que roban y matan a un carbonero de Santiago de Minas Nuevas 28 de Enero.

1654Ab
No. 4. Autos hechos por el Justica Mayor del Pueblo de las Bocas (Villa Ocampo, Dgo.) Sobre la averiguacion de las muertes que los indios enemigos hicieron en el camino real en el parage que llaman de los Sauces hallando en el Cuatro cuerpos muertos y entre ellos a Juan de Oses.

1654Ac
No. 5. Expediente relativo a la paz que se hizo con los Yndios Tobosos.

1654Ad
No. 72. Informacion Original hecha en este Reyno de la nueva Vizcaya de las muertes, robos, y danos que los Yndios naturales de ella hacen.

1654Ca
N 41. Criminal en averiguacion de las muertes que hicieron los indios en el Paraje de la Sierra.

1655Aa
43. Autos que practico el General Enrique de Avila y Pacheco Gobernador de las Probincias de la nueva Viscaya con motivo de la persecucion de los indios que mataron a Miguel de Arrieta.

1655Ab
No. 5. Autos de guerra con motivo de las frecuentes abusos que cometen los indios enemigos de la Real Corona.

1655Ba
No. 48. Criminal querella de Felipe de la Cruz mulato esclavo de Domingo de Apresa contra los indios salineros por lesiones inferidas al querellante.

1656Aa
No. 3. Autos y Diligencias originales practicadas con motivo de la guerra que hacen los indios enemigos de la Real Corona.

1657Bb
N 113. Criminal iniciado en Durango por el Gobernador Davila Pacheco sobre asalto q en el paraje de cerrillos serca del rio de Nazas cometieron los indios al tres de carros /?/ de matiasde Hinojosa q resulto herido.

1658Aa
N 6. Diligencias practicadas con motivo dela guerra que hacen a la Real Corona por los indios alzados.

1658Ab
No. 9. Autos de Guerra contra los indios rebelados.

1662C
N 44. Criminal, querella de Rafael y Cristobal Ramos contra Juan Boyero y Diego indios por espias de los enemigos por lo cual fueron condenados a muerte.

1667Aa
N. 4. Autos sobre la guerra que hacen los Yndios rebelados contra la Real Corona.

1669Ba
N 39. Criminal contra Gregorio Yndio por indicios de que puede ser espia.
1670Bg
34. Criminal en Averiguacion de los delitos que cometen los Yndios Conejos y negros.

1673Ab
No. 107. Autos relativos a las guerras con los indios enemigos de la real Corona para evitar los danos y robos que estos hacen.

1676Aa
N 13. Testimonio delexpediente que se remitio al Virrey relativo a los indios sublevados.

1677A
132. Administracion y de Guerra, autos de guerra contra los indios Salineros, ocomes, Cocoyomes, acoclames, y gavilanes.

1684Aa
No. 106. Expediente formado con motivo de la guerra que hacen los indios alzados a la Real Corona.

1684Ab
No. 113. Autos de guerra contra los Yndios alzados en Conchos.

1685Da
No. 46. Criminal contra un Indio de nacion Concho por presunciones de ser uno de los que asaltaron los Carros de Diego de Andavaso.

1686Bb
N-23. Criminal, En averiguacion del asalto y muerte que dieron los indios en los Sauces cerca de Santiago Papasquiaro en ese asalto mataron 7 personas y se llevaron 350 mulas de una recua que se dirigia a Durango.

1686Bc
N-26. Criminal, Sobre la muerte de unos indios en la hacienda de Sta Cruz.

1688Cb
28. Criminal contra un Yndio llamado Alonso, por traicion a la Real Corona.

1699a
N 123. Criminal en averoguacion si tiene o no culpa Nicolas Castaneda por encontrarse entre los indios enemigos.

1704Ab
#103. Autos practicados con motivo de la guerra que hacen a los enemigos de la Real Corona.

1704Ac
N 136. Guerra, Autos de la campana que hizo el Gral. Martin de Alday por orden del Gobernador Maestre de Campo Cordova contra la Real Corona.

1708a
N 5. Diligencias practicadas con motivo de la paz que piden los Yndios de Nacion Acoclames.

1708b
N 34. Administrativo y de Guerra, Autos de Guerra y diligencias practicados contra los enemigos de la Real Corona.

1710a
G-2. Informe que rinde el Alferez Andres de Mendoza sobre Cocollomes en el Real de Guanacevi.

1715Aa
N 106. Guerra, Expediente relativo a la campana hecha por el gobernador don manuel san juan de santa cruz contra los indios Cocoyomes y Acoclames.

1716Aa
G-104. G-104. Guerra, Documentos relativos a la rebelion de los indios Acoclames Cocoyomes, y sus aliados.

1716Ab
G-107. Guerra, Orden del general gob. Manuel de San Juan y Santa Cruz, para hacer la guerra a las naciones Cacoclames, Cocoyames y sus aliados, con fecha 10 de Septiembre de 1716, y diligencias que con tal motivo se practicaron de los capitanes de Presidio que en el ella participaron.

1718Ab
No. 9. Guerra, Testimonio de un Despacho de Virrey Duque de [Alburquerque] de 1656 para hacer la Guerra a los Tobosos.

1718Ac
N-7. Comunicaciones y autos de guerra contra los enemigos de la Real Corona.

1722Aa
G-103. Guerra, Diligencias sobre los indios rebeldes de las naciones coahuila cocoyame, cabezas, acoclames, que el gobernador martin de Alday mando a aprehender y sobre las diligencias de jurisdicion sus citados entre las autoridades eclesiasticas de Santa Maria de Parras.

1722Ab
G-106. Autos de Guerra, hechos contra los indios enemigos y paz de los yndios cocoyames por el gobernador don martin dealday.

1722Da
G 121. Criminal, Instruida por orden el Gobernador Martin de Alday, contra los indios Coahuilenos de pueblo de Santa Rosa de Nadadores, por haberse alzado, apostado y cometido unos robos y muertes.

1723A
G-104. Guerra, Testimonio de los Autos que su fulminaron sobre la sublevaceon y pacificacion de los indios de nacion Tacuitatomes “alias” Chisos que habitaban en el Pueblo de San Francisco de Conchos por el Gob don Martin deAlday.

1724Aa
G-121. Guerra, Autos de Guerra contra los indios enemigos de quienes se recibieron informes por Cautivos que se les escaparon desde Sierra Mojada y narran los crimines y costumbres de los indios alzados.

1724Ab
G-104A. Guerra, Autos de la Campana hecha por ordenes del Gob. Lopez de Carbajal a los indios de la region de Mapimi en la que tomo parte el mismo Gob y el Cap Dn Jose de Berroteran Cap. del Presido de Mapimi.

1725Aa
#107a. Guerra, Orden del Gov Lopez de Carvajal para que los Capitanes de los Presidios imediatos a parral opinen sobre la campana que si iba a hacer a los indios COCOYAMES, ACOCLAMES, SISIMBLES, TRIPAS BLANCAS, Y CUAGUILENOS, San Felipe el Real, Agosto 9 de 1725.

1725Ab
G-104. Guerra, Representaciones que ante el Gob Lopez de Carvajal hicieron los soldados de los presidio del gallo, mapimi, pasaje y cerro gordo por el descuente de haberes ordenado por el Brigadier Pedro de Rivera visitador de Presidios y testimonio de diligencias sobre la fuga de los soldados del valle de San Bartolome, cartas del Capn de Janos y del gob de nuevo mexico.

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Appendix 1: Chipped Stone Material Types

Gray Cherts

A variety of gray cherts suitable for knapping are available in the Carlsbad region. Because many of the geologic units in the Carlsbad region are the same as those in the Roswell region (the San Andres formation and the Pecos River gravels, for instance), it is not surprising that many of the lithic materials local to both regions are the same or very similar.

Colors include off-white, various shades of gray and brownish gray, and black (the gray and brownish gray shades are the most common). Individual pieces frequently possess two or more shades or colors; the transitions from one shade to the other may be gradual or they may be abrupt, as in striping or mottling. A few pieces of off-white and gray (or light gray and dark gray) striped material, sometimes referred to as "fingerprint" or "zebra" chert, were noted in the collections. Other local cherts, especially those from the Guadalupe Mountains and their drainages, are thinly speckled with black to very dark gray and brown dots or specks that are usually much smaller than a pinhead; these spots and speckles are generally unevenly spaced and do not consistently cover any given piece. As many as 18 sorting varieties were tabulated during the analysis, though all are pooled for presentation here.

Variable percentages of the local cherts display the effects of heat treatment in the form of differing degrees of orange coloration. These pieces also have a good luster equal to or better than that normally seen in untreated (e.g., strictly gray) examples.

The knapping quality of the local gray cherts varies from grainy (transitional to siltite) to fine cryptocrystalline. Perhaps the greatest problems for knappers are the small sizes, internal fractures, and textural irregularities common to a large percentage of the parent units.

Other Cherts

This catchall category includes varieties of cherts that probably belong to the local gray category as well as some that may be nonlocal. The probable local cherts include grainy cherts or siliceous siltstones, which embody many of the colors and color combinations of the local gray cherts described above. The grainy structure of these cherts requires greater strength on the part of the knapper and makes it more difficult to fashion tools. These materials comprise the majority of the other chert category.

A few cherts of radically different colors and which do not derive from the same sources as the gray cherts include white chalcedonic chert, white and brown chalcedonic chert, tan chert, medium brown chert, medium brown chert with black speckles, and a red/reddish-orange/red/yellow chert. All of these cherts have a fine, cryptocrystalline structure which enhances their knapability. As many as 17 sorting varieties were noted in the project analysis.

I suspect that the natural units for these materials are generally small (i.e., 10 cm or less in maximum dimensions), and some are obviously riddled with internal fractures and other flaws that make knapping difficult. These cherts occur in low frequencies in the Seven Rivers assemblages. Both the geologic units outcropping in the Carlsbad and the Pecos River terrace gravels are the suspected sources of these cherts.

Chalcedonies

These moderately to greatly translucent, cryptocrystalline materials include up to 16 sorting varieties with white, yellowish, gray, brownish-gray, and red to orange colors. The Pecos River gravels are the suspected sources for these material.

Limestones

Limestone is the dominant rock type of the San Andres formation. Outcrops of the San Andres dominate the surface geology of southeastern New Mexico west of the Pecos river (Dane and Bachman 1965). Its units comprise much of the topography in the vicinity of the project sites. Colors range from medium to light gray and medium to light brown. The limestone in these units ranges from nonindurated to well-indurated. Material in some of the latter units are silicified and are sufficiently hard for use as tool stones.

Quartzites, Fine Quartzites, and Siltites

Siltites, or silicified siltstones and shales, are a common component of the geology in southeastern New Mexico. Contrary to lithic assemblages in the Roswell region, flakes of this material are not particularly common in the Seven Rivers assemblages. Grain sizes include true siltstones and mudstones. Three sorting varieties—light gray, light brown, and purple—are represented.

The gray and brown quartzites are both fine-grained. Since materials similar if not identical to these have been observed in various units of the San Andres formation, we suspect that the Seven Rivers examples are locally derived. The coarser-grained purple quartzites are a well-known constituent of the Pecos River gravels in this part of the state.

Other Materials

This miscellaneous category at the Seven Rivers project sites includes relatively few materials of both local and nonlocal origin. Some like massive white quartz, silicified wood, and perhaps rhyolite were probably picked out of the Pecos River gravels.

Several lithic materials are recognized as deriving or possibly deriving from distant sources. The few examples include Alibates material from the Texas Panhandle, Edwards chert from west-central Texas, and clear obsidian from north-central New Mexico and/or the gravels of the Rio Grande. Specimens that may or may not be Alibates and Edwards are also present and have been tabulated separately within the "other" category.

Appendix 2: Projectile Points

Table A2.1. Dart points, Seven Rivers project

Site	FS Number	Provenience	Material	Dimensions (mm)	Weight (g)	Description
LA 8053	164	32S/10E, surface	Edwards chert	32 x 19 x 5	3.4	Complete Pecos point, rectangular stem variety; appears to be a reworked blade fragment from a large point; a second possible reworking suggested by asymmetrical blade; neck width = 12.5 mm; good visual criteria and ultraviolet = medium for Edwards chert.
LA 8053	325	2N/32E, surface	speckled medium gray chert	31+ x 21 x 6	4.2+	Trinity-like point; tip broken, distal end of blade reworked but evidently not to be a scraper (no wear; retouch not steep); neck width = 16 mm.
LA 38264 East	472	16N/9W, excavation	light gray chert	18+ x 18+ x 4+	1.6+	Blade fragment; nicely flaked (appears to be finished).
LA 38264 East	611	31N/33W, excavation	chert	27 x 20+ x 5.5	2.9+	Nearly complete Ellis-like point; speckled and mottled white, medium gray-brown, and dark gray chert; appears to be a blade fragment reworked into an Ellis-style point; neck width = 16 mm.
LA 38264 East	670	30N/19W excavation	medium to dark brown and gray chert	23+ x 15+ x 4.5+	1.6+	Corner-notched with serrated blade; probably heat-treated (very glossy); neck width = 11 mm.
LA 38264 East	764	33N/24W, excavation	off-white chert with medium gray mottles	19+ x 25+ x 7+	2.8+	Base of a corner-notched point (Maljamar?); neck width = 13.5 mm.
LA 38264 East	767	33N/26W, excavation	speckled medium gray chert	-	-	The ear (lower corner of blade) of corner-notched point.
LA 38264 East	808	35N/35W, excavation	speckled medium gray chert	23+ x 27+ x 6	4.1+	Base of Marcos-like point; probably heat-treated (hint of orange); neck width = 15 mm.
LA 38264 East	860	34N/17W, excavation	speckled dark brown-gray chert	12+ x 13+ x 4+	0.7+	Stem of a corner-notched point; neck width = 11 mm.
LA 38264 East	867	39N/30W, excavation	speckled dark gray-black chert	11+ x 19+ x 4+	0.7+	Corner or side-notched; stem only; neck width = 9.5 mm.
LA 38264 East	963	40N/19W, excavation	mottled light brown and brown-gray chert	33+ x 20+ x 7.5	4.5+	Stemmed point (Gary-like or Wells-like); material very similar to that from the San Andres formation in the Roswell/Artesia area; badly fragmented; neck width = 11.5 mm.
LA 38264 East	1017	39N/17W, excavation	medium gray-brown and dark gray chert	36+ x 22+ x 8+	6.1+	Corner-notched point with heavily reworked blade that may not have functioned as a projectile point in its current form; neck width = 17.5 mm.
LA 38264 East	1033	40N/10W, excavation	off-white to light gray coarse chert	45 x 25 x 7	5	Complete Shumla-like point; material could be a fine siltite; red specks suggest heat treatment; neck width = 9.5 mm.
LA 38264 East	1094	45N/28W, surface	chert	14+ x 20+ x 5+	1.7+	Base of blade of Gary-like point; light gray-brown with white, light gray, and medium gray mottles.

Table A2.1 (continued). Dart points, Seven Rivers project

Site	FS Number	Provenience	Material	Dimensions (mm)	Weight (g)	Description
LA 38264 East	1134 1190	48N/34W, excavation 50N/33W, excavation (TF 4 fill)	speckled light to medium gray chert	31+ x 33+ x 7	7.7+	Marcos-like point in two pieces (FS 1134 and FS 1190) that conjoin, both from excavations within 20 cm of surface; heat-treated (pink tinge); neck width = 19 mm.
LA 38264 East	1193	51N/33W, excavation (TF 4 fill)	medium gray chert	24+ x 10+ x 5.5+	1.1+	Lateral fragment of an Ellis-like (?) point; possibly heat-treated.
LA 38264 East	1265	22N/31W, excavation	speckled medium gray chert	25+ x 24+ x 6+	4.2+	Ellis-like point with reworked blade; possibly heat-treated; neck width = 15.5 mm.
LA 38264 East	1428	50N/34W, excavation (TF 4 fill)	speckled off-white, and light to dark gray chert	39+ x 28+ x 8	8.2+	Blade of a crudely flaked, corner/basally notched point; neck width = 13 mm.
LA 38264 East	1440	34N/29W, excavation	dark gray-black chert	35+ x 23+ x 4+	3.4+	Blade of finely flaked, corner/basally notched point; blade edges finely serrated; neck width = 13 mm.
LA 38264 East	1532	7N/38W, excavation	medium gray-brown and dark gray chert	22+ x 18+ x 4+	1.7+	Ellis-like point; heat-treated (pink tinge); badly fragmented; neck width = 11 mm.
LA 38264 East	1554	6N/43W, excavation	chalcedony	21+ x 13+ x 5	1.5+	Reworked; light gray with black inclusions; 9 mm.

+ incomplete measurement because of fragmentation

Table A2.2. Arrow points, Seven Rivers project

Site	FS Number	Provenience	Material	Dimensions (mm)	Weight (g)	Description
LA 8053	165	32S/38E, surface	chert	23+ x 18 x 4	-	Perdiz-like point; probably a reworked blade fragment; medium brown and dark gray with white siliceous fossil fragments; probably heat-treated; neck width = 5 mm.
LA 8053	507	6S/34E, excavation	mottled medium gray-brown and dark gray chert	13+ x 18 x 4	0.7+	Livermore-like point; probably like FS 995 when complete; neck width = 5 mm.
LA 8053	623	3S/45E, excavation	light, medium, and dark gray chert	9+ x 6+ x 2+	0.1+	Tip fragment only; narrow enough to be part of a point like FS 995.
LA 8053	720	19S/46E, excavation	chert	8+ x 15+ x 3.5+	0.7+	Livermore-like point; probably like FS 995 when complete; speckled light, medium, and dark brown and brown-gray; neck width = 4.5 mm.
LA 8053	791	4N/48E, excavation	medium and dark gray chert	8+ x 5+ x 2+	0.1+	Tip fragment only; narrow enough to be part of a point like FS 995.
LA 8053	825	5S/52E, excavation	light brown and light gray chert	13+ x 8+ x 3+	0.3+	Midblade fragment of a Livermore-like point (probably like FS 995 when complete).
LA 8053	829	5S/55E, excavation	chert	18+ x 12+ x 2+	0.4+	Perdiz-like (?) point; shape of base uncertain; neck width = 6 mm.
LA 8053	995	28S/69E, excavation	speckled medium gray-brown chert	36+ x 14+ x 4	1.4+	Livermore-like point; nearly complete; neck width = 5 mm.
LA 38264 East	814	35N/38W, TF 7 fill	very dark brown obsidian	8+ x 12+ x 3	0.3+	Side-notched; finely flaked; appears black but is brown on thin edges; neck width = 10 mm.
LA 38264 East	1241	25N/30W, excavation	dark brown-gray chert	7+ x 9+ x 3.5+	0.2+	Base of stem; may be a Neff-style Livermore; neck width = 6 mm.
LA 38264 East	1259	23N/35W, excavation	light gray chert	7+ x 8+ x 3.5+	0.2+	Base of stem; may be a Neff-style Livermore; neck width = 5.5 mm.
LA 38264 West	1	12N/30E, surface	off-white chalcedonic chert	18+ x 11+ x 4+	0.6+	Side-notched; base missing; neck width = ca. 7 mm.

+ incomplete measurement because of fragmentation

Appendix 3: Scrapers

The scrapers are assigned to types according to whether the scraping edge is on the distal edge (end scrapers), lateral edge (side scrapers), or both the distal and one lateral edge (side-end scrapers) of flakes (Table A3.1).

We suspect that all of the scrapers were hand-held during use, simply because they are so thick and not particularly amenable to hafting. Also, the shapes lack standardization and appropriateness of form (i.e., triangular or teardrop). Thus, they cannot be characterized as classic Plains end scrapers of the Late Prehistoric and early historic bison-hunting cultures.

Table A3.1. Scrapers, Seven Rivers project

Site	FS Number	Provenience	Material	Dimensions (mm)	Weight (g)	Description
LA 112349	13	PP 13	medium gray-brown and dark gray chert	38 x 36 x 11	19.3	End type made on flake; both lateral edges unifacially flaked to shape; some remnant cortex on dorsal face.
LA 112349	18	PP 18	Edwards chert	25+ x 29+ x 6+	6.2+	Proximal end fragment of a probable end type; ultraviolet response medium; both lateral edges unifacially flaked to shape.
LA 8053	778	4N/45E, excavation	limestone	38 x 37 x 10	21	End type on a short, thick flake; lateral edges also flaked but evidently for shaping only; could have been hafted in spite of thickness; complete.
LA 8053	1060	13S/71E, excavation	fingerprint chert with wide gray bands	34 x 29 x 14	15	End type on a thick flake fragment; one lateral edge also flaked, evidently for shaping only; too thick to haft; complete.
LA 38264 East	219	36N/46W, surface	medium gray-brown and dark gray chert	18 x 22 x 8	4.2	End type on a short, thick flake; probably heat-treated; complete.
LA 38264 East	332	26N/54W surface	mottled light brown and dark gray chert	45 x 27 x 14	17.7	Side-end type on a thick flake fragment; complete.
LA 38264 East	532	20N/40W, surface	speckled light to medium gray-brown chert	44 x 22 x 9	8.8	Side type on a cortical flake from a tabular core; complete.
LA 38264 East	840	37N/37W, excavation	light, medium, and dark brown-gray chert	40 x 44 x 17	28.8	End type on a thick cortical flake (i.e., an "end cut") from a spherical core; burned, possibly heat-treated; complete.
LA 38264 East	854	38N/36W, excavation	speckled medium to dark brown-gray chert	40 x 30 x 13	15	End type on a thick flake; complete; this specimen has general appearance of, but is not an example of, the classic Late Prehistoric to early historic Plains bison-hunting end scraper (too thick to haft).
LA 38264 East	873	39N/33W, excavation	lightly banded light gray-brown chert	46 x 40 x 15	28.8	End type on a natural chert fragment where the scraping edge is the only modification; burned but probably not heat-treated; complete.
LA 38264 East	1119	47N/33W, excavation	speckled medium gray chert	46 x 30 x 11	17	Side-end type on a thick flake; possibly heat-treated (burned); complete.
LA 38264 East	1330	19N/33W, excavation	speckled light to medium gray chert	23+ x 21+ x 9+	5.1+	Side type on a flake; probably heat-treated (reddish cortex on platform); proximal end remains.
LA 38264 West	2	4N/64W, surface	dark purple and medium yellow-brown quartzite	38 x 35 x 14	20.8	End type on a short, thick flake; lateral edges also flaked but evidently for shaping only; too thick to haft; complete.
LA 38264 West	110	PP 19, surface	dark gray-red silicified wood	33 x 28 x 10	10.3	End type on a flake; one lateral edge also flaked, evidently for shaping only; thin enough to haft; complete.

PP point provenience
+ incomplete measurement because of fragmentation

Appendix 4: Pottery

The pottery from the Seven Rivers project sites was analyzed according to the protocol I developed over two decades for the pottery assemblages of southeastern New Mexico sites. This protocol validates only some of the types defined over the years. The types applicable to the project sites include Chupadero Black-on-white, Jornada Brown, South Pecos Brown, El Paso Brown, red-slipped or red-washed brown ware, generic red-on-terracotta, and apparent amalgams of these types (Jornada/South Pecos, etc.; Tables A4.1–A4.3).

Previously described pottery types that we believe to be of either limited or no usefulness in describing southeastern New Mexico pottery include Roswell Brown, McKenzie Brown, Crosby Black-on-gray, and Middle Pecos Black-on-white. The analysis does not take them into account.

Vessel Form

Many pottery discussions in reports on the archaeology of southeastern New Mexico contain sherd tabulations of brown wares by vessel type (jars versus bowls). Because of past experiences with brown ware collections, I do not trust these breakdowns.

Most distinctions between jar and bowl sherds are based on degree of polish between the interior and exterior surfaces. That is, if a sherd is better polished on the exterior than the interior, the vessel is assumed to be a jar. If the opposite is true, a bowl is indicated. But in too many cases, the degree of polish on both surfaces is basically identical, thereby confounding assignment. Also, I have seen large jar neck sherds that were better polished in the *interior* surface than on the exterior surface.

Accordingly, only those sherds displaying unequivocal evidence of vessel form are designated jar or bowl. These include bowl and jar rim sherds that are large enough to conclusively show vessel shape and distinctively curved jar sherds from the body/neck juncture. Vessel lip sherds are usually too small to permit reliable determination.

One of the more curious aspects of the Seven Rivers project brown ware assemblage, and especially the largest of these (LA 8053), is the virtual absence of lip and rim sherds. Several nonspecific lip sherds are present, but only one rim sherd, from a Jornada Brown bowl, is large enough to reliably indicate vessel form.

All lip sherds and the lip of the one rim sherd are the same—parallel-sided to very slightly tapered walls and minimally flattened lips. In all cases, the tapering appears to be the result of inconsistent thinning of the coils, rather than the intentional tapering of the rim.

Pottery Types

The following pottery types were identified in the Seven Rivers assemblage.

Chupadero Black-on-white

Chupadero Black-on-white has long been recognized as the primary white ware in prehistoric central and southeastern New Mexico (Mera 1931). Its manufacture evidently started as early as AD 1050 or 1100 in central New Mexico and lasted into the late 1400s or early 1500s (Breternitz 1966; Hayes et al. 1981; Kelley and Peckham 1962; Snow 1986; Wiseman 1982, 1986). Chupadero is demonstrated to have been made in the Gran Quivira region of central New Mexico and the Sierra Blanca region of southeastern New Mexico (Kelley 1979; A. H. Warren's contributions in Hayes et al. 1981; Hayes 1981).

Chupadero Black-on-white displays a wide range of surface and paint colors, including black-on-gray, black-on-white, and dark red-on-white. Its major characteristics are: a peculiar olla form with a very narrow mouth, small multirope handle, cannonball shape, and flat, disc bottom; and coarsely scraped interior surfaces on ollas and the exterior surfaces of bowls. The painted surface may or may not be slipped with a white, light gray, or medium gray clay. Depending on

Table A4.1. Pottery distribution, LA 8053

FS No.	Provenience	Type	Number	Comments
13	0/42E, surface	South Pecos Brown	1	
73	10S/44E, surface	Jornada Brown	1	
74	10S/46E, surface	Jornada Brown	1	
75	10S/48E, surface	Jornada Brown	1	
84	12S/46E, surface	Jornada Brown	4	All same vessel.
90	14S/49E, surface	Jornada Brown	1	
102	18S/46E, surface	Jornada Brown	2	May not be same vessel.
115	22S/50E, surface	South Pecos Brown	1	
128	26S/28E, surface	South Pecos Brown	1	
129	26S/40E, surface	South Pecos Brown	1	
131	26S/44E, surface	South Pecos Brown	3	Probably all same vessel; exterior surface colors range 2.5YR3/4 to 5YR3/4, or dark reddish brown (Munsell).
144	28S/40E, surface	South Pecos Brown	2	Probably same vessel.
150	30S/40E, surface	South Pecos Brown	1	
153	30S/48E, surface	South Pecos Brown	8	Probably all same vessel; exterior surface colors range 5YR4/4 to 10YR4/1, or reddish brown to dark gray (Munsell).
157	32S/32E, surface	South Pecos Brown	1	
159	32S/38E, surface	South Pecos Brown	1	
160	32S/40E, surface	red-on-terracotta	2	Same bowl.
161	32S/42E, surface	South Pecos Brown	1	
166	34S/22E, surface	South Pecos Brown	1	
168	34S/28E, surface	South Pecos Brown	1	
173	34S/40E, surface	red-fired brown	1	Interior surface fired red, 2.5YR4.5/6, reddish brown to red (Munsell); appears intentional.
189	38S/46E, surface	South Pecos Brown	1	Temper grains small.
193	40S/42E, surface	South Pecos/Jornada Brown	1	Temper grains small and sparse.
281	24S/72E, surface	Chupadero Black-on-white	1*	Bowl sherd.
285	26S/70E, surface	Chupadero Black-on-white	2*	Bowl sherds; one conjoins FS 952; the other, a rim sherd, conjoins FS 1007.
299	32S/56E, surface	Jornada Brown	1	
307	32S/74E, surface	El Paso Brown	1	Probably same vessel as FS 970.
335	4N/22E, surface	Chupadero Black-on-white	1**	Jar sherd.
355	6N/46E, surface	Jornada Brown	1	
528	2S/37E, excavation	Chupadero Black-on-white	1**	Jar sherd.
590	7S/43E, excavation	Jornada Brown	1	
601	6S/46E, excavation	South Pecos Brown	1	
605	5S/42E, excavation	South Pecos Brown	1	
623	3S/45E, excavation	South Pecos Brown	1	Surface colors 5YR6/6, reddish-yellow (Munsell); could be from decorated bowl.
634	2S/48E, excavation	Jornada Brown	1	Bowl rim sherd; conjoins FS 761.
642	0/42E, excavation	Jornada Brown	1	Bowl; same vessel as FS 634.
660	13S/47E, excavation	South Pecos Brown	1	
		Jornada Brown	1	
662	12S/42E, excavation	South Pecos/Jornada Brown	1	
664	12S/44E, excavation	Jornada Brown	1	
665	12S/45E, excavation	South Pecos Brown	1	
666	12S/46E, excavation	Jornada Brown	1	
671	11S/43E, excavation	South Pecos Brown	1	Same vessel as FS 676, FS 684.
673	11S/45E, excavation	Jornada Brown	1	
676	11S/48E, excavation	South Pecos Brown	1	Same vessel as FS 671, FS 684.
677	11S/49E, excavation	Jornada Brown	1	
		South Pecos Brown	1	
682	10S/44E, excavation	Jornada Brown	1	
684	10S/46E, excavation	South Pecos Brown	1	Same vessel as FS 671, FS 676.
		Jornada Brown	1	
685	10S/49E, excavation	South Pecos Brown	1	
690	9S/45E, excavation	Jornada Brown	1	
692	9S/49E, excavation	South Pecos Brown	1	
		Jornada Brown	1	
697	8S/44E, excavation	Jornada Brown	1	

Table A4.1 (continued). Pottery distribution, LA 8053

FS No.	Provenience	Type	Number	Comments
				same vessel as FS 727.
708	2S/50E, excavation	South Pecos Brown ?	1	Could be from painted vessel; probably same vessel as FS 727.
714	19S/45E, excavation	South Pecos Brown ?	1	
715	19S/46E, excavation	Jornada Brown	1	
718	19S/49E, excavation	Jornada Brown	1	
727	18S/47E, excavation	South Pecos Brown ?	1	Probably same vessel as FS 708, FS 714.
729	18S/50E, excavation	Jornada Brown	1	
731	17S/42E, excavation	South Pecos Brown	1	
733	17S/47E, excavation	Jornada Brown	1	
739	16S/46E, excavation	Jornada Brown	1	
741	16S/49E, excavation	South Pecos Brown	1	
746	15S/46E, excavation	Jornada Brown	2	FS 746 and FS 748 may not be same vessel.
748	15S/48E, excavation	Jornada Brown	1	
759	20S/50E, excavation	South Pecos Brown	2	Probably not same vessel.
761	1N/46E, excavation	Jornada Brown	1	Conjoins FS 634.
774	2N/51E, excavation	South Pecos/Jornada Brown	1	
779	3N/46E, excavation	Jornada Brown	1	FS 779-FS 790 Could all be same vessel. FS 790 is a rim sherd but vessel form is uncertain.
780	3N/47E, excavation	Jornada Brown	1	
790	4N/47E, excavation	Jornada Brown	1	
865	10S/67E, excavation	red-on-terracotta or red-slipped brown	1	Either a streaky slip or painted with red line that is at least 10 mm wide.
885	12S/67E, excavation	Jornada Brown	2	FS 885-FS 892 probably all same vessel.
889	11S/63E, excavation	Jornada Brown	1	
890	11S/64E, excavation	Jornada Brown	2	
891	11S/65E, excavation	Jornada Brown	3	
892	11S/66E, excavation	Jornada Brown	1	
952	26S/70E, excavation	Chupadero Black-on-white	1*	Bowl sherd; conjoins FS 285.
954	26S/74E, excavation	South Pecos Brown, smudged interior surface	2	
956	25S/68E, excavation	Chupadero Black-on-white	1*	
970	24S/74E, excavation	El Paso Brown	1	Probably same vessel as FS 307.
998	28S/70E, excavation	Chupadero Black-on-white	1*	
1007	27S/69E, excavation	Chupadero Black-on-white	5*	Conjoins FS 285.
1008	27S/70E, excavation	Chupadero Black-on-white	2*	
1010	27S/72E, excavation	South Pecos Brown	1	
1013	27S/74E, excavation	South Pecos Brown	3	Two sherds probably same vessel.
1024	22S/64E, excavation	Jornada Brown	1	
1036	19S/66E, excavation	South Pecos Brown	1	
1052	29S/70E, excavation	Chupadero Black-on-white	1*	
1073	near 1S/45E	Jornada Brown	1	One large bowl sherd; surface color interior 7.5YR6/4, light brown; exterior 5YR5/3, dark reddish brown.
1075	near 0/49E, collected after project	Chupadero Black-on-white	1**	
		South Pecos/Jornada Brown	1	Jar neck sherd.
		Jornada Brown	2	Probably same vessel as row above.
1102	28S/74E, E	South Pecos Brown, smudged interior surface	1	Probably same vessel as FS 954.

* Sherds that belong to the same Chupadero Black-on-white bowl; the 14 sherds came from FSs 281, 285, 952, 956, 998, 1007, 1008, and 1052.

** Sherds that probably belong to the same Chupadero Black-on-white jar; the 3 sherds came from FSs 335, 528, and 1075.

Table A4.2. Pottery distribution, LA 38264 East

FS No.	Provenience	Type	Number	Comments
173	42N/25W, surface	El Paso Brown	1	
174	44N/28W, surface	Jornada Brown	1	
185	44N/30W, surface	Jornada Brown	1	
214	46N/36W, surface	Jornada Brown	1	Same vessel as FS 399.
398	4N/70W, surface	Jornada Brown	2	Same vessel.
399	4N/72W, surface	Jornada Brown	1	Same vessel as FS 214.
448	8N/82W, surface	Chupadero Black-on-white	1	Bowl sherd.
602	31N/26W, excavation	Jornada Brown	2	Probably same vessel.
672	30N/20W, excavation	Jornada Brown	1	
681	30N/27W, excavation	Jornada Brown	2	Probably same vessel.
706	29N/23W, excavation	Jornada Brown	1	
817	36N/21W, excavation	Jornada Brown	1	
831	37N/21W, excavation	Jornada Brown	1	
844	38N/21W, excavation	Jornada Brown	1	
888	40N/30W, excavation	El Paso Brown	1	
890	40N/31W, excavation	El Paso Brown	3	All same vessel.
909	32N/12W, excavation	Chupadero Black-on-white	1	Same vessel as FS 974.
942	40N/29W, excavation	El Paso Brown	1	
974	36N/11W, excavation	Chupadero Black-on-white	1	Same vessel as FS 909.
1020	39N/18W, excavation	Jornada Brown	1	
1056	42N/30W, excavation	El Paso Brown	1	
1058	42N/31W, excavation	El Paso Brown	6	All same vessel.
1062	42N/33W, excavation	El Paso Brown	1	
1069	43N/29W, excavation	Jornada Brown	1	
1072	43N/30W, excavation	Jornada Brown	1	
1075	43N/31W, excavation	Jornada Brown	1	
1092	44N/35W, excavation	El Paso Brown	1	

Table A4.3. Pottery distribution, LA 112349

FS No.	Provenience	Type	Number
5	surface	South Pecos Brown	1
68	surface	South Pecos Brown	1

the region of manufacture, the primary temper agents are crushed sherd, ivory to yellow carbonate ("caliche") particles, and/or Capitan alaskite or "granite." The latter material is denoted by porcelaneous white and clear feldspar, with or without clear quartz and minor mafics such as mica. A. H. Warren (in Hayes et al. 1981; Hayes 1981) provides detailed descriptions of these and other, minor temper types.

El Paso Brown

El Paso Brown, the first type of pottery made in south-central New Mexico, far West Texas, and northern Chihuahua, was first described by Lehmer (1948). While most archaeologists believe that El Paso Brown is a thick ware, Lehmer's description makes it clear that the wall thickness ranges from 2 to 9 mm, with an average of 5.2 mm. The importance of this observation is that some of us, including me, have suggested on occasion that especially thin El Paso sherds (i.e., 4 mm or less) may belong to El Paso Polychrome vessels rather than plain brown ones.

El Paso Brown is characterized by a medium to dark brown or black paste. Surface colors are often lighter in color, giving a cross section with two and even three shades in a sandwiched effect.

The temper is crushed igneous rock, rich in white to off-white (ivory) feldspars in moderate to abundant numbers. Rounded and frosted quartz grains are usually present in lower numbers, one or more as large as or larger than most feldspar grains. Other minerals such as golden biotite, hornblende, and other mafics may also occur in small amounts. Temper grain size is usually thought to be large (Lehmer 1948). However, this perspective is rendered by thin walls rather than grain size per se.

The surface finish of classic El Paso Brown is smooth and perhaps streakily polished. However, some of the project sherds have uncharacteristically good polish. Quite often, remnants of deep scrape marks derived from the wall-thinning process are seen on interior surfaces. Sherd surfaces and edges readily erode, resulting in a peculiar prominence of the light-colored temper grains and a distinctive, irregular fracture.

Jornada Brown

Jornada Brown was named by H. P. Mera (1943) but was first described by Jennings and Neumann (1940). I recognize two varieties of Jornada Brown—classic and thin. It should be noted that no sherds of the classic variety were recovered from the project sites; all Jornada Brown from Seven Rivers is of the thin variety.

Classic Jornada Brown is the variety described for the type site, LA 2000, on the Rio Peñasco in southeastern New Mexico. It is generally thicker than El Paso Brown, but the two ranges overlap considerably. Walls 6 to 7 mm are common on classic Jornada. Sherds of classic Jornada are denoted by light, medium, or dark brown and gray-brown pastes and surfaces. Paste and surface colors are usually the same or very nearly so; the sandwich effect in colors so common to El Paso Brown does not often occur in classic Jornada Brown. Tempering materials are finely crushed igneous rock rich in white to off-white (ivory) feldspars, with few or no other minerals. Quartz may be present but often is not. Reddish hematite, both as earthy grains and as stains on feldspar crystals, is common but not always present. Surface treatment includes floating or smoothing of the surfaces until fine clay covers most or all of the temper particles. After that, a polishing stone was used to create a good to excellent sheen, which is one of the hallmarks of the type. Rare examples are left unpolished or are streakily polished. Polishing provides for better protection and survival of the surfaces in general, though interior surfaces may be eroded from use.

Jornada Brown, thin variety, differs from the classic variety in two respects—average thickness and typical surface colors. These differences are not great, but they deviate sufficiently to lead to problems of distinguishing Jornada Brown from El Paso Brown. This leads in turn to the perennial controversy surrounding the efficacy of discussing brown ware pottery in terms of types. The walls of thin Jornada are in the 5.5 to 6 mm range. Thickness may relate to the available clays and their properties for making pottery. The surface colors of thin Jornada Brown tend to be lighter than the those of the classic variety; light gray-brown to light orange or yellow-red are common. That is not to say that these color variations do not occur on classic Jornada, but in general they occur on fewer sherds.

One seeming incongruity between the usually light surface colors and the pastes of the thin Jornada Brown from the project sites is the fact that many of the sherds have thin carbon streaks (less often), variable brown to black pastes, or black pastes (more often). The presence of carbon merely signals the fact that the pottery was not fired hot enough and/or long enough to burn out all of the carbon that naturally occurs in many clays. Elsewhere, I noted that black pastes are often a characteristic of pottery made at sites on the Southern Plains (Wiseman 2002). Does this indicate that some of the pottery from the projects sites was made in the vicinity of the sites? The tempering materials suggest not, but the matter should be investigated at every opportunity.

Nonspecific Red-on-terracotta

Nonspecific red-on-terracotta pottery in the project collections is represented by bowl sherds that are too small to determine which of several types are represented. Type names are generally assigned according to the widths of the red lines in the painted designs. Line widths from 2 to 5 mm belong to Three Rivers Red-on-terracotta (Mera and Stallings 1931), and those over 8 mm belong to Broadline Red-on-terracotta. The 5 to 8 mm range is reserved for San Andres Red-on-terracotta (McCluney 1962). One must also be careful that the pastes and tempers of the sherds belong to Three Rivers Red Ware. This is especially true of sherds on which the surfaces are a light to medium brown, for these examples may actually be Mogollon Red-on-brown, imported from southwestern New Mexico. Three Rivers Red Ware is tempered with off-white (ivory) and white feldspars of Sierra Blanca syenites and monzonites, or the gray feldspars of Sierra Blanca gray syenite (see discussion under South Pecos Brown). Mogollon Red-on-brown is usually tempered with tuff or rhyolitic tuff, the chief components of which are soft, rounded white particles and occasional clear quartz crystals.

Red-slipped Brown Ware

Red-Slipped brown ware consists of an overall, thin to thick, red slip applied to the interior surfaces of bowls and, rarely, the exterior surfaces of jars. This was done to a minority of vessels of the plain brown pottery types made in southeastern New Mexico. Only one probable red-slipped bowl sherd is present in the Seven Rivers project assemblages.

South Pecos Brown

South Pecos Brown was first recognized by A. J. Jelinek (1967). The type is assigned to some of the plain brown pottery occurring on sites in the middle stretches of the Pecos Valley within New Mexico. A. H. Warren (pers. comm., 1975) further elaborated the type by pointing out that sherds fitting the general description usually also had gray feldspar crystals in the temper. These gray feldspar crystals, often stained with red hematite, may be the only color of feldspar within the sherds, or they may be accompanied by white and off-white feldspars. Accessory minerals such as magnetite, hornblende, and mica may also be present in small amounts.

Sherds in which the feldspar crystals are all gray were tempered with a distinctive gray syenite. This syenite comes from the Sierra Blanca highlands of northern Otero county or adjacent Lincoln county, New Mexico, but the source has not yet been pinpointed.

Temper abundance in South Pecos Brown is generally low because the individual grains are so large on average. Because of the large sizes and angular shapes of the temper grains, the paste appears to be blocky in edge-snips, rather than granular. South Pecos pastes are frequently light to medium gray.

Surface finish is also a key to South Pecos Brown pottery. Between the large temper particles and a tendency for the clay body to shrink somewhat upon firing, temper particles often protrude through the surface like miniature mountains and cause minute cracks to radiate outward. According to Jelinek (1967), South Pecos is not usually polished. However, in our experience, the surfaces are usually at least lightly polished, and in some cases, rather well-polished.

The surface colors of South Pecos Brown in the project assemblages run the usual gamut from medium or dark gray-brown to light brown and gray-brown to various shades of reddish brown. One sherd, from 34S/40E of LA 8053, however, is striking for its rather bright, fired-red color (Munsell 2.5 YR 5/6, reddish brown to red). The potters almost certainly intended to achieve this color. The exterior surface color is light gray (Munsell 10 YR 6/1). Does this sherd come from a Lincoln Black-on-red bowl? We think not, because the exterior surface finish lacks the streaky grooving from perfunctory polishing so typical of Lincoln.

Three South Pecos Brown sherds from 26S/74E and 28S/74E at LA 8053 have intentionally smudged interior surfaces. All probably belong to the same vessel.

South Pecos/Jornada Brown

South Pecos/Jornada Brown is a catchall category for sherds with attributes of both Jornada Brown and South Pecos Brown. Only four sherds from LA 8053 were assigned to this category.

The sherd from the surface of 40S/42E is basically South Pecos Brown in paste color (gray), sparsity of temper, and the presence of radial cracks on the exterior surface (interior surface is eroded). The principal Jornada-like characteristics are that the exterior surface is fairly well polished, and the temper grains are small.

The sherd from the fill of 12S/42E is basically Jornada Brown in that the paste is carbonaceous. The South Pecos characteristic is that the surfaces are not floated. Both surfaces are lightly polished, which can be a trait of both Jornada and South Pecos.

The sherd from the fill of 2N/46E is basically South Pecos Brown in paste color (gray) and has the radial cracks on the one intact surface. The well-polished intact surface is Jornada Brown–like.

The jar neck sherd from 0/49E (collected after project completed) is basically Jornada Brown with its floated, well-polished interior and exterior surfaces lacking radial cracks. Yet the paste is gray like South Pecos Brown.

Minimum Number of Vessels

The estimation of the minimum number of vessels by pottery type was straightforward for types represented by few sherds.

At LA 8053, at least two Chupadero Black-on-white vessels are represented—a jar and a bowl. The distribution of the bowl sherds in the southeast corner of the east excavation unit, plus paste, temper, and design characteristics, all point to a single vessel. The paste and temper of the jar sherds indicate that one vessel is represented, although their scattered distribution is remarkable.

The estimates for Jornada Brown and South Pecos Brown are based on sherd distributions within the site. The MNI for sherds of both types was determined by clustering. For Jornada Brown, three clusters are fairly well defined by excavated sherds.

For South Pecos Brown, two clusters are defined, one in the West Block and the other in a surface concentration south and west of the West Block. A third cluster of South Pecos sherds is suggested in the southeast corner of the east excavation unit. However, only four sherds were found there, so it is doubtful if they represent a third vessel.

Appendix 5: Bifaces

Roughouts, or First-/Early-Stage Bifaces

I apply the terms *roughout* or *early-stage biface* to chipped stone items that were roughly flaked (i.e., relatively few, large flakes removed) into leaf-shaped or ovate forms (Wiseman 1971). This stage is believed to be the first of several steps in the manufacture of formal artifacts, especially projectile points.

Two classes of roughly flaked bifaces are recognized: oval/lenticular (Class 1) and square/round (Class 2). The latter tend to be more nearly equidimensional and thicker in cross section than the oval/lenticular examples. We suspect the difference is attributable at least in part to the geometry of the original raw material units.

All but three of the roughouts or first-/early-stage bifaces are made from cherts. The exceptions are of limestone (2) and siltite, or silicified siltstone (1).

All but one of the artifacts are made from local materials or materials that are presumed to be locally available. The one exception is FS 828, from LA 38264 East. FS 828 is a distinctive white chert that contains abundant red and black, worm-shaped speckles. Its source is unknown; presumably it is not from the immediate region.

Class 1: Oval/Lenticular Roughouts

Some Class 1 (oval/lenticular) roughouts were made from large flakes, but most appear to have been units or chunks of material reduced to form (Tables A5.1–A5.3). FS 1039, from LA 38264 East, is actually an overshot or outrepassé flake from a roughout. Most of the fragmentary examples were broken during manufacture.

The average measurements of the five complete Class 1 artifacts from the project sites (all LA 38264) are as follows: length = 40 mm (range 33–52), width = 28 mm (range 24–34), thickness = 12 mm (range 9–16), weight = 13.8 g (range 6.2–21.1).

Class 2: Square/Round Roughouts

Most Class 2 (square/round) roughouts are complete and appear to have been units or chunks of material reduced to form (Tables A5.4–A5.5). The shapes of these square to round items may reflect the shapes of the original raw material units rather than the intended final shapes of the artifacts.

It is also very possible that some of these items are bifacial cores. In our view of southeastern New Mexico lithic manufacturing, with its generally small raw material units, all raw-material units, where possible, would have eventually been reduced to usable artifacts. Thus, an "exhausted" bifacial core, barring problems of further reduction, might itself be reduced into an artifact.

The average measurements of the 16 complete Class 2 roughouts from the project sites are as

Table A5.1. Class 1 (oval/lenticular) roughouts, LA 8053

FS No.	Provenience	Material	Dimensions (mm)	Weight (g)	Comments
275	22S/70E, surface	fingerprint chert with tan patina	15+ x 31+ x 6+	2.8+	Basal part of a thin roughout; material suggests source area west of Roswell.
812	7S/53E, excavation	mottled medium and dark gray chert	27+ x 13+ x 8+	2.6+	Lateral edge fragment.
967	24S/71E, excavation	mottled medium and dark gray and gray-brown chert	30+ x 24+ x 9+	6.2+	Tip fragment.
993	28S/64E, excavation	speckled orange-tan chert (patinated?)	30+ x 24+ x 7+	5.0+	Tip (?) fragment; heat-treated.
1032	20S/68E, excavation	light to medium orange pink chert	23+ x 20+ x 6+	2.5+	Tip (?) fragment; heat-treated.

+ incomplete dimension because of breakage

Table A5.2. Class 1 (oval/lenticular) roughouts, LA 38264 East

FS No.	Provenience	Material	Dimensions (mm)	Weight (g)	Comments
29	28N/8W, surface	limestone	39+ x 49 x 21	37.2+	Largest and thickest example of the class.
79	58N/6W, surface	gray chert	45 x 34 x 13	16	Complete; verges on very fine siltite; patinated light brown all over; notch 11 x 1.5 mm on one edge.
85	58N/8W, surface	dappled gray chert	20+ x 29+ x 10+	6.4+	Basal fragment; probably heat-treated.
524	10N/110W, surface	medium gray chert	35+ x 24+ x 11	8.3+	Reworked fragment?
535	14N/38W, surface	faint fingerprint chert with dappled medium gray	52 x 29 x 16	21.1	Complete flake with bifacial flaking on one side; heat-treated.
664	32N/15W, surface	fingerprint chert	39 x 29 x 9	10.4	Complete.
804	35N/32W, excavation	light and dark gray chert	35+ x 21+ x 10+	8.5+	Fragment with burin along break; heat-treated.
828	36N/38W, excavation	white igneous chert with red and black worm-shaped speckles; may be from southwestern New Mexico or other igneous region	20+ x 26+ x 9+	4.0+	Basal fragment; heat-treated.
881	39N/37W, excavation	medium brown and dark gray chert	25+ x 21+ x 12+	4.7+	Small lateral fragment.
894	40N/35W, excavation	light to medium brown and gray mottled chert	32+ x 31+ x 8+	5.0+	Basal fragment of a bifacially worked flake.
1029	39N/14W, excavation	medium gray-brown chert	19+ x 22+ x 8+	2.9+	Broken, then reworked along break; not a scraper.
1035	40N/12W, excavation	white, light gray, and gray-rose chert	17+ x 36+ x 12+	5.9+	Basal fragment.
1039	40N/15W, excavation	light to medium brown gray-brown and black chert	20+ x 29+ x 6+	3.8+	Distal end of an overshot (outrepasse) biface flake; heat-treated.
1064	42N/35W, excavation	gray-speckled white chert	14+ x 13+ x 6+	0.7+	Tip fragment.
1110	46N/34W, excavation	medium gray-brown and dark gray/black speckled chert	33 x 24 x 9	6.2	Complete.
1152	41N/24W, excavation	yellowish gray and red chert	21+ x 17+ x 6+	2.0+	Tip fragment; burned or possibly heat-treated.
1237	26N/31W, excavation	light and medium gray-brown chert	38+ x 24+ x 8+	6.6+	Small fragment.
1326	19N/31W, excavation	medium gray-brown chert	32+ x 23+ x 11+	3.9+	Tip fragment.
1358	16N/32W, excavation	medium gray-brown chert	34 x 26 x 12	10.1	Broken, then reworked on break; not a scraper; heat-treated.
1426	50N/34W, excavation	dark gray chert	33+ x 30 x 14	12.4+	Tip missing; burned or possibly heat-treated; 0-20 cm below surface inside Feature 4 (annular midden).
1591	3N/47W, excavation	light to medium gray and gray-brown chert	20+ x 26+9+	4.3+	Basal fragment.
1648	9N/50W, excavation	dark gray speckled chert	29+ x 31+ x 6+	4.4+	Small basal fragment.

+ incomplete dimension because of breakage

Table A5.3. Class 1 (oval/lenticular) roughouts, LA 112349

FS No.	Provenience	Material	Dimensions (mm)	Weight (g)	Comments
69	Point Provenience 69	medium gray-brown and dark gray chert	31+ x 39+ x 13+	16.2+	Proximal fragment made from a large flake.

+ incomplete dimension because of breakage

Table A5.4. Class 2 (square/round) roughouts, LA 8053

FS No.	Provenience	Material	Dimensions (mm)	Weight (g)	Comments
48	6S/42E, surface	speckled, light to medium brown chert	36 x 26 x 8	7	Complete; may be a knapping practice piece (2 perpendicular edges).
133	26S/48E, surface	medium brown and dark gray chert	31 x 23 x 16	11.9	Complete; probably abandoned because of thinning problems.
145	28S/46E, surface	limestone	56 x 33 x 21	43.4	Complete; unusual material.
230	6S/56E, surface	fossiliferous chalcedonic gray chert nodes in medium yellow brown rock matrix (unusual material but not Edwards chert);	43 x 42 x 13	24.6	Complete; fossils are shells 2-3 mm long/ diameter.
579	4N/34E, excavation	medium gray-brown chert	32+ x 24 x 11	11.1+	Possibly a bifacial core.
623	3S/45E, excavation	speckled medium to dark brown-gray chert	37 x 30 x 11	14.1	Complete; possibly a bifacial core.
647	14S/41E, excavation	tan and medium to dark gray-brown and gray chert	35 x 26 x 13	9.3	Complete; possibly a bifacial flake core.
749	15S/48E, excavation	speckled and mottled, light, medium, and dark gray chert	33 x 29 x 17	15.6	Complete; possibly a bifacial core.
777	2N/54E, excavation	mottled tan, medium gray-brown, and dark gray chert	27 x 21 x 10	6.3	Complete; possibly a pebble core.
996	28S/69E, excavation	mottled tan and medium to dark gray chert	33+ x 20 x 10	7.5+	Distal end truncated by flake removed perpendicular to plane of artifacts (struck in direction indicated by arrow in illustration).
1001	28S/73E, excavation	speckled and mottled medium gray-brown and dark gray chert	33 x 27 x 13	10.7	Complete; possibly a bifacial core.

+ incomplete dimension because of breakage

Table A5.5. Class 2 (square/round) roughouts, LA 38264 East

FS No.	Provenience	Material	Dimensions (mm)	Weight (g)	Comments
36	34N/10W, surface	fingerprint and gray chert	42 x 34 x 14	18.4	Complete; 60% cortex on one face; exhausted bifacial core?
398	2N/72W, surface	fine medium gray-brown siltite with white siliceous fossils	42 x 38 x 12	19.8	Complete; an exhausted bifacial core?
856	38N/38W, excavation	dappled-gray and medium and dark gray chert	33 x 24 x 17	11.6	Complete? An exhausted bifacial core?
868	39N/30W, excavation	medium brown-gray chert	29 x 26 x 16	10.4	Complete; some cortex; an exhausted bifacial core?
875	39N/33W, excavation	medium and dark gray chert	28 x 24 x 11	7.8	Complete (possibly broken and partly reworked)? An exhausted bifacial core?
937	38N/29W, excavation	black chert	34 x 27 x 13	9.9	Complete; an exhausted bifacial core?
949	34N/23W, excavation	light to medium brown and gray chert with sector of black chert and crystal-filled phenocrysts	48 x 40 x 21	32.6	Complete; an exhausted bifacial core?
1066	43N/27W, excavation	light brown-gray chert	34 x 27 x 20	15.2	Complete; burned or possibly heat-treated; an exhausted bifacial core?

follows: length = 39 mm (range 27–56), width = 31 mm (range 21–42), thickness = 15 mm (range 8–21), weight = 16.8 g (range 6.3–43.4).

Fine, or Second-Stage Bifaces

Fine or second-stage bifaces are generally thinner than roughout bifaces and display finer flaking, especially at the edges (Tables A5.6–A5.8). Thus, they are thought to represent a refinement of roughout bifaces in the process of preforming other tools such as projectile points (hence the term "second stage"). Alternatively, they may represent finished tools such as large bifaces that were subsequently transformed through use and resharpening into the classic beveled knives of the Late Prehistoric Plains bison-hunting cultures (Sollberger 1971).

One of the more interesting facets of the fine bifaces from the project sites is the fact that three and possibly four of them are made from exotic materials. Two are of Edwards chert (FS 268 and FS 1090, LA 38264 East), one may be Niobrara chert or jasper (FS 1064, LA 38264 East); and one is Tecovas chert (FS 290, LA 8053). Edwards chert comes from west-central Texas, central Texas, and the eastern Trans-Pecos of Texas, Niobrara chert comes from western Kansas and southwestern Nebraska, and Tecovas chert comes from the Texas Panhandle.

Arrow Point Preform

A single preform fragment of obsidian from LA 38264 was evidently intended to be a Washita-style point (Table A5.9). However, it broke while the first notch was being made.

Miscellaneous Biface Fragments

Eight items from LA 38264 belong to the category of chipped stone manufacture debris, waste, or rejects (Table A5.10). They are generally small and lack sufficient characteristics by which to confidently assign them to other biface types and classes. In other cases, they are clearly rejects, and some may be the result of knapping practice. Their importance lies mainly in the materials they represent and the fact that they indicate biface manufacture.

Table A5.6. Fine, or second-stage bifaces, LA 8053

FS No.	Provenience	Material	Dimensions (mm)	Weight (g)	Comments
290	28S/58E, surface	Tecovas chert	16+ x 21+ x 4+	1.3+	Biface flake that has been edge-trimmed on the ventral surface, making item bifacial; probably heat-treated.
1005	27S/66E, excavation	medium and dark gray chert with red impurities in fissures	17+ x 9+ x 3+	0.4+	Corner fragment of a triangular (?) item; probably heat-treated.

+ incomplete dimension because of breakage

Table A5.7. Fine, or second-stage bifaces, LA 38264 East

FS No.	Provenience	Material	Dimensions (mm)	Weight (g)	Comments
209	34N/36W, surface	dark red chert	14+ x 26+ x 7+	3.2+	Small medial fragment; material probably imported.
268	28N/44W, surface	Edwards chert	22+ x 30+ x 8+	4.8+	Basal fragment; ultraviolet = medium.
680	30N/27W, excavation	dark gray speckled chert	25+ x 22+ x 5+	2.9+	Tip fragment; light, medium, and dark gray speckles.
835	37N/32W, excavation	light and medium gray chert	16+ x 11+ x 5+	0.8+	Small fragment of uncertain breakage derivation.
861	34N/18W, excavation	medium gray chert	21+ x 11+ x 5+	1.5+	Basal (?) fragment.
879	39N/36W, excavation	light gray chert	21+ x 14+ x 8+	1.8+	Edge fragment; heat-treated.
902	31N/11W, excavation	light to medium gray chert	28+ x 29+ x 6+	5.3+	Basal fragment; heat-treated; natural fractures have iron deposits that turned red during heating; cortex on 1 face.
1064	42N/35W, excavation	Niobrara (?) chert	12+ x 10+ x 7+	0.9+	Small edge fragment; rich yellow-brown color with thin quartz vein running through it.
1090	44N/34W, excavation	Edwards chert	36+ x 14+ x 8+	4.3+	Edge fragment; ultraviolet = medium.
1231	27N/31W, excavation	fingerprint chert with gray speckles throughout	19+ x 19+ x 7+	1.5+	Edge fragment.
1319	20N/34W, excavation	dark gray chert with dark red in places (heat treatment?)	33+ x 37+ x 9+	13.3+	Basal fragment with some cortex on 1 face; verges on siltite.

+ incomplete dimension because of breakage

Table A5.8. Fine, or second-stage bifaces, LA 38264 West

FS No.	Provenience	Material	Dimensions (mm)	Weight (g)	Comments
4	18N/2E, surface	medium brown-gray chert with dark gray mottles	35+ x 24+ x 7+	4.2+	May be a dart preform broken laterally during notching, with the break carrying away part of what may be the stem.

+ incomplete dimension because of breakage

Table A5.9. Arrow point preform, LA 38264 West

FS No.	Provenience	Material	Dimensions (mm)	Weight (g)	Comments
3	6N/14W, surface	clear black obsidian	11+ x 9 x 3	0.4+	Side-notched Washita-style point broken while notching; blade missing; neck width = 6 mm.

+ incomplete dimension because of breakage

Table A5.10. Miscellaneous biface fragments, LA 38264 East

FS No.	Provenience	Material	Dimensions (mm)	Weight (g)	Comments
257	34N/40W, surface	light gray chert	20+ x 14+ x 9+	1.8+	Edge fragment with thickness of a roughout biface and the secondary flaking of a fine biface.
446	45N/80W, surface	dark brown-gray chert	11+ x 22+ x 7+	1.4+	Basal (?) edge fragment.
685	30N/30W, excavation	dark gray to black chert	24+ x 17+ x 6+	2.3+	Very irregular, reworked piece; remnant of platform of original flake.
810	35N/36W, excavation	speckled light gray chert	18+ x 23+8+	2.4+	Tip of what may be a reworked roughout biface (steep retouch along part of one edge).
866	39N/30W, excavation	light and dark gray chert	14+ x 8+ x 4+	0.3+	Nondescript edge fragment.
872	39N/33W, excavation	speckled, medium gray-brown chert	16+ x 18+ x 8+	2.4+	Non-descript fragment; heat-treated (orange-pink tinge in places).
883	39N/38W, excavation	tan chert	29+ x 21+ x 6+	2.8+	Tip of what may be either a roughout biface or a fine biface.
1382	14N/35W, excavation	speckled, dark gray-brown chert	12+ x 23+ x 5+	1.4+	Nondescript biface fragment that might be from a reworked roughout biface; probably heat-treated.

+ incomplete dimension because of breakage

Appendix 6: Lithic Debitage

Core Types

The terms for the types of cores and some of the flakes largely reflect the system I have used over the past 30 years. The system is modified from that learned while he studied under the French-trained Israeli archaeologist, Avraham Ronen. In the remarks that follow, the word “face” refers to the surface from which flakes actually detach. Thus, the hammer strikes the platform, and the flake removes from the core face.

Core Flakes

Core flakes are large flakes that were used as a source of flakes. They should not be confused with flakes from which flakes were removed for other purposes (for instance, in the process of being thinned to make a roughout, or first-stage biface).

Two-Platforms-Adjacent Cores

The striking platforms of two-platforms-adjacent cores share a common edge and form an angle between them. That angle is usually about 90 degrees, but it may also be as much as 140 or 150 degrees.

Two-Platforms-Parallel Cores

The striking platforms of two-platforms-parallel cores do not share a common edge. The platforms are roughly parallel to one another because the opposing flat sides of a cobble or pebble are used as the platforms. However, the degree of parallelness can vary widely. Flakes struck from the two platforms may be removed from different faces or from the same face of the core.

Flake Types

Biface Notching Flakes

These distinctive, small flakes have the U-shaped platforms characteristic of flakes removed during the notching of bifaces for hafting (Austin 1986).

Biface-Thinning Flakes

Flakes classified as biface-thinning flakes are probably produced by pressure and baton techniques. These flakes tend to be thin, are strongly curved (and frequently twisted) along the length axis, and have decidedly acute platform/ventral surface angles. These flakes also frequently have one or more flake scars on the dorsal surface at the distal end that were removed from the opposite direction.

Core-Reduction Flakes

Core-reduction flakes comprise the majority of any lithic debitage assemblage. Flakes removed to trim the core (after initial decortication), shape the core, and obtain flakes suitable for making formal artifacts, and flakes that fail to meet the requirements for formal artifacts are all included in this category.

Decortication Flakes and Platform-Preparation Flakes

Decortication flakes and platform-preparation flakes both have large amounts of cortex on the dorsal surface. The primary difference is one of thickness: decortication flakes are relatively thick, and platform-preparation flakes are very thin. While the distinction between thick and thin is subjective and therefore of questionable value, it seems to purvey a difference in attitude. The thicker, decortication flakes suggest an absence of concern for conserving material. The thinner, platform-preparation flakes suggest just the opposite—remove cortex to prepare a good striking surface, but do not remove any more material than is absolutely necessary.

Hammerstone Flakes

Hammerstone flakes were removed from

hammerstones during pounding. They have one or more ridges or high points on the dorsal surfaces, which were heavily blunted from hard pounding. Most hammerstone flakes are considered unintentional.

Platform-Edge-Rejuvenation Flakes

Platform-edge-rejuvenation flakes were removed from cores to overcome a series of step fractures and other failures that were preventing successful flake detachment. Two general approaches were used. One was to strike the corrective flake from further back on the platform but in the same direction as regular flake removal. The other approach was to strike the rejuvenation flake from one side of the platform edge. Either way, the resulting flake has a distinctive triangular cross section with a smooth surface below one side of the apex and multiple step fracture scars on the other. The apex on the rejuvenation flake removed from further back on the platform is perpendicular to the long axis of the flake. That of the flake removed from the side of the core is parallel to the long axis (i.e., forms a prominent spine down the dorsal surface).

Platform Types

Most of the terms for the platforms are generally self-explanatory, but a few remarks are appropriate.

Multiple-Flake-Scar Platforms

Multiple-flake-scar platforms differ from faceted platforms in several important ways. Multiple-flake-scar platforms have two or more scars of previously removed flakes on them. While the flake scars may have been the result of core platform preparation (i.e., removal of cortex to improve flake production), the procedure was to remove the cortex from the platform of the core in an expedient manner and without any intention other than to remove that cortex. To this end, the decortication flakes may and often were removed from any convenient direction on the core. Thus, reduction flakes from these cores can have flake scars that obviously emanated from more than one direction.

A faceted platform, as the term is used by Old World lithic technologists, involves more than simple decortication. A series of small flakes was sequentially removed from the same edge of the core, resulting in parallel flake scars and flake-scar ridges. Moreover, the flake removal is done in such a way that a convex platform, rather than a flat one, is created. This convex surface permitted easier isolation of an aiming point for flake detachment and therefore greater control over the final product. My experience with Southwestern lithic assemblages, particularly those from the pottery periods, is that true faceted platforms are rarely found.

Pseudodihedral Platforms

The term *pseudodihedral* is modified from the Old World concept of dihedral platforms. This method of core-platform preparation involved the removal of two series of flakes, one down each side of the core. The distal ends of one row of flakes intersected those of the other row, resulting in a single tentlike ridge down the center of the core platform. This ridge was then used as an aiming point for regular flake detachment. This ridge permitted easier isolation of an aiming point for flake detachment and therefore greater control over the final product. Flakes produced from dihedral cores display two flake scars ending in a central peak on their platforms. Ideally, ripples and other landmarks show that the two flakes were removed from opposite directions, terminating in the peak.

In Southwestern assemblages, true dihedral platforms are rare, but prehistoric knappers employed a similar (or "pseudo") approach. They frequently aimed their hammers at ridges between adjacent flake scars, or at edges between flake scars and cortex, or at the edge of a core platform. Such aiming points had the same effect as the dihedral ridge—limiting the place where the blow could land, thereby creating greater control over the size and shape of the new flake. The resulting flake platforms have a peak between two flake scars or between a flake scar and cortex.

Distal-Termination Types

Only one distal termination type, modified-feathered, needs explanation. This type of termination occurred when the flake was so thick that a portion of the opposite side of the core was carried away with the flake, resulting in a blunt distal edge.

Shatter

Shatter is any piece of material derived from the knapping process that cannot be classified as a core or flake. In general, shatter results from uncontrolled breakage of the core, usually because of naturally occurring internal fractures or other inconsistencies in the material.

Edge Configuration and Use-Wear

Unifacial and bifacial edge wear are found on several kinds of edge configurations that might reflect function. These configurations, as seen from the dorsal or ventral surfaces of the flakes, are straight, convex, concave, sinuous, irregular, and projections. The distinction between use-wear on concave edges and notches can be somewhat arbitrary in some instances. For the most part, notches have small diameters and configurations that set them apart from the remainder of the edges on which they are located.

Two basic types of use-wear are represented: marginal unifacial wear and marginal bifacial wear. Very conservative criteria were used in deciding whether edge damage is attributable to use-wear. Generally speaking, a number of contiguous scars had to be present for a given manifestation to be designated use-wear. In a number of instances, the flake scars were sufficiently long and regular in shape that they may have been the product of minute intentional retouch.

Appendix 7: Radiocarbon Data Sheets from Beta Analytic

BETA

BETA ANALYTIC INC.

DR. M.A. TAMERS and MR. D.G. HOOD

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REPORT OF RADIOCARBON DATING ANALYSES

Mr. Timothy D. Maxwell — Auth. July 8, 1998

Museum of New Mexico — July 27, 1998

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-118869	2830 +/- 60 BP	-25.6 o/oo	2820 +/- 60 BP
Beta-118870	2930 +/- 50 BP	-25.8 o/oo	2910 +/- 50 BP
Beta-118874	1040 +/- 50 BP	-12.3 o/oo	1240 +/- 50 BP
Beta-118876	110 +/- 50 BP	-24.8 o/oo	110 +/- 50 BP

Beta-118869
SAMPLE #: 614-38264E-1
ANALYSIS: Standard-AMS
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

Beta-118870
SAMPLE #: 614-38264E-2
ANALYSIS: Standard-AMS
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

Beta-118874
SAMPLE #: 614-38264E-6
ANALYSIS: Standard-AMS
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

Beta-118876
SAMPLE #: 614-38264E-8
ANALYSIS: Standard-AMS
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

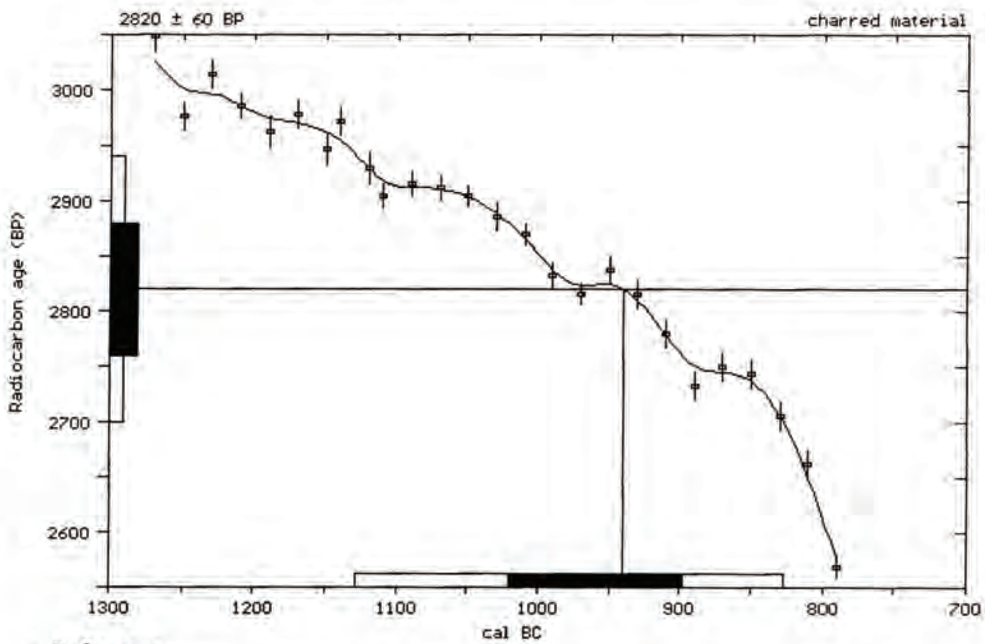
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25.6:lab. mult=1)

Laboratory Number:	Beta-118869
Conventional radiocarbon age:	**2820 ± 60 BP**
Calibrated results: (2 sigma, 95% probability)	**cal BC 1130 to 825**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal BC 940
1 sigma calibrated results: (68% probability)	cal BC 1020 to 900



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Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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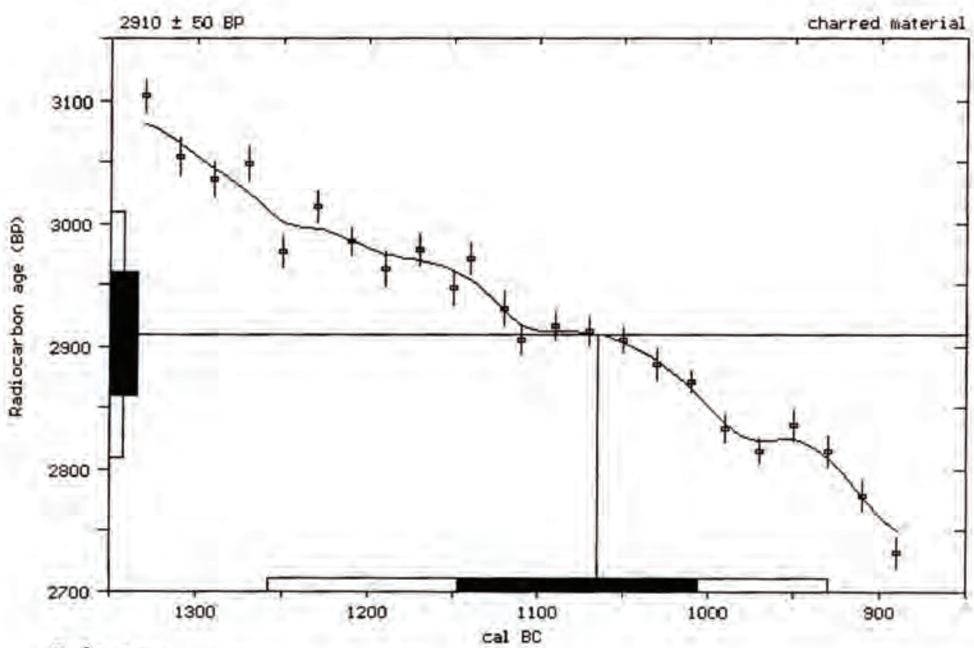
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25.8:lab. mult=1)

Laboratory Number:	Beta-118870
Conventional radiocarbon age:	**2910 ± 50 BP**
Calibrated results: (2 sigma, 95% probability)	**cal BC 1260 to 930**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal BC 1065
1 sigma calibrated results: (68% probability)	cal BC 1145 to 1005



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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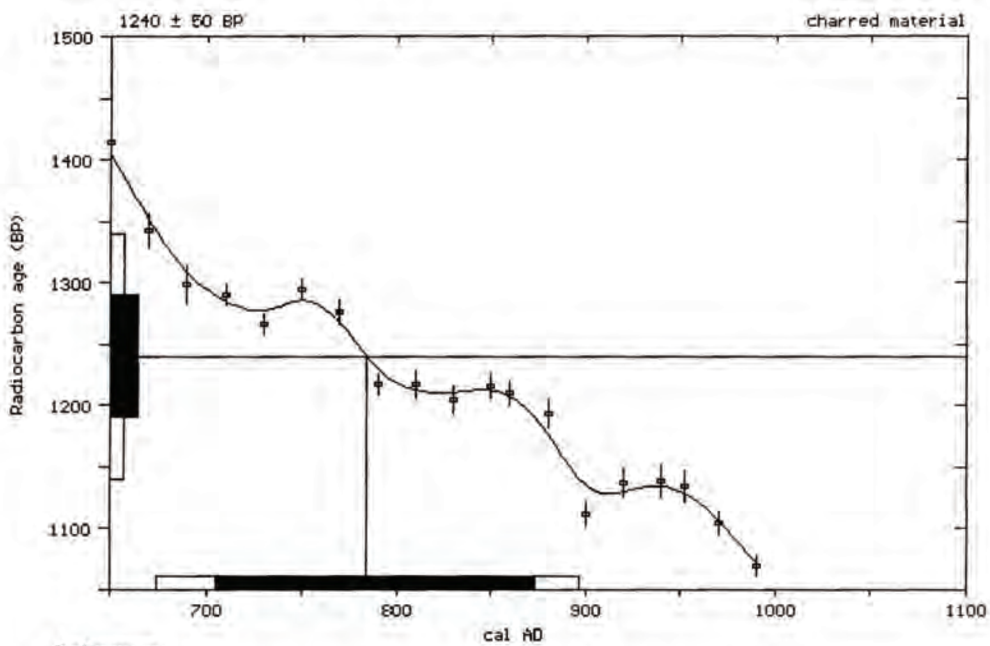
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-12.3:lab. mult=1)

Laboratory Number:	Beta-118874
Conventional radiocarbon age:	**1240 ± 50 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 675 to 895**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 785
1 sigma calibrated results: (68% probability)	cal AD 705 to 875



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86
A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322
Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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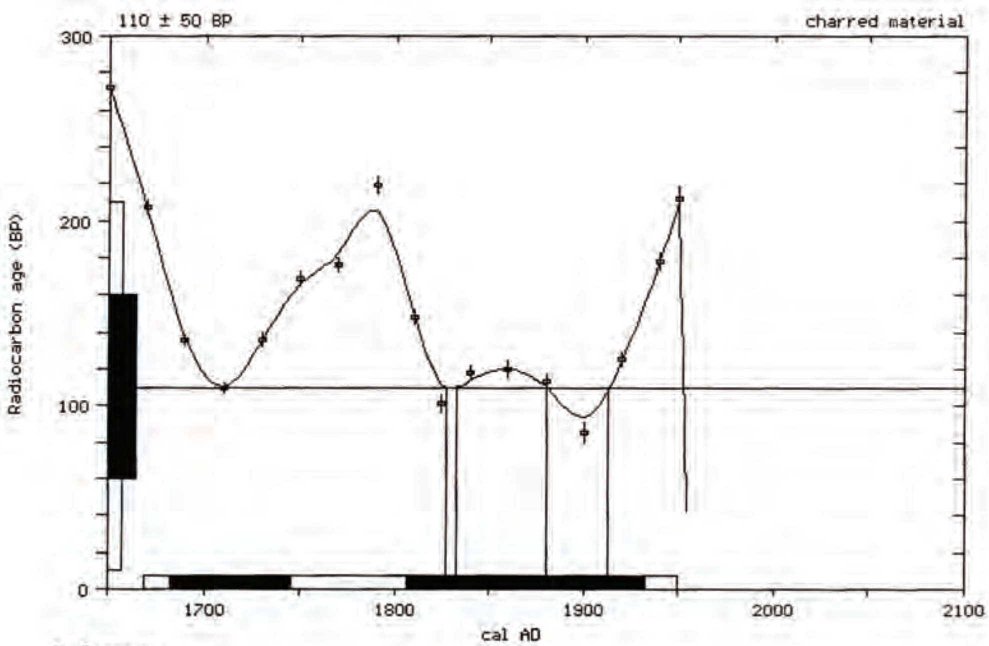
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-24.8:lab. mult=1)

Laboratory Number:	Beta-118876
Conventional radiocarbon age:	**110 ± 50 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 1670 to 1950**

Intercept data:

Intercepts of radiocarbon age with calibration curve:	cal AD 1825 and cal AD 1835 and cal AD 1880 and cal AD 1915
1 sigma calibrated results: (68% probability)	cal AD 1680 to 1745 and cal AD 1805 to 1935



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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REPORT OF RADIOCARBON DATING ANALYSES

Mr. Timothy D. Maxwell — June 8, 1998

Museum of New Mexico — July 15, 1998

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-118871	2880 +/- 60 BP	-25.0* o/oo	2880 +/- 60* BP
SAMPLE #: 614-38264E-3 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid COMMENT: the small sample was given extended counting time			
Beta-118872	2930 +/- 50 BP	-25.3 o/oo	2930 +/- 50 BP
SAMPLE #: 614-38264E-4 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-118873	2800 +/- 80 BP	-25.0* o/oo	2800 +/- 80* BP
SAMPLE #: 614-38264E-5 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-118875	3590 +/- 60 BP	-25.0* o/oo	3590 +/- 60* BP
SAMPLE #: 614-38264E-7 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-118877	2830 +/- 50 BP	-25.0 o/oo	2830 +/- 50 BP
SAMPLE #: 614-38264E-9 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

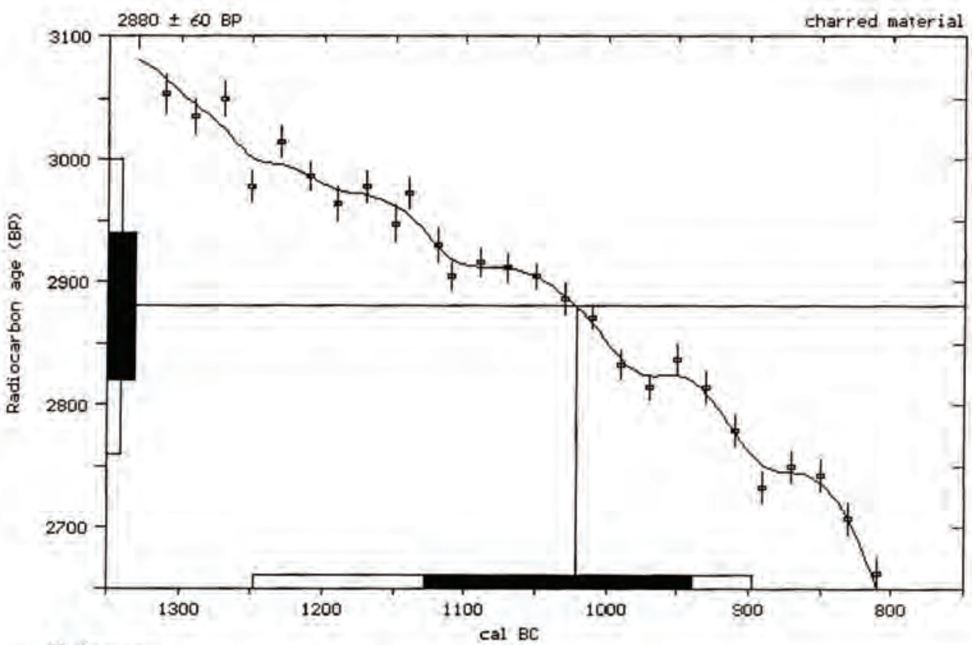
(Variables: est. C13/C12=-25.0:lab. mult=1)

Laboratory Number:	Beta-118871
Conventional radiocarbon age*:	**2880 ± 60 BP**
Calibrated results: (2 sigma, 95% probability)	**cal BC 1250 to 900**

* C13/C12 ratio estimated

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal BC 1020
1 sigma calibrated results: (68% probability)	cal BC 1130 to 940



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86
A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322
Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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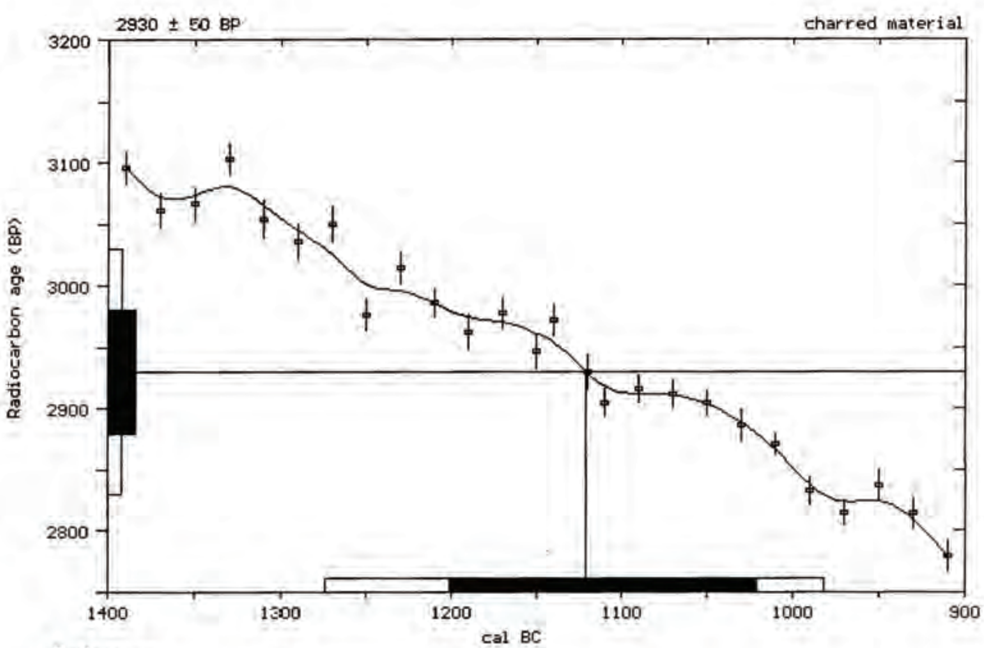
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25.3:lab. mult=1)

Laboratory Number:	Beta-118872
Conventional radiocarbon age:	**2930 ± 50 BP**
Calibrated results: **(2 sigma, 95% probability)**	**cal BC 1275 to 980**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal BC 1120
1 sigma calibrated results: (68% probability)	cal BC 1200 to 1020



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

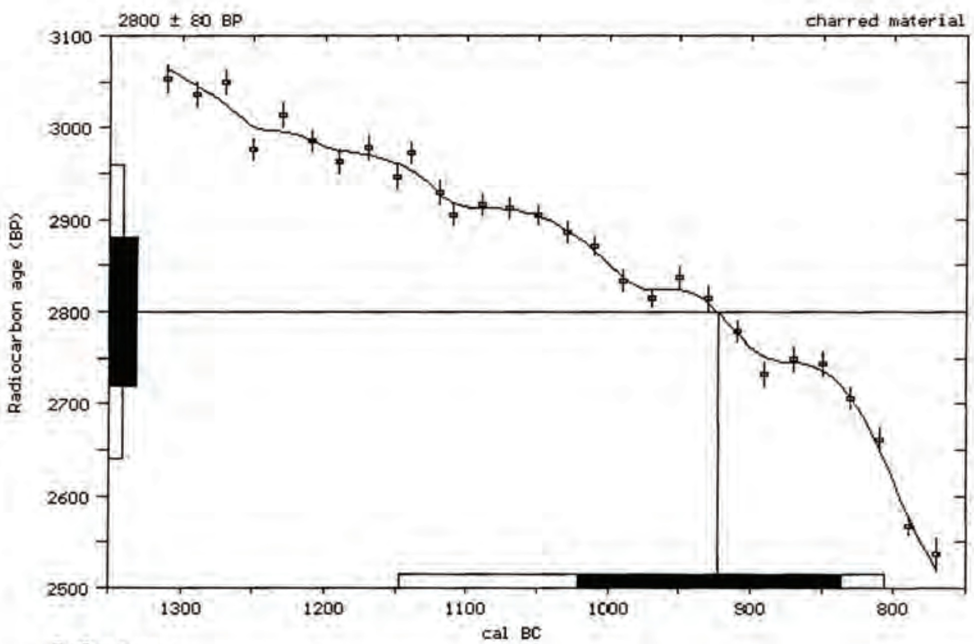
(Variables: est. C13/C12=-25.0:lab. mult=1)

Laboratory Number:	Beta-118873
Conventional radiocarbon age*:	**2800 ± 80 BP**
Calibrated results: (2 sigma, 95% probability)	**cal BC 1145 to 805**

* C13/C12 ratio estimated

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal BC 925
1 sigma calibrated results: (68% probability)	cal BC 1020 to 835



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86
A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322
Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

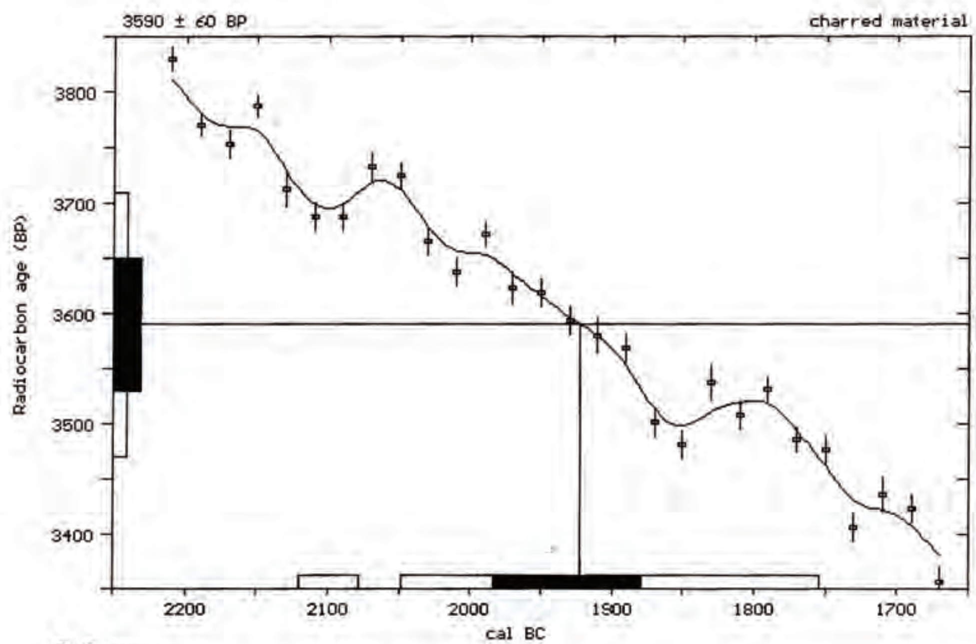
(Variables: est. C13/C12=-25.0:lab. mult=1)

Laboratory Number:	Beta-118875
Conventional radiocarbon age*:	**3590 ± 60 BP**
Calibrated results: (2 sigma, 95% probability)	**cal BC 2120 to 2080 and cal BC 2050 to 1755**

* C13/C12 ratio estimated

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal BC 1920
1 sigma calibrated results: (68% probability)	cal BC 1985 to 1880



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86
A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322
Calibration - 1993
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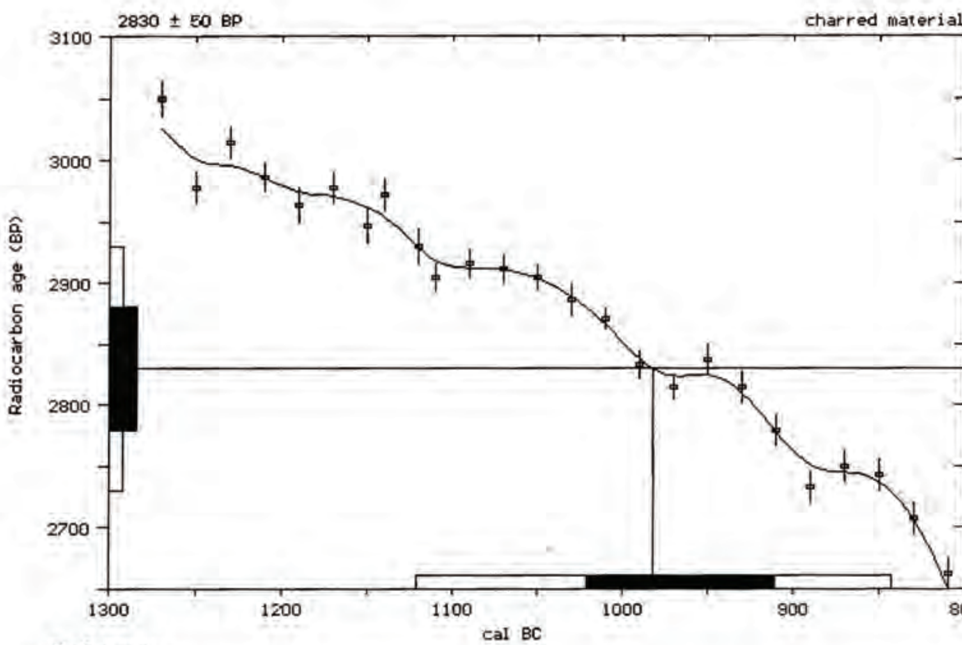
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-25.0:lab. mult=1)

Laboratory Number:	Beta-118877
Conventional radiocarbon age:	**2830 ± 50 BP**
Calibrated results: (2 sigma, 95% probability)	**cal BC 1120 to 845**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal BC 980
1 sigma calibrated results: (68% probability)	cal BC 1020 to 910



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86
A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322
Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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REPORT OF RADIOCARBON DATING ANALYSES

Mr. Regge N. Wiseman — Auth. Nov. 2, 1998

Museum of New Mexico — November 13, 1998

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-122654	2230 +/- 40 BP	-25.2 o/oo	2230 +/- 40 BP
SAMPLE #: 614-8053-1 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-122655	980 +/- 50 BP	-23.8 o/oo	1000 +/- 50 BP
SAMPLE #: 614-8053-2 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-122656	930 +/- 50 BP	-25.2 o/oo	930 +/- 50 BP
SAMPLE #: 614-8053-3 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-122657	640 +/- 50 BP	-11.2 o/oo	860 +/- 50 BP
SAMPLE #: 614-8053-4 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-122658	920 +/- 70 BP	-25.0* o/oo	920 +/- 70* BP
SAMPLE #: 614-8053-5 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

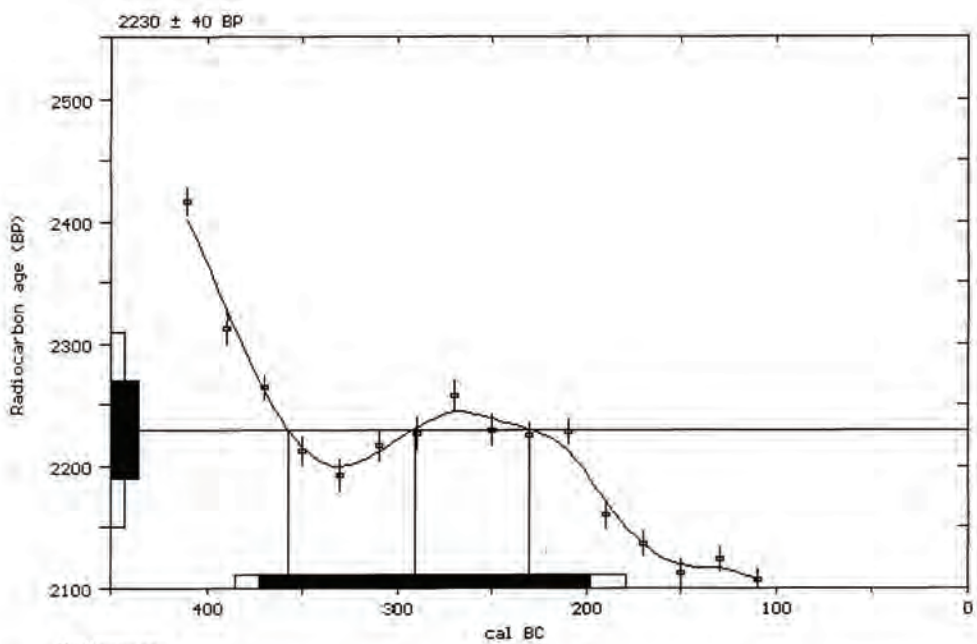
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-25.2:lab mult.=1)

Laboratory Number:	Beta-122654
Conventional radiocarbon age:	**2230 ± 40 BP**
Calibrated results: (2 sigma, 95% probability)	**cal BC 385 to 180**

Intercept data:

Intercepts of radiocarbon age with calibration curve:	cal BC 355 and cal BC 290 and cal BC 230
1 sigma calibrated results: (68% probability)	cal BC 375 to 200



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86
A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322
Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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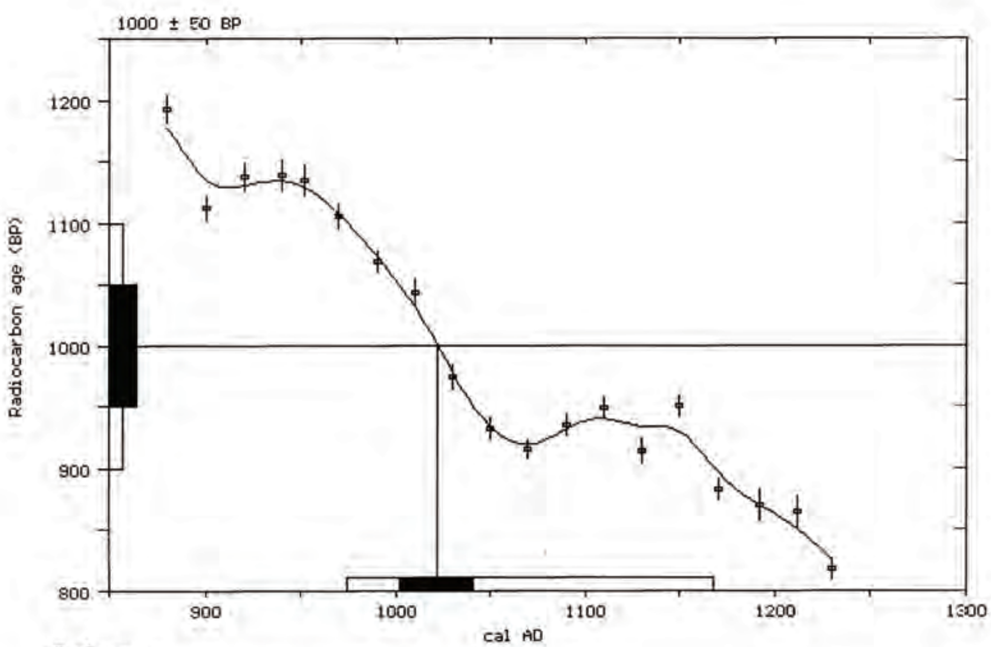
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-23.8:lab mult.=1)

Laboratory Number:	Beta-122655
Conventional radiocarbon age:	**1000 ± 50 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 975 to 1170**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 1020
1 sigma calibrated results: (68% probability)	cal AD 1000 to 1040



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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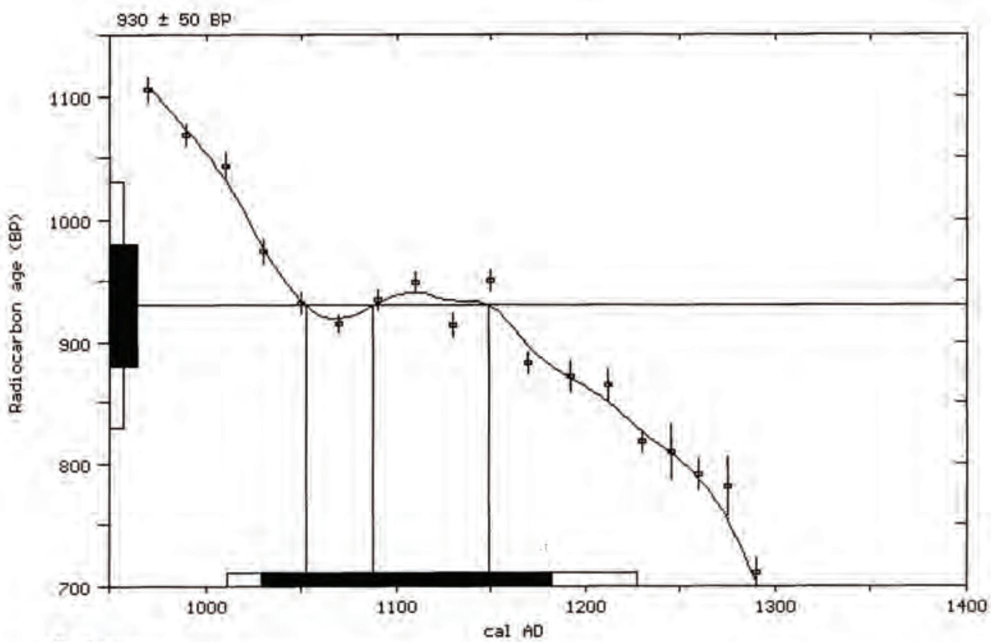
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-25.2:lab mult.=1)

Laboratory Number:	Beta-122656
Conventional radiocarbon age:	**930 ± 50 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 1010 to 1225**

Intercept data:

Intercepts of radiocarbon age with calibration curve:	cal AD 1055 and cal AD 1090 and cal AD 1150
1 sigma calibrated results: (68% probability)	cal AD 1030 to 1180



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86
A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322
Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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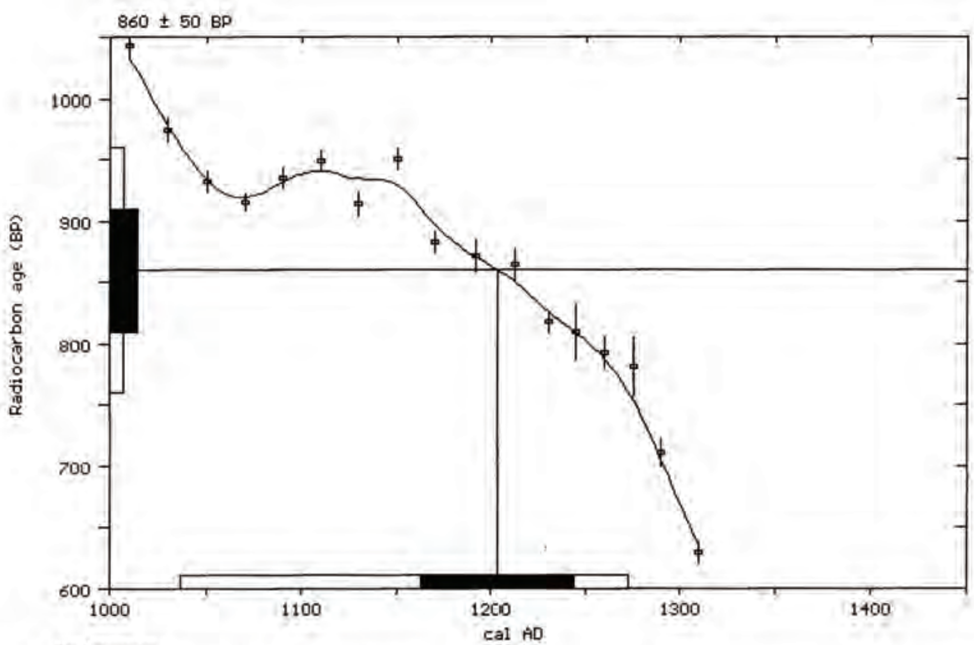
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-11.2:lab mult.=1)

Laboratory Number:	Beta-122657
Conventional radiocarbon age:	**860 ± 50 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 1035 to 1275**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 1205
1 sigma calibrated results: (68% probability)	cal AD 1165 to 1245



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86
A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322
Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

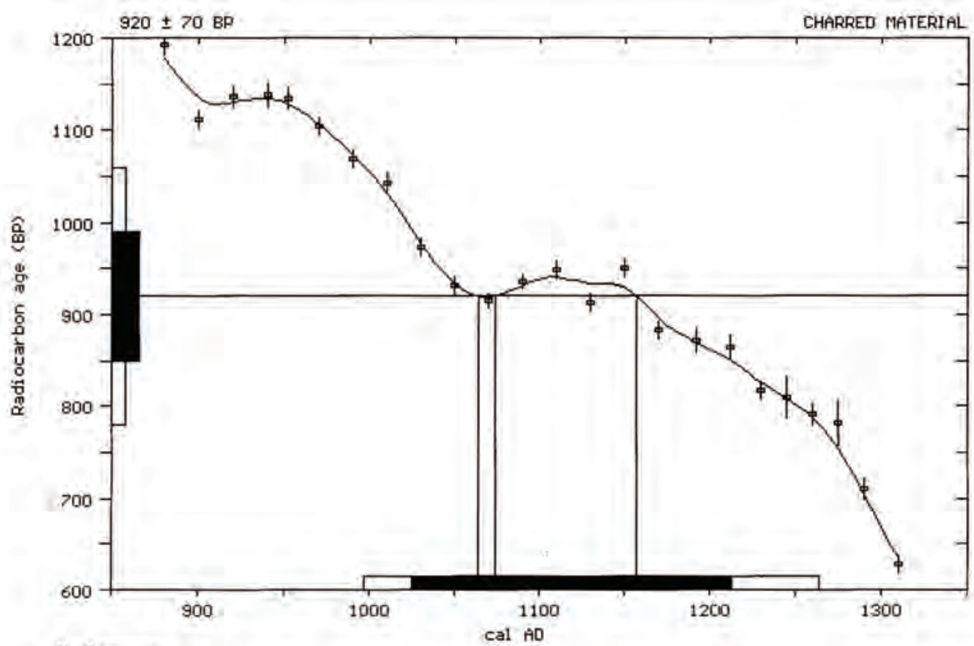
(Variables:estimated C13/C12=-25:lab mult.=1)

Laboratory Number:	Beta-122658
Conventional radiocarbon age*:	**920 ± 70 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 995 to 1265**

* C13/C12 ratio estimated

Intercept data:

Intercepts of radiocarbon age with calibration curve:	cal AD 1065 and cal AD 1075 and cal AD 1155
1 sigma calibrated results: (68% probability)	cal AD 1025 to 1215



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86
A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322
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REPORT OF RADIOCARBON DATING ANALYSES

Mr. Regge N. Wiseman

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-122659	960 +/- 60 BP	-25.0* o/oo	960 +/- 60* BP
SAMPLE #: 614-8053-6 ANALYSIS: radiometric-standard MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid COMMENT: the small sample was given extended counting time			
Beta-122660	880 +/- 40 BP	-24.9 o/oo	880 +/- 40 BP
SAMPLE #: 614-8053-7 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-122661	1100 +/- 40 BP	-24.8 o/oo	1100 +/- 40 BP
SAMPLE #: 614-8053-8 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-122662	1150 +/- 40 BP	-24.4 o/oo	1160 +/- 40 BP
SAMPLE #: 614-8053-9 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-122663	900 +/- 50 BP	-24.0 o/oo	920 +/- 50 BP
SAMPLE #: 614-38264E-10 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

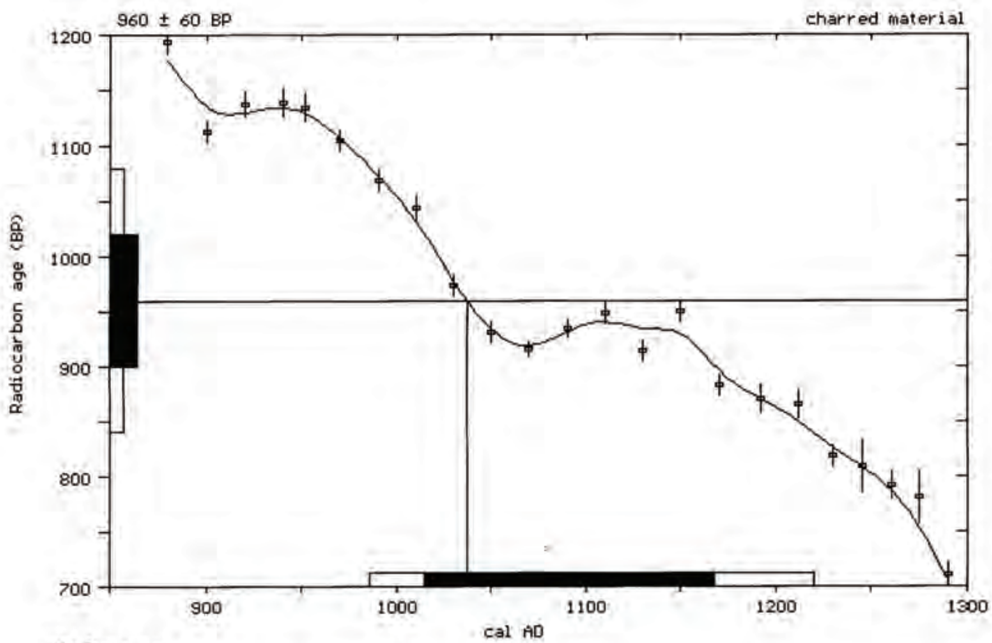
(Variables: est. C13/C12=-25.0:lab. mult=1)

Laboratory Number:	Beta-122659
Conventional radiocarbon age*:	**960 ± 60 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 985 to 1220**

* C13/C12 ratio estimated

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 1035
1 sigma calibrated results: (68% probability)	cal AD 1015 to 1170



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86
A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322
Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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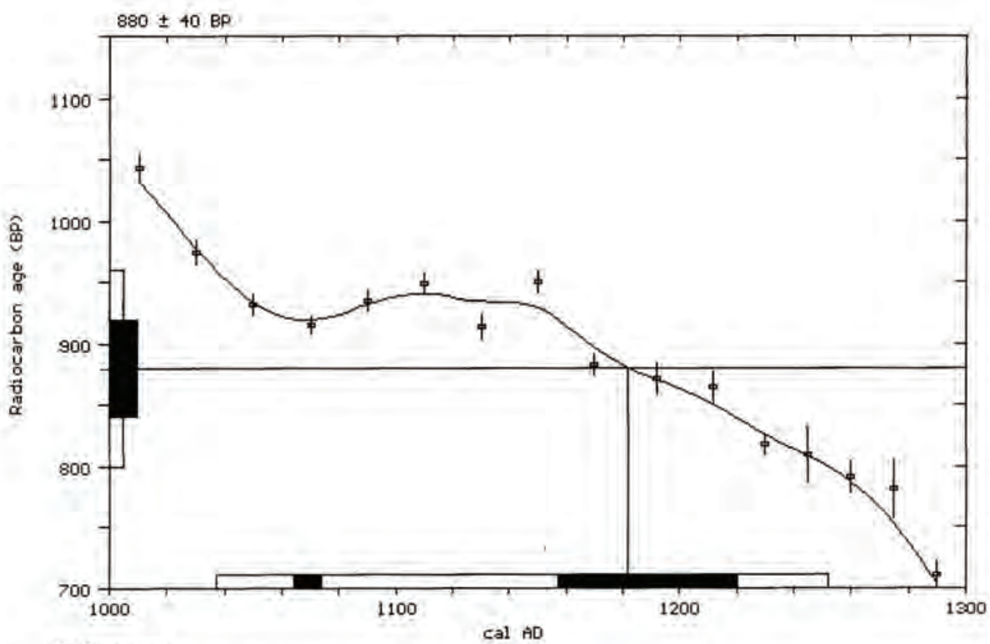
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-24.9:lab mult.=1)

Laboratory Number:	Beta-122660
Conventional radiocarbon age:	**880 ± 40 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 1035 to 1250**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 1180
1 sigma calibrated results: (68% probability)	cal AD 1065 to 1075 and cal AD 1155 to 1220



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86

A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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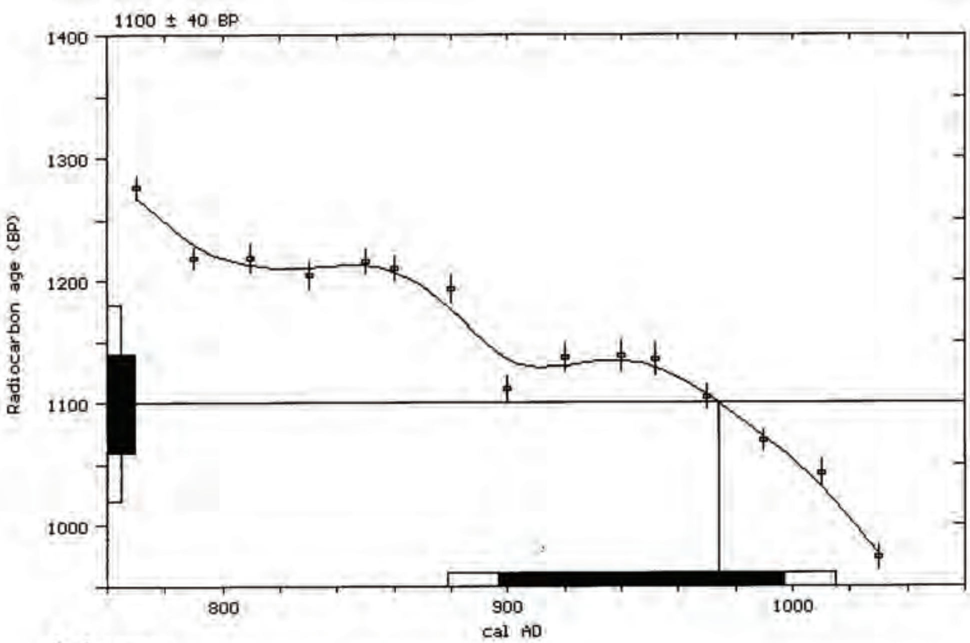
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-24.8:lab mult.=1)

Laboratory Number:	Beta-122661
Conventional radiocarbon age:	**1100 ± 40 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 880 to 1015**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 975
1 sigma calibrated results: (68% probability)	cal AD 895 to 995



References:
Pretoria Calibration Curve for Short Lived Samples
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Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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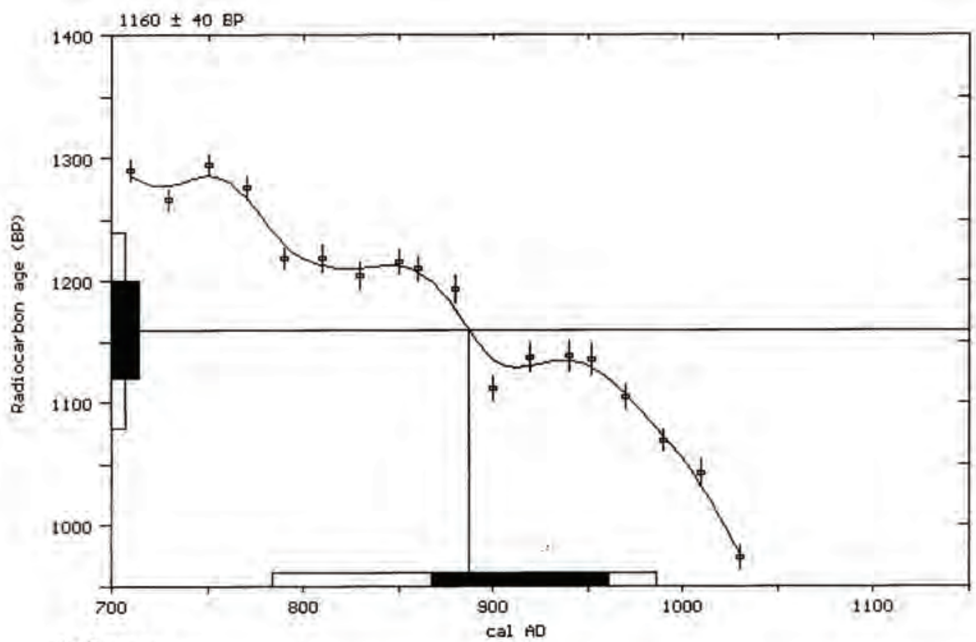
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-24.4:lab mult.=1)

Laboratory Number:	Beta-122662
Conventional radiocarbon age:	**1160 ± 40 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 785 to 985**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 885
1 sigma calibrated results: (68% probability)	cal AD 865 to 960



References:

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Calibration - 1993
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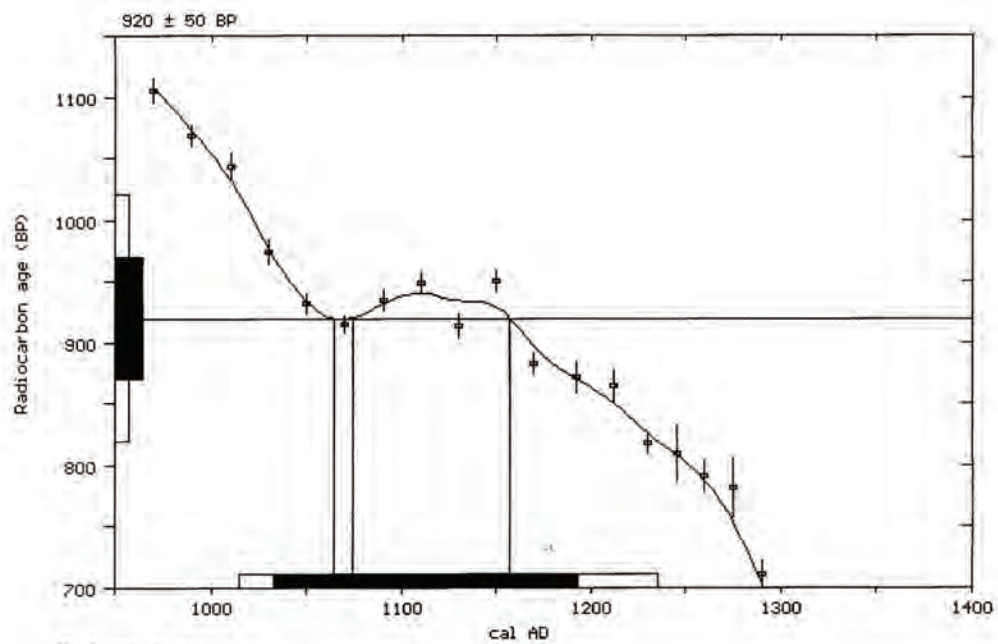
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-24:lab mult.=1)

Laboratory Number:	Beta-122663
Conventional radiocarbon age:	**920 ± 50 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 1015 to 1235**

Intercept data:

Intercepts of radiocarbon age with calibration curve:	cal AD 1065 and cal AD 1075 and cal AD 1155
1 sigma calibrated results: (68% probability)	cal AD 1035 to 1195



References:

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Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86
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Calibration - 1993
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REPORT OF RADIOCARBON DATING ANALYSES

Mr. Regge N. Wiseman

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-122664	2820 +/- 50 BP	-26.9 o/oo	2790 +/- 50 BP
SAMPLE #: 614-38264E-11 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-122665	1870 +/- 50 BP	-25.1 o/oo	1870 +/- 50 BP
SAMPLE #: 614-38264E-12 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-122666	3430 +/- 50 BP	-23.5 o/oo	3450 +/- 50 BP
SAMPLE #: 614-38264E-13 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-122667	2920 +/- 50 BP	-26.5 o/oo	2900 +/- 50 BP
SAMPLE #: 614-112349-1 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			
Beta-122668	2970 +/- 50 BP	-24.6 o/oo	2970 +/- 50 BP
SAMPLE #: 614-112349-2 ANALYSIS: Standard-AMS MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid			

NOTE: It is important to read the calendar calibration information and to use the calendar calibrated results (reported separately) when interpreting these results in AD/BC terms.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

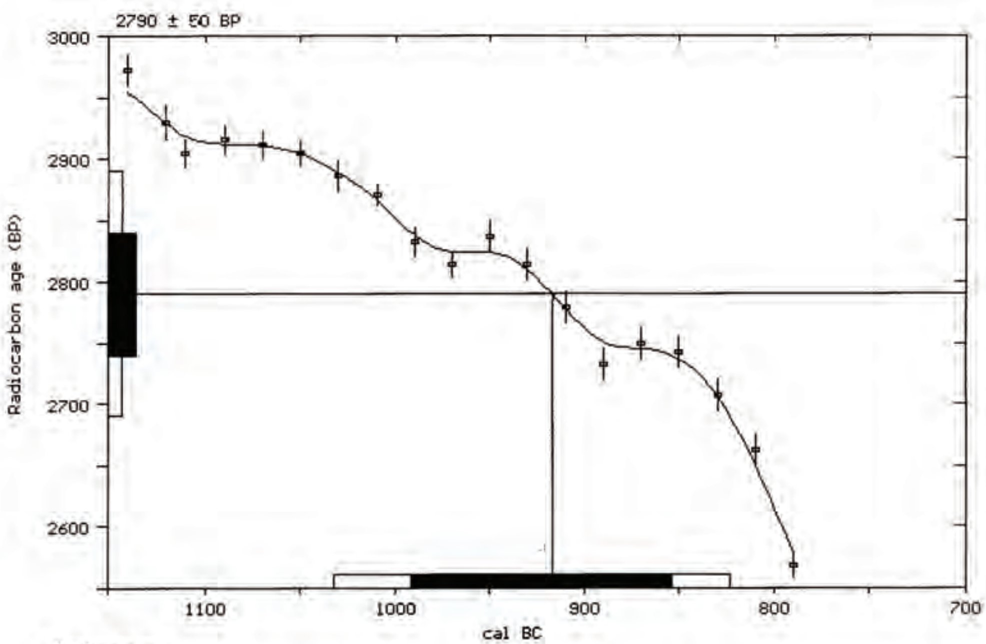
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-26.9:lab mult.=1)

Laboratory Number:	Beta-122664
Conventional radiocarbon age:	**2790 ± 50 BP**
Calibrated results: (2 sigma, 95% probability)	**cal BC 1030 to 825**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal BC 915
1 sigma calibrated results: (68% probability)	cal BC 990 to 855



References:

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Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86
A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322
Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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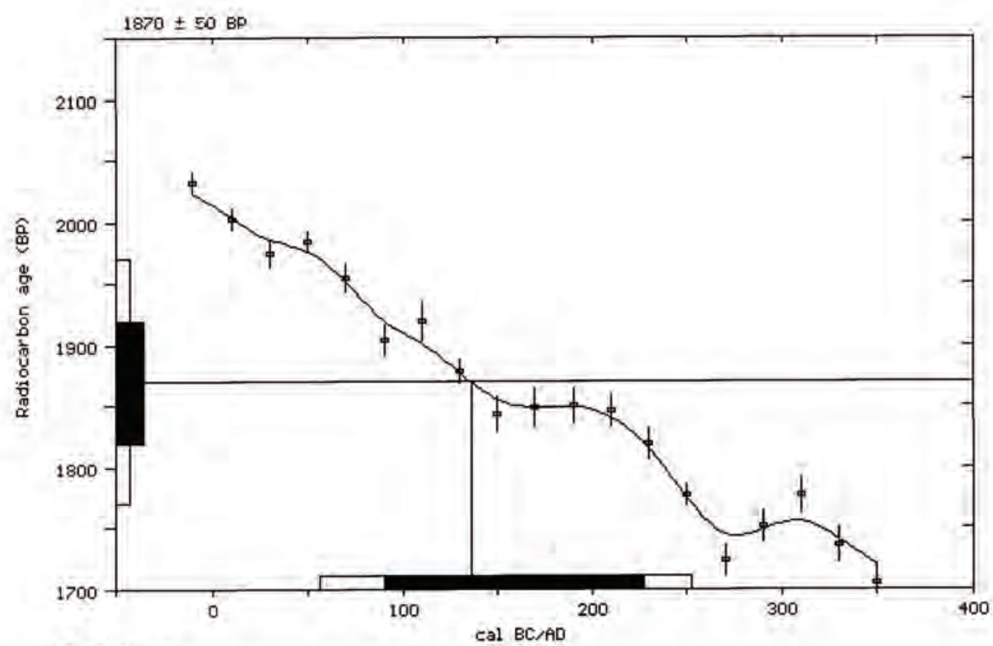
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-25.1:lab mult.=1)

Laboratory Number:	Beta-122665
Conventional radiocarbon age:	**1870 ± 50 BP**
Calibrated results: (2 sigma, 95% probability)	**cal AD 55 to 250**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal AD 135
1 sigma calibrated results: (68% probability)	cal AD 90 to 225



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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-23.5:lab mult.=1)

Laboratory Number: Beta-122666

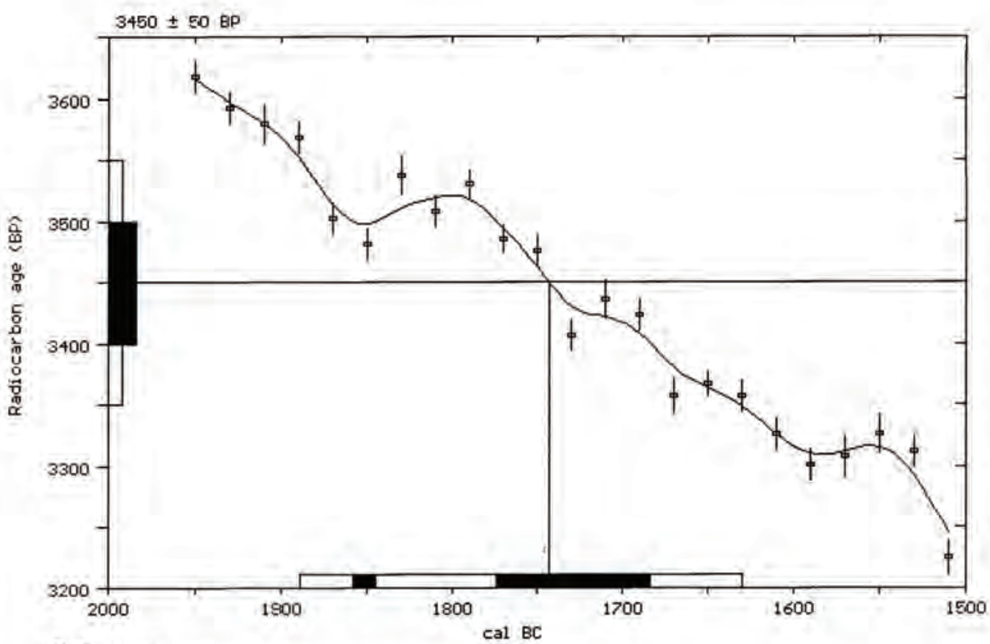
Conventional radiocarbon age: **3450 ± 50 BP**

Calibrated results:
(2 sigma, 95% probability) **cal BC 1890 to 1630**

Intercept data:

Intercept of radiocarbon age
with calibration curve: cal BC 1745

1 sigma calibrated results:
(68% probability)
cal BC 1860 to 1845 and
cal BC 1775 to 1685



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86
A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322
Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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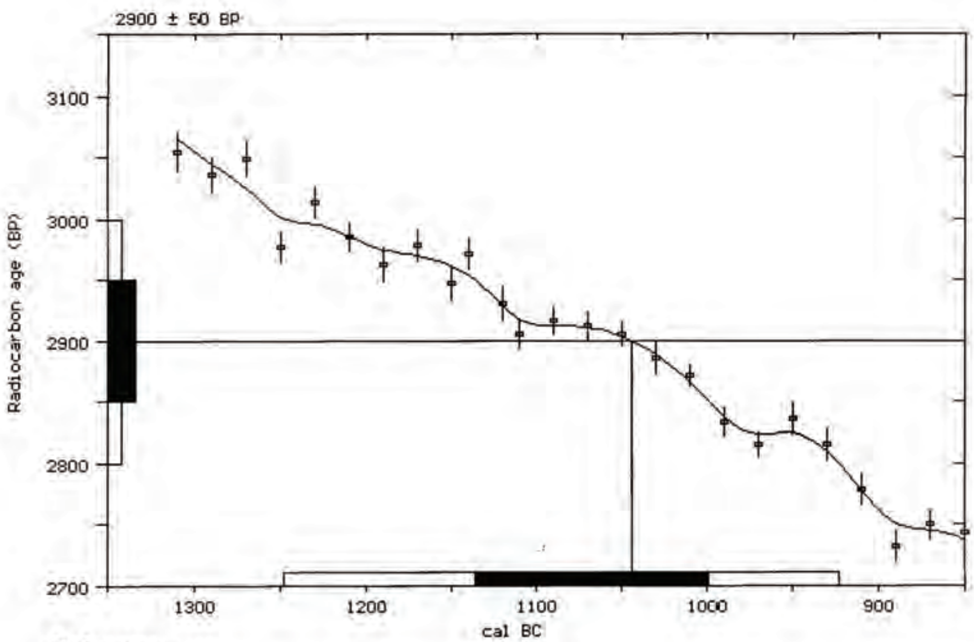
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-26.5:lab mult.=1)

Laboratory Number:	Beta-122667
Conventional radiocarbon age:	**2900 ± 50 BP**
Calibrated results: (2 sigma, 95% probability)	**cal BC 1250 to 925**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal BC 1045
1 sigma calibrated results: (68% probability)	cal BC 1135 to 1000



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86
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Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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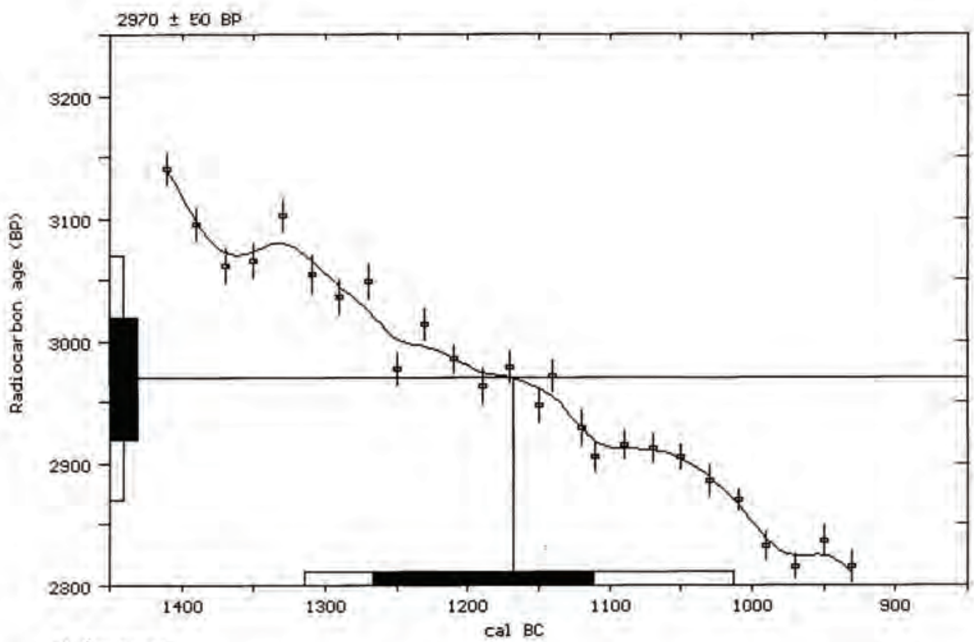
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-24.6:lab mult.=1)

Laboratory Number:	Beta-122668
Conventional radiocarbon age:	**2970 ± 50 BP**
Calibrated results: (2 sigma, 95% probability)	**cal BC 1315 to 1015**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal BC 1170
1 sigma calibrated results: (68% probability)	cal BC 1265 to 1110



References:

Pretoria Calibration Curve for Short Lived Samples
Vogel, J. C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(1), p73-86
A Simplified Approach to Calibrating C14 Dates
Talma, A. S. and Vogel, J. C., 1993, Radiocarbon 35(2), p317-322
Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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REPORT OF RADIOCARBON DATING ANALYSES

Mr. Regge N. Wiseman — Auth. Nov. 2, 1998

Museum of New Mexico — November 13, 1998

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-122874	2930 +/- 50 BP	-24.1 o/oo	2950 +/- 50 BP

SAMPLE #: 614-38264E-14
ANALYSIS: Standard-AMS
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

NOTE: It is important to read the calendar calibration information and to use the calendar calibrated results (reported separately) when interpreting these results in AD/BC terms.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

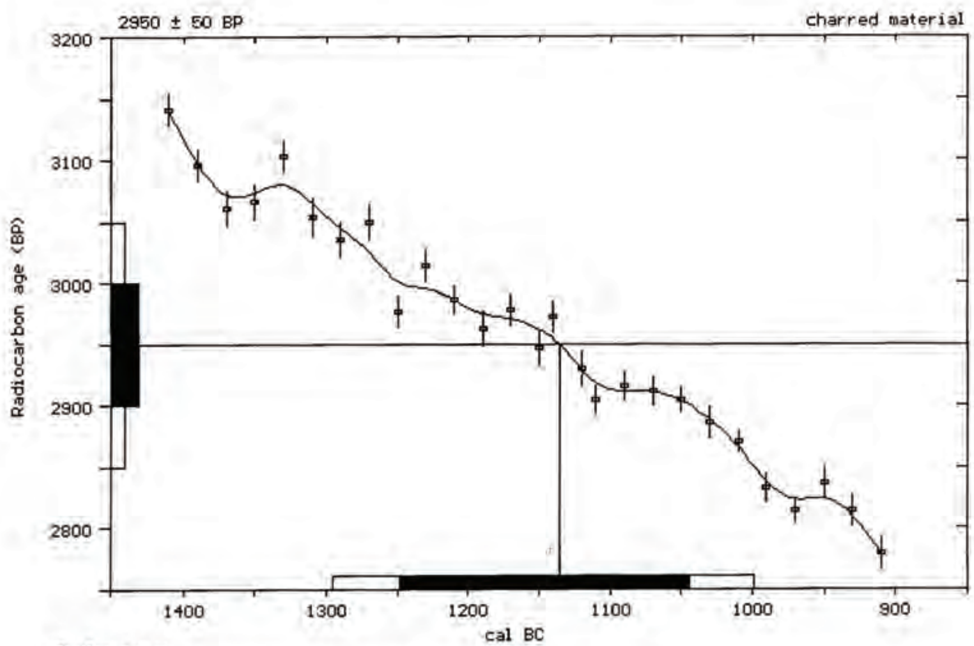
CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables: C13/C12=-24.1:lab. mult=1)

Laboratory Number:	Beta-122874
Conventional radiocarbon age:	**2950 ± 50 BP**
Calibrated results: (2 sigma, 95% probability)	**cal BC 1295 to 1000**

Intercept data:

Intercept of radiocarbon age with calibration curve:	cal BC 1135
1 sigma calibrated results: (68% probability)	cal BC 1250 to 1045



References:

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Calibration - 1993
Stuiver, M., Long, A., Kra, R. S. and Devine, J. M., 1993, Radiocarbon 35(1)

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REPORT OF RADIOCARBON DATING ANALYSES

Mr. Timothy D. Maxwell — Auth. Feb. 22, 1999

Museum of New Mexico — March 9, 1999

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-126922	2750 +/- 170 BP	-26.3 o/oo	2730 +/- 170 BP

SAMPLE #: 614-38264E-15
ANALYSIS: radiometric-standard
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid
COMMENT: the small sample was given extended counting time

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-126923	2890 +/- 60 BP	-25.0 o/oo	2890 +/- 60 BP

SAMPLE #: 614-38264E-16
ANALYSIS: Standard-AMS
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-126924	2920 +/- 60 BP	-24.6 o/oo	2930 +/- 60 BP

SAMPLE #: 614-38264E-17
ANALYSIS: Standard-AMS
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid

Sample Data	Measured C14 Age	C13/C12 Ratio	Conventional C14 Age (*)
Beta-126925	2930 +/- 90 BP	-27.4 o/oo	2900 +/- 90 BP

SAMPLE #: 614-38264E-18
ANALYSIS: radiometric-standard
MATERIAL/PRETREATMENT:(charred material): acid/alkali/acid
COMMENT: the small sample was given extended counting time

NOTE: It is important to read the calendar calibration information and to use the calendar calibrated results (reported separately) when interpreting these results in AD/BC terms.

Dates are reported as RCYBP (radiocarbon years before present, "present" = 1950A.D.). By International convention, the modern reference standard was 95% of the C14 content of the National Bureau of Standards' Oxalic Acid & calculated using the Libby C14 half life (5568 years). Quoted errors represent 1 standard deviation statistics (68% probability) & are based on combined measurements of the sample, background, and modern reference standards.

Measured C13/C12 ratios were calculated relative to the PDB-1 international standard and the RCYBP ages were normalized to -25 per mil. If the ratio and age are accompanied by an (*), then the C13/C12 value was estimated, based on values typical of the material type. The quoted results are NOT calibrated to calendar years. Calibration to calendar years should be calculated using the Conventional C14 age.

CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-26.3:lab mult.=1)

Laboratory Number: Beta-126922

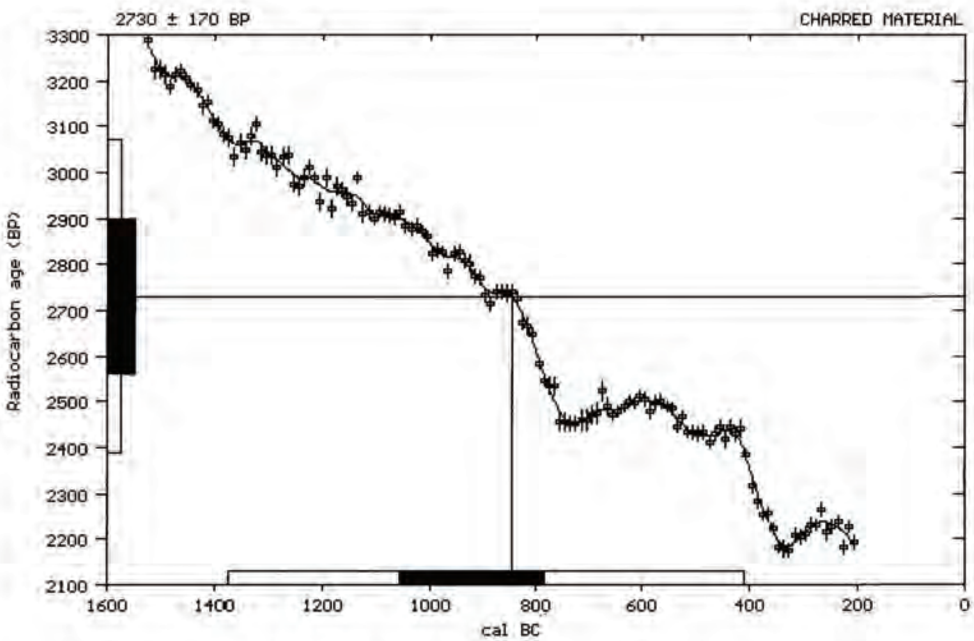
Conventional radiocarbon age: 2730 ± 170 BP

Calibrated results: cal BC 1375 to 410 (Cal BP 3325 to 2360)
(2 sigma, 95% probability)

Intercept data:

Intercept of radiocarbon age with calibration curve: cal BC 845 (Cal BP 2795)

1 sigma calibrated results: cal BC 1055 to 785 (Cal BP 3005 to 2735)
(68% probability)



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Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083
Mathematics
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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-25:lab mult.=1)

Laboratory Number: Beta-126923

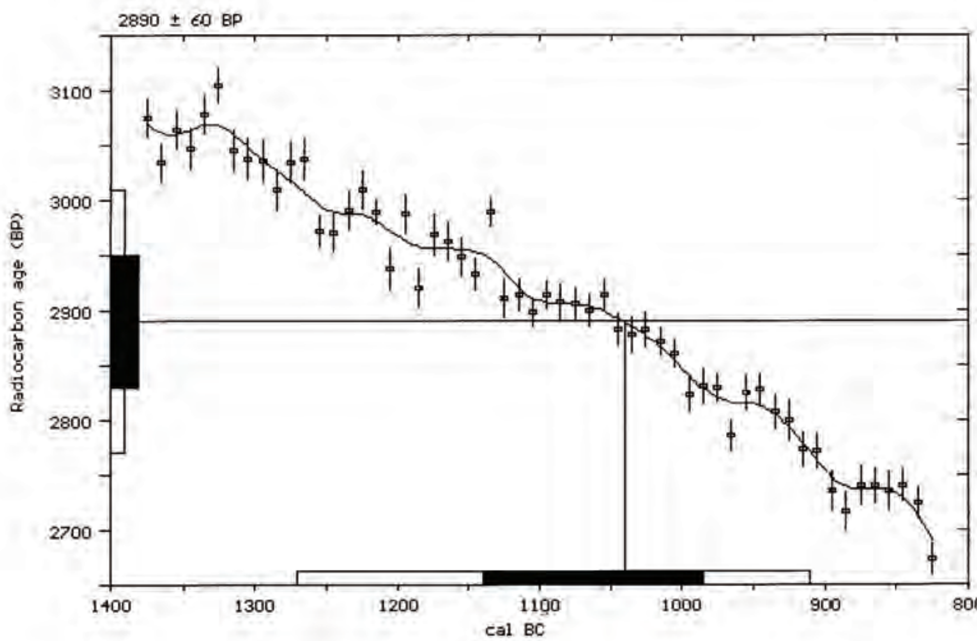
Conventional radiocarbon age: **2890 ± 60 BP**

Calibrated results: **cal BC 1270 to 910 (Cal BP 3220 to 2860)**
(2 sigma, 95% probability)

Intercept data:

Intercept of radiocarbon age with calibration curve: cal BC 1040 (Cal BP 2990)

1 sigma calibrated results: cal BC 1140 to 985 (Cal BP 3090 to 2935)
(68% probability)



References:
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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-24.6:lab mult.=1)

Laboratory Number: Beta-126924

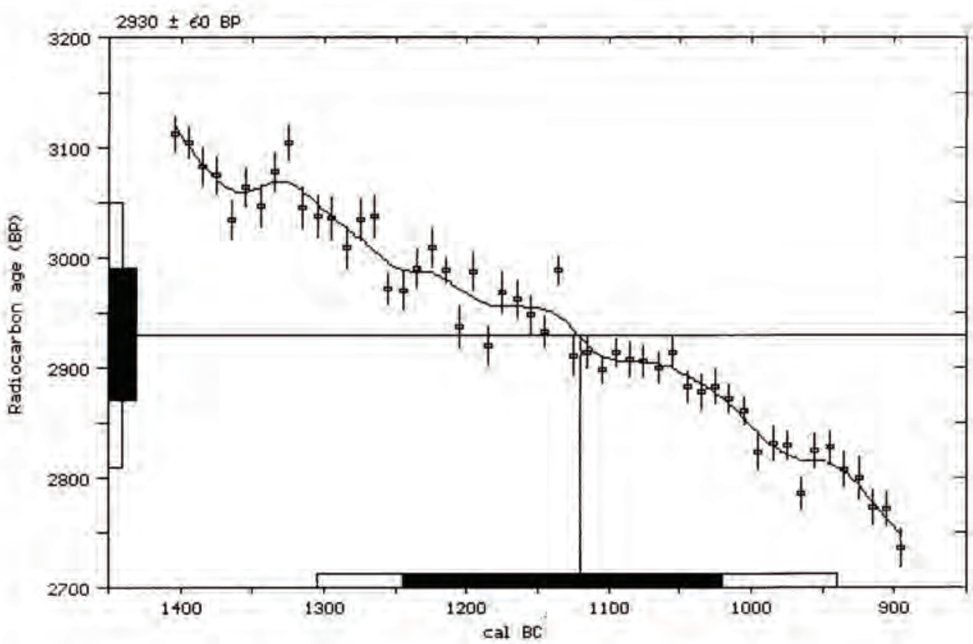
Conventional radiocarbon age: 2930 ± 60 BP

Calibrated results: cal BC 1305 to 940 (Cal BP 3255 to 2890)
(2 sigma, 95% probability)

Intercept data:

Intercept of radiocarbon age with calibration curve: cal BC 1120 (Cal BP 3070)

1 sigma calibrated results: cal BC 1245 to 1020 (Cal BP 3195 to 2970)
(68% probability)



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Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

Beta Analytic Radiocarbon Dating Laboratory

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CALIBRATION OF RADIOCARBON AGE TO CALENDAR YEARS

(Variables:C13/C12=-27.4:lab mult.=1)

Laboratory Number: Beta-126925

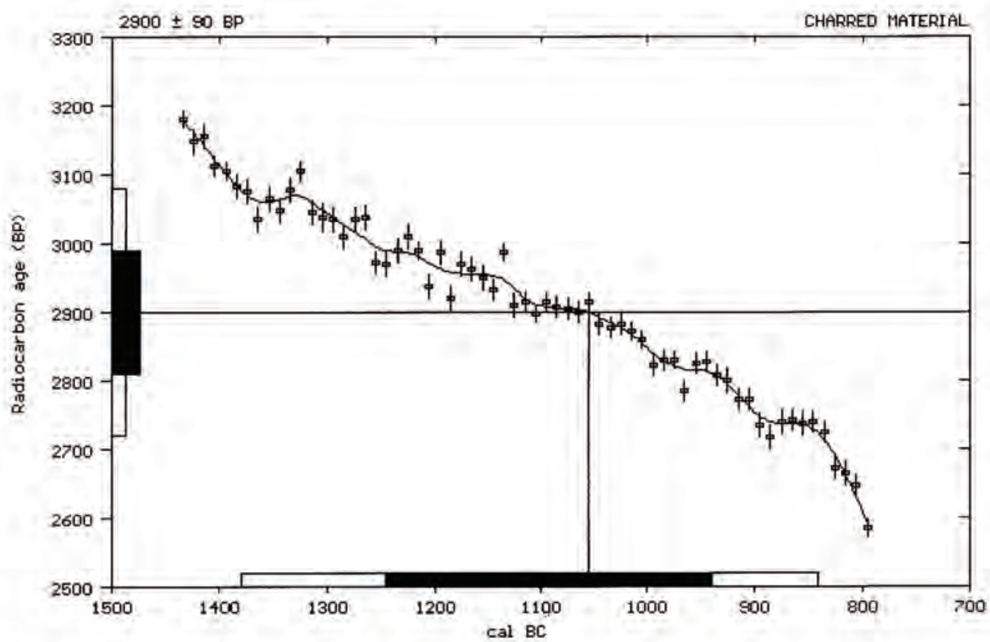
Conventional radiocarbon age: 2900 ± 90 BP

Calibrated results: cal BC 1380 to 840 (Cal BP 3330 to 2790)
(2 sigma, 95% probability)

Intercept data:

Intercept of radiocarbon age with calibration curve: cal BC 1055 (Cal BP 3005)

1 sigma calibrated results: cal BC 1245 to 940 (Cal BP 3195 to 2890)
(68% probability)



References:

Calibration Database

Editorial Comment

Stuiver, M., van der Plicht, H., 1998, Radiocarbon 40(3), pxii-xiii

INCAL98 Radiocarbon Age Calibration

Stuiver, M., et. al., 1998, Radiocarbon 40(3), p1041-1083

Mathematics

A Simplified Approach to Calibrating C14 Dates

Talma, A. S., Vogel, J. C., 1993, Radiocarbon 35(2), p317-322

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Associate Managers

ANALYTICAL PROCEDURES AND FINAL REPORT

FINAL REPORT

This package includes the final date report, this statement outlining our analytical procedures, a glossary of pretreatment terms, calendar calibration information, billing documents (containing balance/credit information and the number of samples submitted within the yearly discount period), and peripheral items to use with future submittals. The final report includes the individual analysis method, the delivery basis, the material type and the individual pretreatments applied. Please recall any correspondences or communications we may have had regarding sample integrity, size, special considerations or conversions from one analytical technique to another (e.g. radiometric to AMS). The final report has also been sent by fax or e-mail, where available.

PRETREATMENT

Results were obtained on the portion of suitable carbon remaining after any necessary chemical and mechanical pretreatments of the submitted material. Pretreatments were applied, where necessary, to isolate ^{14}C which may best represent the time event of interest. Individual pretreatments are listed on the report next to each result and are defined in the enclosed glossary. When interpreting the results, it is important to consider the pretreatments. Some samples cannot be fully pretreated making their ^{14}C ages more subjective than samples which can be fully pretreated. Some materials receive no pretreatments. Please read the pretreatment glossary.

ANALYSIS

Materials measured by the radiometric technique were analyzed by synthesizing sample carbon to benzene (92% C), measuring for ^{14}C content in a scintillation spectrometer, and then calculating for radiocarbon age. If the Extended Counting Service was used, the ^{14}C content was measured for a greatly extended period of time. AMS results were derived from reduction of sample carbon to graphite (100 %C), along with standards and backgrounds. The graphite was then sent for ^{14}C measurement in an accelerator-mass-spectrometer located at one of six collaborating research facilities, who return the results to us for verification, isotopic fractionation correction, calendar calibration, and reporting.

THE RADIOCARBON AGE AND CALENDAR CALIBRATION

The "Conventional C14 Age (*)" is the result after applying C13/C12 corrections to the measured age and is the most appropriate radiocarbon age (the "*" is discussed at the bottom of the final report). Applicable calendar calibrations are included for organic materials and fresh water carbonates between 0 and 10,000 BP and for marine carbonates between 0 and 8,300 BP. If certain calibrations are not included with this report, the results were either too young, too old, or inappropriate for calibration.

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BETA ANALYTIC INC.
RADIOCARBON DATING LABORATORY
CALIBRATED C-14 DATING RESULTS

Calibrations of radiocarbon age determinations are applied to convert BP results to calendar years. The short term difference between the two is caused by fluctuations in the heliomagnetic modulation of the galactic cosmic radiation and, recently, large scale burning of fossil fuels and nuclear devices testing. Geomagnetic variations are the probable cause of longer term differences.

The parameters used for the corrections have been obtained through precise analyses of hundreds of samples taken from known-age tree rings of oak, sequoia, and fir up to 7,200 BP. The parameters for older samples, up to 22,000 BP, as well as for all marine samples, have been inferred from other evidence. Calibrations are presently provided for terrestrial samples to about 10,000 BP and marine samples to about 8,300 BP.

The Pretoria Calibration Procedure program has been chosen for these dendrocalibrations. It uses splines through the tree-ring data as calibration curves, which eliminates a large part of the statistical scatter of the actual data points. The spline calibration allows adjustment of the average curve by a quantified closeness-of-fit parameter to the measured data points. On the following calibration curves, the solid bars represent one sigma statistics (68% probability) and the hollow bars represent two sigma statistics (95% probability). Marine carbonate samples that have been corrected for δ 13/12C, have also been corrected for both global and local geographic reservoir effects (as published in Radiocarbon, Volume 35, Number 1, 1993) prior to the calibration. Marine carbonates that have not been corrected for δ 13/12C, have been adjusted by an assumed value of 0 ‰ in addition to the reservoir corrections. Reservoir corrections for fresh water carbonates are usually unknown and are generally not accounted for in those calibrations. In the absence of measured δ 13/12C ratios, a typical value of -5 ‰ was assumed for freshwater carbonates. There are separate calibration data for the Northern and Southern Hemisphere. Variables used in each calibration are listed below the title of each calibration page.

(Caveat: the calibrations assume that the material dated was living for exactly ten or twenty years (e.g. a collection of 10 or 20 individual tree rings taken from the outer portion of a tree that was cut down to produce the sample in the feature dated). For other materials, the maximum and minimum calibrated age ranges given by the computer program are uncertain. The possibility of an "old wood effect" must also be considered, as well as the potential inclusion of some younger material in the total sample. Since the vast majority of samples dated probably will not fulfill the ten/twenty-year-criterium and, in addition, an old wood effect or young carbon inclusion might not be excludable, these dendrocalibration results should be used only for illustrative purposes. In the case of carbonates, reservoir correction is theoretical and the local variations are real, highly variable and dependant on provenience. The age ranges and, especially, the intercept ages generated by the program must be considered as approximations.)

PRETREATMENT GLOSSARY

Pretreatment of submitted materials is required to eliminate secondary carbon components. These components, if not eliminated, could result in a radiocarbon date which is too young or too old. Pretreatment does not ensure that the radiocarbon date will represent the time event of interest. This is determined by the sample integrity. The old wood effect, burned intrusive roots, bioturbation, secondary deposition, secondary biogenic activity incorporating recent carbon (bacteria) and the analysis of multiple components of differing age are just some examples of potential problems. The pretreatment philosophy is to reduce the sample to a single component, where possible, to minimize the added subjectivity associated with these types of problems.

"acid/alkali/acid"

The sample was first gently crushed/dispersed in deionized water. It was then given hot HCl acid washes to eliminate carbonates and alkali washes (NaOH) to remove secondary organic acids. The alkali washes were followed by a final acid rinse to neutralize the solution prior to drying. Chemical concentrations, temperatures, exposure times, and number of repetitions, were applied accordingly with the uniqueness of the sample. Each chemical solution was neutralized prior to application of the next. During these serial rinses, mechanical contaminants such as associated sediments and rootlets were eliminated. This type of pretreatment is considered a "full pretreatment". On occasion the report will list the pretreatment as "acid/alkali/acid - insolubles" to specify which fraction of the sample was analyzed. This is done on occasion with sediments (See "acid/alkali/acid - solubles"

Typically applied to: charcoal, wood, some peats, some sediments, textiles

"acid/alkali/acid - solubles"

On occasion the alkali soluble fraction will be analyzed. This is a special case where soil conditions imply that the soluble fraction will provide a more accurate date. It is also used on some occasions to verify the present/absence or degree of contamination present from secondary organic acids. The sample was first pretreated with acid to remove any carbonates and to weaken organic bonds. After the alkali washes (as discussed above) are used, the solution containing the alkali soluble fraction is isolated/filtered and combined with acid. The soluble fraction which precipitates is rinsed and dried prior to combustion.

"acid washes"

Surface area was increased as much a possible. Solid chunks were crushed, fibrous materials were shredded, and sediments were dispersed. Acid (HCl) was applied repeatedly to ensure the absence of carbonates. Chemical concentrations, temperatures, exposure times, and number of repetitions, were applied accordingly with the uniqueness of each sample. The sample, for a number of reasons, could not be subjected to alkali washes to ensure the absence of secondary organic acids. The most common reason is that the primary carbon is soluble in the alkali. Dating results reflect the total organic content of the analyzed material. Their accuracy depends on the researcher's ability to subjectively eliminate potential contaminants based on contextual facts.

Typically applied to: organic sediments, some peats, small wood or charcoal, special cases

"collagen extraction"

The material was first tested for friability ("softness"). Very soft bone material is an indication of the potential absence of the collagen fraction (basal bone protein acting as a "reinforcing agent" within the crystalline apatite structure). It was then washed in de-ionized water and gently crushed. Dilute, cold HCl acid was repeatedly applied and replenished until the mineral fraction (bone apatite) was eliminated. The collagen was then dissected and inspected for rootlets. Any rootlets present were also removed when replenishing the acid solutions. Where possible, usually dependant on the amount of collagen available, alkali (NaOH) was also applied to ensure the absence of secondary organic acids.

Typically applied to: bones

1

"acid etch"

The calcareous material was first washed in de-ionized water, removing associated organic sediments and debris (where present). The material was then crushed/dispersed and repeatedly subjected to HCl etches to eliminate secondary carbonate components. In the case of thick shells, the surfaces were physically abraded prior to etching down to a hard, primary core remained. In the case of porous carbonate nodules and caliche, very long exposure times were applied to allow infiltration of the acid. Acid exposure times, concentrations, and number of repetitions, were applied accordingly with the uniqueness of the sample.

Typically applied to: shells, caliche, calcareous nodules

"neutralized"

Carbonates precipitated from ground water are usually submitted in an alkaline condition (ammonium hydroxide or sodium hydroxide solution). Typically this solution is neutralized in the original sample container, using deionized water. If larger volume dilution was required, the precipitate and solution were transferred to a sealed separatory flask and rinsed to neutrality. Exposure to atmosphere was minimal.

Typically applied to: Strontium carbonate, Barium carbonate
(i.e. precipitated ground water samples)

"none"

No laboratory pretreatments were applied. Special requests and pre-laboratory pretreatment usually accounts for this.

"acid/alkali/acid/cellulose extraction"

Following full acid/alkali/acid pretreatments, the sample is rinsed in NaClO2 under very controlled conditions (Ph = 3, temperature = 70 degrees C). This eliminates all components except wood cellulose. It is useful for woods which are either very old or highly contaminated.

Applied to: wood

"carbonate precipitation"

Dissolved carbon dioxide and carbonate species are precipitated from submitted water by complexing them as amonium carbonate. Strontium chloride is added to the ammonium carbonate solution and strontium carbonate is precipitated for the analysis. The result is representative of the dissolved inorganic carbon within the water. Results are reported as "water DIC".

Applied to: water

2

EXPLANATION OF THE BETA ANALYTIC DENDRO-CALIBRATION PRINTOUT

CALIBRATION OF RADICARBON AGE TO CALENDAR YEARS

Variables used in the calculation of age calibration → **(Variables: C13/C12= :Delta-R= :Glob res= :lab. multi=1)**

Laboratory Number: Beta-12345

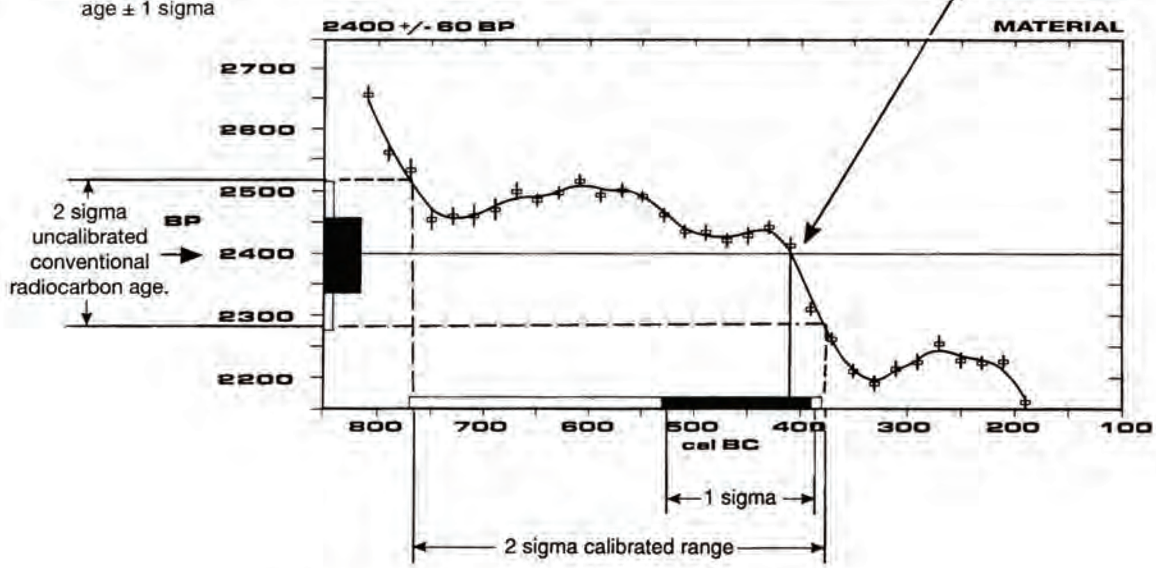
Conventional radiocarbon age: **2400 +/- 60 BP** — The uncalibrated conventional radiocarbon age (± 1 sigma)

The recommended calibration age range to be used for interpretation → **Calibrated result: (2 sigma, 95% probability)** **cal BC 770 to 380**

Intercept data:

Intercept of conventional radiocarbon age with calibration curve: cal BC 410 ← The intercept between the conventional radiocarbon age and the calibrated calendar time scale curve.

The calibration result of the conventional radiocarbon age ± 1 sigma → 1 sigma calibrated result: (68% probability) cal BC 530 to 390



References:

Pretoria Calibration Curve for Short Lived Samples

Vogel, J.C., Fuls, A., Visser, E. and Becker, B., 1993, Radiocarbon 35(l), p73-86

A Simplified Approach to Calibrating C14 Dates

Talma, A.S. and Vogel, J.C., 1993, Radiocarbon 35(2), p317-322

Calibration - 1993

Stuiver, M., Long, A., Kra, R.S. and Devine, J.M., 1993, Radiocarbon 35(l)

Beta Analytic, Inc., 4985 S.W. 74th Court, Miami, Florida 33155

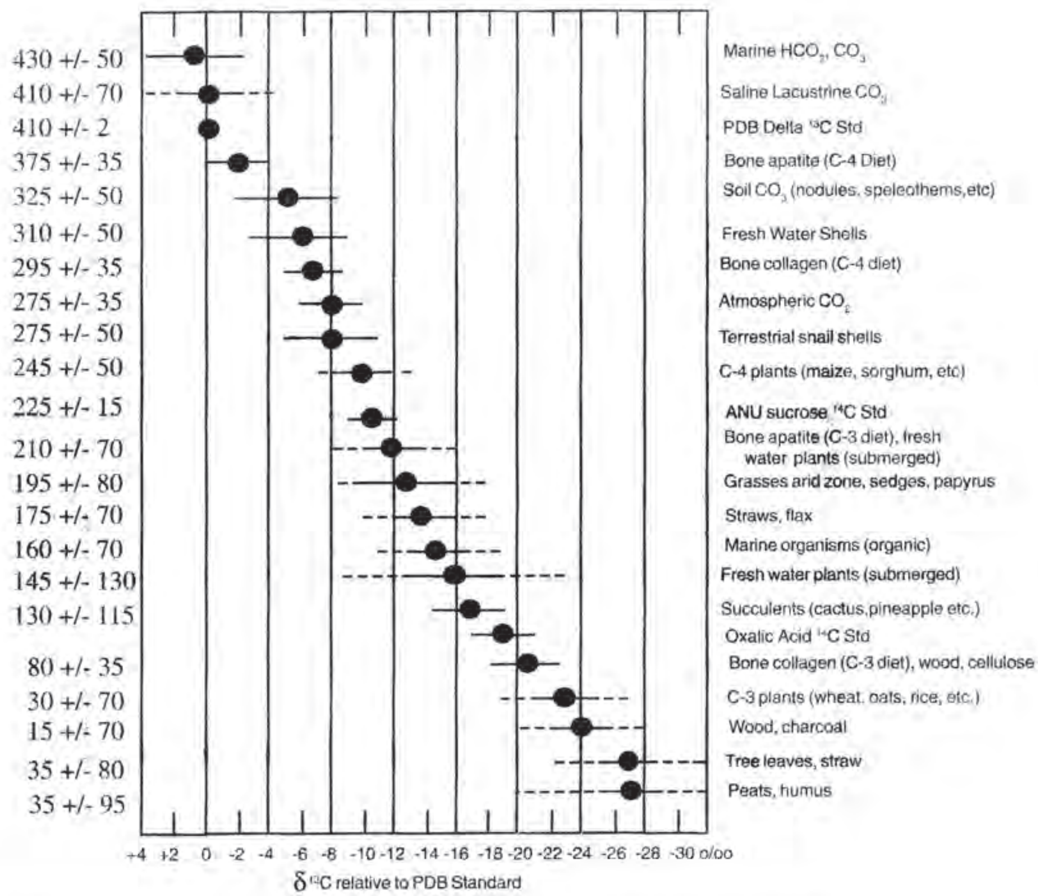
Reporting results (recommended):

1. List the conventional radiocarbon age with its associated 1 sigma standard deviation in a table and designate it as such.
2. Discussion of ages in the text should focus on the 2 sigma calibrated range.

Derivation of a radiometric or accelerator dendro-calibrated (CALENDAR) date requires use of the CONVENTIONAL radiocarbon date (Stuiver and Polach)[1]. The conventional date is a basic radiocarbon date that has been normalized to the modern standard through the use of $^{13}C/^{12}C$ ratios* (analyzed or estimated). The statistical error (+/-) on an analyzed $^{13}C/^{12}C$ value is quite small and does not contribute significantly to the combined error on the date. However, use of an estimated $^{13}C/^{12}C$ ratio for an unknown sample may incur a large combined error term. This is clearly illustrated in the figure below (Gupta & Polach:modifiec by J. Head)[2] where the possible range of $^{13}C/^{12}C$ values for a particular material type may be so large as to preclude any practical application or correction.

In cases where analyzed $^{13}C/^{12}C$ values are not available, we provide (for illustration) dendro-calibrations assuming a mean "chart" value, but without an estimated error term.

Where a sample carbon reservoir different from that modern oxalic acid/wood modern standard is involved (e.g. shell), further reservoir correction must be employed; the variables used in each calibration displayed on each individual calibration sheet.



[1] Stuiver, M. and Polach, H.A., 1977. Discussion: Reporting of 14-C data. Radiocarbon 19, 355-363.

[2] Gupta S.K. and Polach H.A., 1985, Radiocarbon Dating Practices at ANU Handbook, p. 114, Radiocarbon Laboratory, Research School of Pacific Studies, ANU, Canberra

*Radiocarbon is incorporated into various materials by different pathways and this introduces differing degrees of isotopic fractionation. The $^{13}C/^{12}C$ ratio of any material is the millesimal difference of the sample to the carbonate PDB standard and is directly related to the $^{14}C/^{12}C$ ratio. The degree of sample ^{14}C enrichment or depletion then is normalized to that of the modern standard.

Appendix 8: Example of the Subsistence Round by Members of a Shoshoni Village in Southeastern California

(quoted from Steward 1970 [1938]:80–83)

Koso Hot Springs Village, Little Lake, and Koso Mountains

This district, known as Kuhwiji, is a relatively large subsistence area, embracing about 1,000 square miles [2589 sq km] and centering in the Koso Mountains, where the greater precipitation in the Upper Sonoran and Transitional zones supported most of the important food plants, but including also the surrounding plains and eastern escarpment of the Sierra Nevada. The inhabitants, who lived in three winter villages, exploited the entire territory, but lacked sufficient intervillage cohesion to constitute a true band.

Subsistence Activities

The following sketch of seasonal activities is largely from the point of view of the inhabitants of the Koso Hot Springs Village [100 or more people]. In the winter they dwelt in pithouses, eating stored seeds and hunting rabbits. In April some families moved to Haiwee Springs, Hugwata, about 12 miles away, where they spent 1 or 2 months, finishing up any stored seeds and gathering greens. In June they usually went to Cold Spring, where a few people sometimes wintered and hunted rabbits. This hunting was done by individual men using spring-pole traps. Meanwhile, a few families sometimes joined together for a communal antelope hunt.

Antelope were most numerous in Indian Wells Valley, near Brown, about 10 miles south of Little Lake. There were also some just south of Owens Lake and at the northern end of Saline Valley. Drives near Brown involved mostly Little Lake Shoshoni and some Nawavite (probably Tubatulabal), their neighbors to the south. A few Saline Valley Shoshoni might participate, but the trip of nearly 75 miles was generally too long.

The antelope hunt director announced the hunt several days in advance. Antelope were driven by 8 or 10 men, perhaps aided by fire, into a corral built of posts spaced about 20 feet apart and covered with brush. The corral had a wide opening but no wings. As the animals milled around inside, archers stationed between the posts shot them. There was no shaman.

In midsummer some families might go into Saline Valley and occasionally into Death Valley to gather mesquite. They removed the seeds and ground the bean pulp into flour which could be readily transported. But if they had gotten any considerable surplus it was cached to be procured on subsequent trips.

Between July and September most families wandered in the Koso Mountains, which, lying in the zone of greatest plant growth, afforded many different seeds. They remained as near their winter villages as possible in order that trips during winter to seed caches should not be too long. But if certain species were sufficiently abundant elsewhere, they went several days' travel from the winter village to get them.

During September or October, if they were not already in the Koso Mountains, families ordinarily went there for pine nuts. Large crowds preferred to travel together on these trips, under the direction of the village chief. Sometimes the Koso Springs villagers joined the people from Uyuwumba, the Cold Spring village, and if the crop in that vicinity were unusually heavy they might even winter there. If the Koso Mountain yield were small, some families might go into the Panamint Mountains, where perhaps they kept company with Death Valley Shoshoni who had come for the same reason.

In the fall some families also went to Owens Lake to hunt ducks. Although a few minor rabbit drives were held during the summer, this was the season for large drives.

For large rabbit drives, families who happened to be in the vicinity of places with numerous rabbits cooperated. The main drives were at Rose Valley, Darwin Wash, the vicinity of Cold Spring, Little Lake, and Olancha. Visitors came from a convenient distance to join these. For example, people from Keeler came 25 miles and people from Saline Valley came perhaps 50 miles to Olancha, but Panamint Valley was too far away. Panamint people either had local drives or joined one closer to home.

In the drives they used one or two nets, each about 2 feet high and 100 or more feet long, propped at intervals with sticks. Eight or ten men beat the brush, driving the rabbits into the nets, while the owners remained behind their nets to dispatch the ensnared animals with clubs. There is some question about directors of these drives. BD thought district chiefs were in charge; GG that net owners were directors and divided the kill.

The annual round of food quest, which was scarcely sufficiently fixed to be a routine, varied in different ways. Mountain sheep might be hunted by individuals in the Koso Mountains or the Sierra Nevada and deer in the Sierra Nevada. Fish were taken in Rose Valley and, with poison, in Little Lake. Larvae were procured in Owens Lake. Caterpillars (piuga) could be had on the ground around Koso Springs, Little Lake, and elsewhere. Other animals eaten were bear, badger, chuckwalla, gopher, mice, rats, doves, eagles, hawks, crows, snakes, mountain lions, wildcats, but not coyotes, wolves, frogs, magpies, or grasshoppers. To vary the vegetable diet, acorns might be procured from the eastern foot of the Sierra Nevada.

Relative scarcity of animals made meat a minor food. Dried rabbits would not keep over 2 weeks. Large game meat, cut into thin slices and dried in trees, would keep longer but was usually consumed quickly. Hunting was of relatively greater importance during seed shortage, but considerable reliance was placed on rodents. Even in good years stored seeds rarely lasted more than a year. GG's grandmother recalled a period of several months when a complete lack of seeds, rabbits, or other important foods caused several deaths.

Appendix 9: Small, Radiocarbon-Dated Thermal Features in Southeastern New Mexico

Table A9.1 includes most published radiocarbon dates on small thermal features for southeastern New Mexico sites east of the Capitan, Sierra Blanca, Sacramento, and Guadalupe Mountains. Several sites that produced radiocarbon dates have been omitted because of the lack of descriptions in published work that would allow them to be assigned to the categories used here. Very large burned-rock features such as annular middens (also known as agave roasters, midden circles, mescal pits, etc.) are not included.

Table A9.1. Small, radiocarbon-dated thermal features in southeastern New Mexico

Site Number	Radiocarbon Age	Calibrated Intercept	Lab Number	Publication
		Small Nonrock Thermal Features		
LA 110956	-	5425 BC	Beta-	Brown 1998
ENM 10418	880 BC	-	TX-5023	Lord et al. 1985
LA 38264	840 BC	915 BC	Beta-122664	Wiseman 2009
LA 49226	740 BC	-	-	Kyte 1984
ENM 10418	170 BC	-	TX-5011	Lord et al. 1985
LA 36566	30 BC	-	-	Oakes 1985
LA 38264	AD 80	AD 135	Beta-122665	Wiseman 2009
ENM 10418	AD 210	-	TX-5016	Lord et al. 1985
ENM 10418	AD 230	-	Beta-10463	Lord et al. 1985
LA 22112	-	AD 245	Beta-	Staley 1996
LA 22112	-	AD 260	Beta-	Staley 1996
LA 22112	-	AD 260	Beta-	Staley 1996
LA 22112	-	AD 330	Beta-	Staley 1996
ENM 10418	AD 340	-	Beta-10470	Lord et al. 1985
LA 22112	-	AD 410	Beta-	Staley 1996
LA 22112	-	AD 420	Beta-	Staley 1996
ENM 10418	AD 520	-	TX-5021	Lord et al. 1985
LA 22112	-	AD 550	Beta-	Staley 1996
LA 44794	AD 558	-	-	Main 1992
ENM 10230	AD 580	-	TX-5031	Lord et al. 1985
	AD 670	-	TX-5030	Lord et al. 1985
LA 106730	-	AD 635	Beta-	Staley 1996
LA 144606	-	AD 650	Beta-	Straight and Simpson 2004
LA 109920	-	AD 665	Beta-	Staley 1996
LA 32276	AD 700	-	Teledyne	Joyce and Landis 1986
LA 144606	-	AD 710	Beta-	Straight and Simpson 2004
LA 54388	AD 740	-	U. of Texas	Earls and Bertram 1987
	AD 810	-	U. of Texas	Earls and Bertram 1987
	AD 1000	-	U. of Texas	Earls and Bertram 1987
LA 109927	-	AD 770	Beta-	Staley 1996
LA 109292	-	AD 800	Beta-	Staley 1996
LA 106730	-	AD 855	Beta-	Staley 1996
LA 109292	-	AD 865	Beta-	Staley 1996
LA 22107	-	AD 880	Beta-	Staley 1996
LA 18400	-	AD 885	MASCA	Parry and Speth 1984
LA 109927	-	AD 885	Beta-	Staley 1996
LA 8053	AD 790	AD 885	Beta-122662	Wiseman 2009
LA 22107	-	AD 890	Beta-	Staley 1996
LA 8053	AD 850	AD 975	Beta-122661	Wiseman 2009
LA 26363	-	AD 975	Beta-	Zamora 2000
LA 36564	AD 890	-	-	Oakes 1985
LA 54388	AD 890	-	U. of Texas	Earls and Bertram 1987
	AD 910	-	U. of Texas	Earls and Bertram 1987
	AD 920	-	U. of Texas	Earls and Bertram 1987
LA 36564	AD 940	-	-	Oakes 1985
LA 8053	AD 950	AD 1020	Beta-122655	Wiseman 2009
LA 36565	AD 990	-	-	Oakes 1985
LA 103523	AD 990	AD 1035	Beta-88600	Kemrer 1998
LA 116469	AD 990	AD 1035	Beta-118885	Wiseman 2003
LA 116469	AD 990	AD 1035	Beta-118884	Wiseman 2003
LA 116469	AD 1000	AD 1040	Beta-118887	Wiseman 2003
LA 8053	AD 1020	AD 1055/1090/1150	Beta-122656	Wiseman 2009
LA 36565	AD 1030	-	-	Oakes 1985
LA 131361	AD 1030	AD 1060/1080/1150	Beta-176993	Gibbs 2003
LA 38264	AD 1030	AD 1065/1076/1155	Beta-122663	Wiseman 2009
LA 8053	AD 1070	AD 1180	Beta-122660	Wiseman 2009
LA 8053	AD 1090	AD 1205	Beta-122657	Wiseman 2009
LA 22107	-	AD 1215	Beta-	Staley 1996
LA 36566	AD 1240	-	-	Oakes 1985
ENM 10230	AD 1310	-	TX-5037	Lord and Reynolds 1985
ENM 10418	AD 1420	-	Beta-10466	Lord and Reynolds 1985
LA 116467	AD 1530	AD 1455	Beta-118881	Wiseman 2003
Garza Hearth	-	AD 1640	MASCA	Parry and Speth 1984
LA 6825	AD 1680	AD 1645	Beta-82889	Wiseman 1996
LA 6825	AD 1710	AD 1654	Beta-82890	Wiseman 1996
LA 44565	AD 1810	AD 1690/1735/1815/1925	Beta-118880	Wiseman 2003
LA 38264	AD 1840	AD 1825/1835/1880/1915	Beta-118876	Wiseman 2009

Table A9.1 (continued). Small, radiocarbon-dated thermal features in southeastern New Mexico

Site Number	Radiocarbon Age	Calibrated Intercept	Lab Number	Publication
		Small Rock Thermal Features		
X29ED13	4034 BC	-	Tx-2285	Gallagher and Bearden 1980
LA 38276	2687 BC	-	-	Katz and Katz 1985
LA 26363	-	2280 BC	-	Zamora 2000
LA 38264*	1640 BC	1920 BC	Beta-118875	Wiseman 2009
LA 38264*	1500 BC	1475 BC	Beta-122666	Wiseman 2009
LA 48761	1207 BC	-	-	Katz and Katz 1985
ENM 10222	1140 BC	-	TX-5040	Lord and Reynolds 1985
LA 131875	1100 BC	1310 BC	Beta-176994	Gibbs 2003
LA 38233	1080 BC	-	-	Katz and Katz 1985
LA 112349	1020 BC	1170 BC	Beta-122668	Wiseman 2009
LA 38264	1000 BC	1135 BC	Beta-122874	Wiseman 2009
LA 112349	950 BC	1045 BC	Beta-122667	Wiseman 2009
LA 38233	887 BC	-	-	Katz and Katz 1985
LA 38264	880 BC	980 BC	Beta-118877	Wiseman 2009
LA 38233	829 BC	-	-	Katz and Katz 1985
LA 38233	720 BC	-	-	Katz and Katz 1985
LA 38233	579 BC	-	-	Katz and Katz 1985
LA 131346	540 BC	760/640/560 BC	Beta-176991	Gibbs 2003
LA 75163	530 BC	760/680/550 BC	Beta-156283	Polk et al. 2004
LA 38233	444 BC	-	-	Katz and Katz 1985
LA 34150	-	370 BC	MASCA	Maxwell 1986
LA 8053	280 BC	355/290/230 BC	Beta-122654	Wiseman 2009
LA 22112	-	240 BC	Beta-	Staley 1996
X29ED9	56 BC	-	SMU-375	Gallagher and Bearden 1980
X29ED6	AD 30	-	SMU-388	Gallagher and Bearden 1980
LA 22112	-	AD 70	Beta-	Staley 1996
LA 22112	-	AD 100	Beta-	Staley 1996
LA 48756	AD 193	-	-	Katz and Katz 1985
LA 22112	-	AD 240	-	Staley 1996
ENM 10230	AD 260	-	TX-5033	Lord and Reynolds 1985
ENM 10418	AD 300	-	TX-5015	Lord and Reynolds 1985
LA 38233	AD 310	-	-	Katz and Katz 1985
ENM 10418	AD 360	-	TX-5010	Lord and Reynolds 1985
LA 130467	AD 250	AD 370	Beta-176990	Gibbs 2003
LA 22107	-	AD 395	Beta-	Staley 1996
LA 34150	-	AD 530	MASCA	Maxwell 1986
ENM 10418	AD 430	-	Beta-10469	Lord and Reynolds 1985
LA 116469	AD 430	AD 560	Beta-118883	Wiseman 2003
LA 38233	AD 448	-	-	Katz and Katz 1985
ENM 10418	AD 490	-	TX-5020	Lord and Reynolds 1985
LA 116469	AD 570	AD 600	Beta-122886	Wiseman 2003
ENM 10418	AD 600	-	TX-5014	Lord and Reynolds 1985
X29ED13	AD 627	-	SMU-311	Gallagher and Bearden 1980
ENM 10418	AD 660	-	TX-5018	Lord and Reynolds 1985
ENM 10418	AD 680	-	Beta-10464	Lord and Reynolds 1985
LA 34150	-	AD 740	MASCA	Maxwell 1986
LA 75163	AD 710	AD 780	Beta-156284	Polk et al. 2004
LA 38264*	AD 710	AD 785	Beta-118874	Wiseman 2009
LA 109291	-	AD 785	Beta-	Staley 1996
LA 22107	-	AD 975	Beta-	Staley 1996
LA 107625	-	AD 985	Beta-	Phippen et al. 2000
LA 14810	AD 1025	-	U. of Georgia	Beckett et al. 1977
LA 8053	AD 1030	AD 1065/1075/1155	Beta-122658	Wiseman 2009
ENM 10418	AD 1190	-	TX-5017	Lord and Reynolds 1985
LA 48756	AD 1196	-	-	Katz and Katz 1985
ENM 10418	AD 1270	-	TX-5013	Lord and Reynolds 1985
ENM 10418	AD 1450	-	TX-5019	Lord and Reynolds 1985
LA 38276	AD 1495	-	-	Katz and Katz 1985
LA 12762	AD 1510	AD 1440	Beta-176987	Gibbs 2003
ENM 10418	AD 1610	-	Beta-10465	Lord and Reynolds 1985
ENM 10418	AD 1730	-	TX-5012	Lord and Reynolds 1985

*These three dates (cal 1920 BC, cal 1475 BC, and cal AD 785) are from the same feature, TF-6; one or more dates may be incorrect, or all two or three might represent one or more reuses of the feature.

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