1991

Archaic milling cultures of the southern San Francisco Bay region

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Order Number 1344261

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San Jose State University, 1991

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ARCHAIC MILLING CULTURES OF THE SOUTHERN SAN FRANCISCO BAY REGION

A Thesis

Presented to

The Faculty of the Department Social Sciences

San Jose State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

By

Richard Thomas Fitzgerald Jr.

May, 1991

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ABSTRACT

ARCHAIC MILLING CULTURES OF THE SOUTHERN
SAN FRANCISCO BAY REGION

by Richard T. Fitzgerald Jr.

This thesis documents evidence of an aboriginal subsistence pattern that was in use during the archaic period of California prehistory. This economic focus, based upon the collection and processing of vegetal foods via stone tools known as "milling stones," forms the second stage of a three part scheme explaining the development of California's prehistoric hunters and gatherers. The existence of this stage has been hypothesized for the San Francisco Bay region, yet no direct evidence has ever been documented. Data from three archaeological sites in the southern San Francisco Bay region are examined in order to reveal the presence and nature of this archaeological pattern. The identification of a milling stone complex in the bay region and its implications upon Central California archaeology are discussed.

ACKNOWLEDGMENTS

There are many individuals who contributed to this thesis. Starting from the top I would like to thank my committee members for their guidance and patience helping me through this project. A special thanks to Dr. W. R. Hildebrandt whose ideas, enthusiasm, and work ethic made this thesis possible. Thanks are also in order to the following people for contributing their time and expertise to this project: Tom Origer (obsidian hydration), John Holson (x-ray floresence) Dr. R. Cartier (access to data), Rusty VanRossman, Scotty Thompson, and Jerry Doty (art work, maps, and graphics), Dr. C. King (mapping and general information on SCl-65), Dr. T. Layton (lab assisitance), Terry Jones (projectile points), Dr. J. Bennyhoff (special artifact analysis), Dr. D. Fredrickson (theory and sound advice), and Drs. B. Gerow and J. Hester (theory), and to my colleagues at San Jose State, including J. Hall, M. Hylkema, A. Leventhal, J. Lopez, and J. Nelson all who helped in the completion of this thesis. Thanks also go out to G. Gmoser, J. Benson, and J. Angell for their help and friendship. This thesis is dedicated to N. Fitzgerald who endowed me with her keen intellectual curiosity, to S. Fitzgerald and his indomitable courage and to I. Merkyte, for every thing she does is magic.

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CHAPTER I

INTRODUCTION

Singuliere fortune ou le but se deplace,
Et, n'etant nulle part, peut etre n'importe ou !

Charles Baudelaire

Beyond the primary goal of chronologically ordering California prehistory lies the necessity of reconstructing the evolution of aboriginal subsistence systems and settlement patterns.

In the effort to document the shifts of settlement and economic mode amongst California's hunter and gatherers, much attention has been given to a series of technological changes evident within the archaeological record. The first appearance of large numbers of food grinding implements in archaeological sites dated between 7,000 and 5,000 years before present is thought to be indicative of a fundamental change in the subsistence strategies of early California Indians. These tools are thought to represent the change from a primary hunting subsistence to a greater reliance upon collecting and processing plant foods.

Sites containing numerous groundstone tools were first discovered along a wide coastal strip from Santa Barbara county to San Diego county. Similar sites have also been identified in the North Coast Ranges, the southern San Joaquin Valley and the Sierra Nevada. Wallace (1955, 1978) has grouped these sites under the rubric milling stone cultures or the " Milling Stone Horizon."

This shibboleth is believed to represent the basic transition from a predominantly hunting subsistence strategy to a greater reliance upon plant collecting and processing. The hallmark of this hypothesized economic shift is the presence of manos and metates (handstones and milling slabs) used primarily to grind small hard seeds into edible forms.

In many sites across California these tools are found stratigraphically below mortars and pestles, and thus are thought to be associated with an economic pattern that preceded the labor intensive balanophagous economic mode. Because milling stone cultures have ascendancy in theoretical models of settlement-subsistence pattern change in California archaeology, documentation of their existence or nonexistence in the archaeological record is fundamental to evaluating such perspectives regarding the development of prehistoric cultures in central California.

Many California archaeologists (Baumhoff and Olmsted 1963, King and Hickman 1973, True, Baumhoff and Hellen 1979) have suggested the presence of a milling stone pattern for central California, yet concrete proof of a pre-acorn milling based economy has not been fully documented. Elsasser (1986), in a recent review of the prehistory of the Santa Clara Valley, states that there is a need to discover sites:

> . . .which show the supposed transition from the 'Millingstone' or other culture pattern possibly representing Hokan speakers to one indicating an intensive acorn processing economy...(1986:22).

The conspicuous absence of documented archaic milling stone pattern sites in central California raises an important question. Does the milling stone pattern really represent a widespread broad spectrum adaptation or is it a phenomenon isolated spatially and temporally to certain ecological niches within California?

The importance of this question is twofold. First, if milling cultures are widespread, this would support the notion that they represent an important type of hunter/gatherer adaptation in the evolution of the culture history of California. Second, if milling cultures are not widespread, then documentation of their absence may illuminate causal factors in the areas where they did develop, as well as provide clues as to why they failed to appear elsewhere in the state.

In either case, explanations relating to the rise of cultural complexity among native groups cannot progress without a fuller understanding of the economic systems that preceeded the acorn-based economies so prevalent throughout much of California.

Statement of Purpose

The purpose of this study is twofold. The first is to examine data from three sites (SCl-65, SCl-178, [Hildebrandt 1983], and SCr-177, [Cartier 1984]), in the southern San Francisco Bay area in an attempt to indentify temporally discrete archaeological components which exemplify a subsistence strategy based primarily on the collection of non-acorn vegetal foods. Particular attention will be given to SCl-65, as its extensive assemblage has not been previously reported. Site SCl-65 (also know as the Saratoga site) and its large groundstone collection will be described and then compared to assemblages derived from SCl-178 and SCr-177. Based on these data, the second goal is to determine how the settlement/subsistence patterns reflected at the three sites compare with established chronological, cultural, and temporal framework within the greater San Francisco Bay Region. In addition, data from the three sites will be compared to assemblages outside of the region thought to represent subsistence strategies reliant upon the milling of hard seeds and other vegetal foods.

In order to accomplish these goals, the following discussion has been organized into seven chapters. Chapter II contains three parts. The first part focuses on the history of the research and the nature of the milling stone cultures in southern California. This is followed by a review of the literature regarding the milling stone cultures of Northern and Central California. The final part first identifies research issues and concerns based on the review of the literature, and then proposes a research design that will be used to evaluate data from the three sites.

Chapter III describes the environmental settings of the three sites under study. The observed differences between the environments serves as an important guide in determining the probable function of certain tools, which in turn indicates the settlement pattern in use.

In Chapter IV a brief history of the excavations of each of the three sites under study is reviewed. Chapter V outlines the methods used to analyzed the tools, while Chapter VI presents the overall results of the study. In this chapter the artifacts are described *sans* chronological order. The placement of the artifacts into chronological order is attempted in Chapter VII where data from the preceding chapter are used to address the issues originally defined in the research design.

CHAPTER II

RESEARCH ORIENTATION

Archaic Milling stone Patterns of Southern California

Although there is great variability among the assemblages found in the milling stone sites of southern California, there is a general consensus that when viewed *en masse* they reflect a dietary adaptation focused upon the collection and processing of vegetal resources (Basgall and True 1985, Corum 1977). Many questions exist as to what these vegetal resources were and to what degree of importance other foods might have played in the daily diet. However, these questions aside, the importance of plant or seed processing is attested to by the numerous sites found along the coast and interior of southern California that contain overwhelming percentages of ground stone tools versus chipped stone tools.

The concept of a milling stone pattern or "horizon" coalesced over many years as milling sites were uncovered and then placed into regional complexes and/or cultures by several generations of archaeologists. The first archaeologists to formally and systematically investigate milling stone sites were Malcolm Rogers, and David B. Rogers. In the early 1920s Malcolm Rogers working along the San Diego coast found many shell midden sites full of milling equipment. Rogers attributed these tools to the "Shell Midden People," which in a later publication he renamed the "La Jolla complex" (Rogers 1945). Later in the same decade D.B. Rogers' work in Santa Barbara county proposed a tripartite cultural sequence that had as its basal unit a milling stone assemblage not unlike that found by Malcolm Rogers in the San Diego area. D.B. Rogers named this assemblage "Oak Grove" in part based on his assumption that acorns were the main focus of subsistence as reflected by the "evident fondness of this group for the shadows of an oak forest as a location for their villages" (Rogers 1929: 343).

Following the work of these two researchers many more sites were found to contain a pattern similar to those described for the Santa Barbara and San Diego areas. Notably the work of Walker (1937, 1951) at Malaga Cove and Porter Ranch, as well as Heizer and Lemert (1946) and Treganza and Malamud (1950) in Topanga Canyon. Morever, True (1958) in the interior of San Diego County, Peck (1955) at Zuma Creek, and Wallace (1954) at the Little Sycamore site all contributed to the formalization of the concept of a "Milling Stone Horizon" (Basgall and True 1985). Drawing upon this ample evidence William Wallace in 1955 published a paper titled "A suggested chronology for southern California coastal archaeology" in which he set forth a preliminary chronology for southern California prehistory.

Wallace divided the prehistory into four different horizons: Early Man, Millingstone Assemblages, Intermediate Cultures, and Late Prehistoric Cultures. From his discussion of the milling stone assemblages the term "Milling Stone Horizon" has come to be recognized as a phrase defining a widespread expression of a certain lithic assemblage characterized by core and cobble tools (especially handstones), and various forms of milling stones and mullers. As Warren notes, this synthesis marked "a turning point in southern California archaeology" (Warren 1968:1). Wallace's specific details of the prehistory have been changed by the sheer weight of accumulated data, but his recognition of the milling stone pattern has had a lasting effect on all of California archaeology. Specifically, Wallace's concept is in concert with and is cited as proof for the general notion that archaic cultures adjusting to changing environmental conditions and population expansion, began to utilized plant resources to a greater extent than earlier Paleoindian peoples (Willey and Phillips 1958, Cohen 1977). Wallace's publication stands as a lasting contribution to California archaeology because it brought into focus an area of research of great significance to the prehistory of the state. It seems prudent, however, that before addressing the role of milling stone patterns in California archaeological theory, further definition of its many manifestations is required.

Four major divisions have been formulated for the milling stone patternin California, each more or less confined to a particular region. They include the previously mentioned Oak Grove culture for the Santa Barbara Channel area and the La Jollan Complex for the coastal areas around San Diego. The remaining two are the Topanga Complex for Ventura and Los Angeles counties, and the Pauma Complex found in the interior of San Diego county. The milling stone patterns from these four regions have been termed the "Encinitas Tradition" by Warren (1968) as is discussed in more detail below. In Basgall and True's (1985) review of this tradition a fifth group was added by subdividing the Ventura- Los Angeles area into a "Central Coastal Region" and a "Topanga and Interior Los Angeles County Region." This distinction between the interior and the coastal sites of the milling stone cultures is important in examining the variability of milling stone pattern and thus is included in the review of the Encinitas Tradition.

Figure 1 locates these five major regions of the milling stone pattern and specifies some of the principal sites for each. Table 1, provides selected dates from sites within each of the five regions identified in Figure 1.

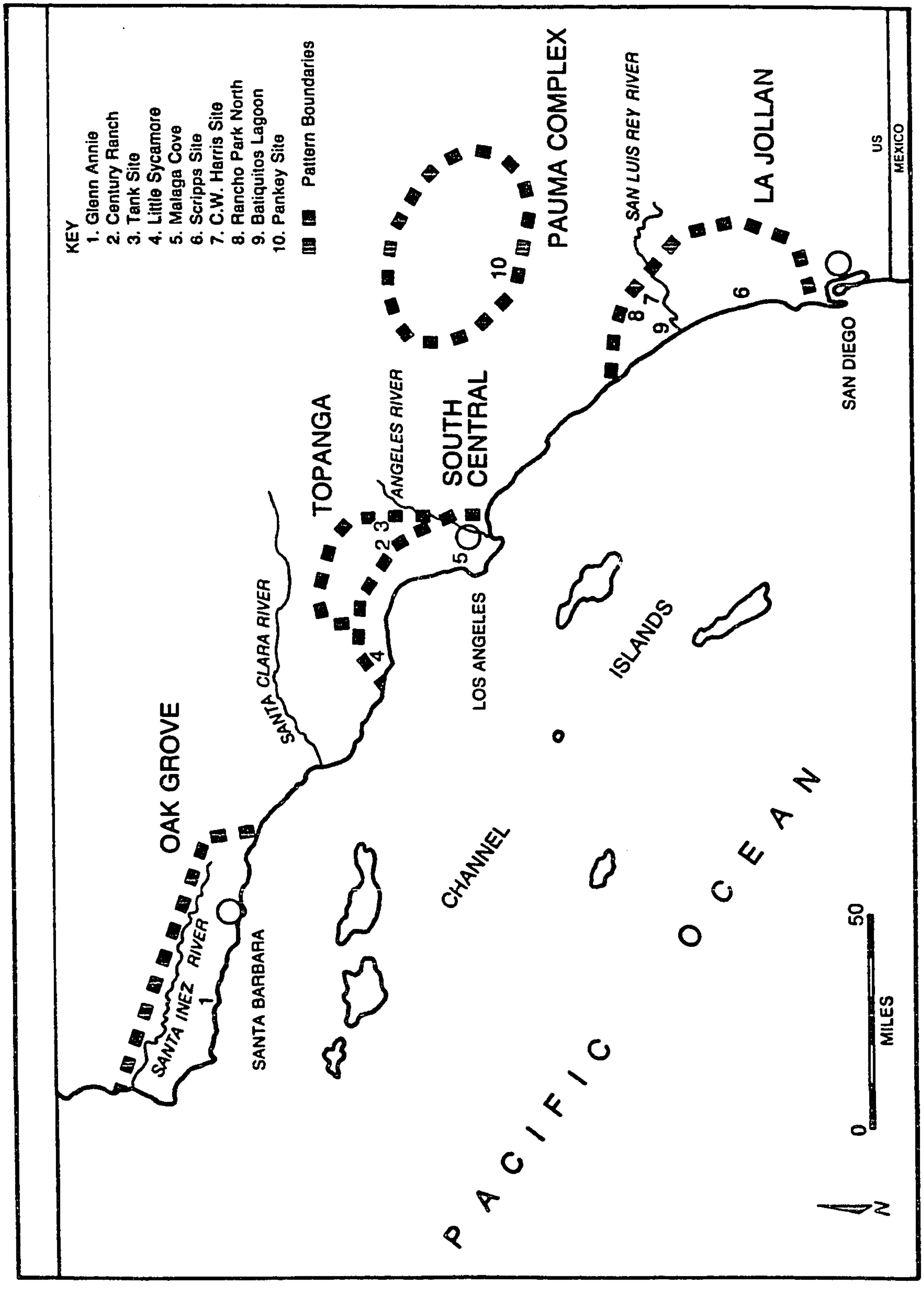


Figure 1. Milling Stone Boundaries of Southern California and Selected Sites.

Table 1: Selected dates for southen California Millingstone sites

REGION	SITE	AGE B.P.	REFERENCE
Oak Grove	Glen Annie	6880 +/-12	Basgall & True (1985)
Oak Grove	SLO-585	7320 +/-170	Greenwood (1972)
Topanga	Tank II	2700 +/-150	Basgall & True (1985)
S.C. Coast	Malaga Cove	6510 +/-200	Basgall & True (1985)
S.C. Coast	Lt. Sycamore	6960 +/-100	Basgall & True (1985)
S.C. Coast	Zuma Creek	4950+/-200	Basgall & True (1985)
La Jollan	Scripps E.	5740 +/-140	Shumway (1961)
La Jollan	Rancho P.N.	6900 +/-280	Kaldenberg (1982)
La Jollan	C.W. Harris	6300 +/-290	Warren & True (1961)
La Jollan	Batiquitos L	6250 +/-150	Basgall & True (1985)

KEY: S.C.= southcentral, Lt.= Little, E.=Estate
Rancho P. N. = Rancho Park North,
Batiquitos L = Batiquitos Lagoon site SDi-663,
AGE B.P. = Years Before Present

The Oak Grove Pattern

The area occupied by the Oak Grove Pattern is bounded by the mainland of Santa Barbara with ill defined boundaries to the south and west. In the south the boundary is ambiguously drawn through central Ventura County. There are some indications that, this pattern may extend as far north as Morro Bay in San Luis Obispo County. An examination of the principal published works concerning the Oak Grove Pattern (Greenwood 1969, Olson 1930, Orr 1943, Owen 1964a, and Rogers 1929) indicates that besides the ubiquitous presence of milling tools, there are numerous questions concerning the composition of Oak Grove assemblages. The variability found in the Oak Grove material culture is partially the result of a lack of published quantitative data for comparative studies. What is apparent is the extensive use of large deep-basined milling blocks with either elongated, elliptical or oval depressions. The ratio of handstones to milling stones is reported by Rogers (1929) to be 2 : 1, and as high as 7.3 : 1 at the Brown site (Greenwood 1969). Other significant elements of Oak Grove include a scarcity of both projectile points, and ornaments, a general absence of mortars and pestles, and the presence of cairn like features often associated with burials. In this regard Rogers noted that:

> ...at the level which marked the surface at the time of the burial, is usually found an aggregation of stones that once served as a grave marker. These markers were doubtless, at one time at the surface, but owing to the settling of the graves and the subsequent accumulation of debris above them, they are now at varying depths below the present surface. (1929:346-7)

Rogers also found that the cairns are frequently made of "objects of household use" (Rogers 1929:347). In other words, handstones and whole and fragmentary milling stones. Another significant pattern, according to Rogers was the use of single metates to cover the deceased. He also remarked on the abundance of red ochre staining the soil around the burials. The burial position recorded by Rogers was extended. This contrasts with the burials found at the Glen Annie site (CA-SBa-142), as reported by Owen (1964). Owen describes the burials he unearthed as loosely flexed. Greenwood found no consistent burial posture at the Brown Site (CA-Ven-150) amongst the 14 burials excavated. This issue may or may not be of significance to the pattern as a whole. The dated early presence of ornaments made of steatite, and shell beads at the Glenn Annie site, and CA-SBa-552 (Martz 1976), are problematic in regards to the Oak Grove pattern as a whole. More typical for Oak Grove is the presence of stoneballs.

A final consideration on the Oak Grove Pattern is the role shellfish and terrestrial and marine mammals played in subsistence.

The traditional view as espoused by Rogers (1929) is that neither shellfish nor faunal remains were as significant in the Oak Grove deposits as they were in the later Hunting or Canalino periods. This is in marked contrast to the contemporaneous milling stone assemblages further south. Problems of preservation and recovery technique probably account for the lack of shellfish remains in Rogers' original fieldwork. Recent research (Erlandson 1985, 1998a, and Glassow et al. 1987) reveals that extensive environmental changes played an important role in dictating the availability and composition of the shellfish communities. This research has also resulted in a number of new radiocarbon assays (discussed below) derived from shellfish remains that indicate shellfish exploitation is coeval with the other milling stone patterns to the south.

This new data seems to support the traditional view that hunting was a of secondary importance to the subsistence strategies of the Oak Grove pattern by the general crudity and/or lack of hunting related tools found in Oak Grove sites. Erlandson, citing new data from the Santa Barbara area suggests that:

> ...systematic shellfish and seed collection predates intensive deer hunting, sea mammal hunting, or fishing (and) ...in combination may have proved a unique and balanced nutritional strategy. (1988a:10)

Topanaga Complex and South-Central Coastal Milling Sites

The Topanaga Complex derives its name from two well documented sites located in Topanga Canyon (see Figure 1), in the Santa Monica Mountains, "which in aboriginal times was probably one of the major routes from the San Fernando Valley to the coast" (Heizer and Lemert 1947:237). The excavated materials from these two sites (CA-LAn-1 and LAn-2) form one of the best samples of milling stone manifestations for the entire pattern. The Topanga Complex sites are generally located within the mountains inland from the coast in Los Angeles county. Following Basgalls and True's (1985) division of milling stone sites, these sites are grouped by their non-littoral setting. A review of the major published works on these sites (Heizer and Lemert 1947; Johnson 1966; Treganza 1950; Treganza and Bierman 1958; Treganza and Malmud 1950) reveals that the major elements found in in the Topanga Complex are consistent with those of the Oak Grove pattern, yet significant differences do exist. A partial reason for the dissimilarity between the patterns lies with the disparity of time periods being compared. The only existing dates for the Topanga pattern come from LAn-2 site which are 2450 +/- 150 and 2700 +/- 150 B.P. The "Tank site" (LAn-1) remains undated but its basal level is widely believed to be nearly coeval with the Oak Grove pattern. The items that are held in common are grinding equipment in the form of handstones and three forms of milling stones, including deep basin, shallow basin, and slab forms. Other shared traits are hammer stones, choppers, scraper planes, crude bifaces, projectile points, and a few mortars and pestles. Also, there exists strong similarities in regards to features comprised of piles of rocks, and groundstone artifacts often associated with burials. These aggregates of rocks often include inverted "metates" placed over reburied remains, as well as core tools, hammer stones, and the ubiquitous handstones. Johnson (1966), who examined the materials from the LAn-2 site, noted a similar pattern of large aggregates of rock. These aggregates consisted of mostly unmodified rock or thermally affected rock with artifacts being rare or absent compared to LAn-1. Other sites within the Topanga Complex which share this pattern of rock aggregates or stone cairns include Century Ranch (King et al. 1968), Porter Ranch and the Chatsworth site (Walker 1951). The Porter Ranch, site in particular contained a remarkable group of cairns comprised of dozens of whole and fragmented milling slabs. The cairns were thought by Walker to be some kind of ceremonial area devoid of any burial association. There were, however "killed metates...and tiny fragments of human skull and arm and leg-bones" (Walker 1951:26) under at least one cairn.

More bones may have been present but were not found due to the lack of screening. As with the Oak Grove pattern there seem to be several burial modes represented in the Topanga Complex.

<u>The SouthCentral Coastal Sites</u>

The many sites of this region are located directly along the coast from southern Ventura county to Los Angeles county. These sites do not necessarily represent a significantly different culture from those of equal age on the interior, but as Basgall and True point out, they may reflect a different subsistence regime due to their proximity to coastal resources. The sites of Malaga Cove (Walker 1937; 1951), Zuma Mesa (Ruby 1961b), Zuma Creek (Peck 1955), Parker Mesa (King 1962), Sweetwater Mesa (King 1967) and the Little Sycamore (Wallace 1954) are the principal sites of this region.

The inventory of tools found at each of these sites does not vary greatly from the interior sites of the Topanga Complex. The usual assemblage of milling tools, cogged stones, stone discodials, stone balls, scrapers, choppers, planes, hammerstones and a few bifaces and projectile points were found at these coastal sites. Those sites which contained burials were found to have similar patterns (flexed and extended) generally with cairns as with the sites on the interior. In Level 2 at the Malaga

Cove site a number of cairns were found where to contain, "a few human bones" (Walker 1951:53). Walker held these bones to be mostly reburials. An unusual platform cairn of 110 stones and artifact fragments along with eight associated cairns each containing broken artifacts and small stones were also found by Walker. Peck (1955) found only six burials at Zuma Creek, two having associated milling equipment as grave markers or goods. At the Little Sycamore site Wallace documented that "the placing of stones over corpses was general, having been reported for ten of the fifteen internments" (Wallace 1954:35). Many of the burials were reburials, and Wallace also found that millingstones were the most frequently used to cover the dead. As with the Topanga Complex several of burial positions were found at these coastal sites with no consistent burial pattern apparent.

La Jollan Complex

Further to the south along the southern California coast another seafood and plant gathering culture has been well documented. As mentioned in the introduction of this chapter these "Shell midden People" were first discovered by Malcolm Rogers (1929), who changed this appellation in a subsequent publication to "La Jollan" (Rodgers 1945). Rodgers divided La Jollan Complex into two parts: La Jollan 1, and La Jollan 2. According to Rogers, La Jollan peoples possessed an impoverished material culture consisting of a heavy core-cobble technology, basined metates and unshaped handstones. Rogers saw the transition from La Jollan 1 to La Jollan 2 marked by improved flaked stone tools and greater care in the burial of the dead. Further definition of the La Jollan Complex has been subsequently provided by a number of sites excavated along or near the San Diego coast. Prominent amongst those sites excavated and identified as containing La Jollan components are the Scripps site (Shumway et al. 1961), two sites located at the Batiquitos Lagoon SDi-211 and SDi-603 (Crabtree et al. 1963), Rancho Park North (Kaldenberg 1982), and the C.W Harris site (Rogers 1939, Warren 1966).

These sites all contain large numbers of seed and plant processing tools in the form of handstones and milling slabs--with deep and shallow basins--as well as cobble core tools. Many of these cobble tools are scraper planes apparently used to process vegetal resources. Also diagnostic for the La Jollan Complex are stone balls, and perforated and imperforate discoidals. A small number of well formed domed scrapers are also found in La Jollan, sites which are problematic due to to their frequent association with the San Dieguito material culture.

The San Dieguito complex represents a generalized Paleo-Indian hunting tradition possessing an array of skillfully executed chiped tools, including knives, leaf shaped points, crescents, and several types of scrapers, found mostly as surface sites along now-extinct streams, lake shores, and playas (Hector et al.1987, Kaldenberg 1976, Warren and True 1961,). The chronological placement of San Dieguito is considered contemporaneous with other early lithic traditions such as the Lake Mojave /Silver Lake Tradition 11,000-8000 B.P.), as well as other lithic assemblages found in the interior deserts of southwestern United States. Significantly, San Dieguito lacks milling equipment, or it is extremely rare, supporting the assumption that the basic economic mode of the San Dieguito peoples was hunting. The assumed hunting focus of the early San Dieguito cultures is supported by the stratagraphic sequence found at the C.W. Harris site (CA-SDi-149). At the Harris site a San Dieguito component was found well beneath a deposit containing La Jollan cultural material, which is then overlain by a later Diegueno remains. This stratigraphic relation is the basic cultural sequence for San Diego county. There is considerable debate concerning the nature of the relationship between the La Jollan and San Dieguito cultures (Hector et al. 1987), most of which lies substantially outside the scope of this thesis. A possible key to solving the nature of the relationship between the

La Jollan and San Dieguito traditions lies with the Pauma Complex (True 1958, and True 1980).

The essential concern here is to illustrate the importance of the stratigraphic sequence at the C.W. Harris site. The superposition of La Jollan materials over the San Dieguito layer documents the change of one subsistence pattern over time to another pattern. Scant data exits on the burial practices of the La Jollan culture. The largest group of burials was excavated from the Sripps site where 17 were uncovered (Shumway et al. 1961). The majority of these were determined to be flexed and generally devoid of grave offering. There were at least three exceptions which contained olivella shell beads (apparently spiral lopped judging from the photos). Some of the burials were covered with broken milling equipment, but the frequency of tools was less than at other milling complexes such as Oak Grove and Topanga.

<u>The Pauma Complex</u>

The milling stone manifestation known as the Pauma complex is the least documented and understood of the four other major patterns. Located throughout most of San Diego county, the Pauma complex is best known as a number of surface sites although subsurface sites do exist (Basgall and True 1985). D.L. True was the first to coin the term "Pauma Complex" based upon his work in the 1950s in the

Pauma Valley (True 1958, True 1980). True recognized the similarities between the San Dieguito material culture, and the Pauma artifacts, " to Topanga, Oak Grove, and other early remains from areas to the north" (True 1958:255). The inventory of tools is very similar to that of the La Jollan pattern which includes milling tools, unshaped hammer-grinder combination stones, stone balls, discoidals, cobble-core tools and a higher than usual number of chipped stone tools for the milling stone pattern in general. The similarities found between the Pauma artifacts and elements of the Campbell and San Dieguito chipped stone technologies may be due to the mixing of artifacts in surface contexts. Alternatively, the chipped stone tools may be part of the general assemblage of the Pauma Complex. A lack of subsurface excavations has hampered the definition and dating of this milling stone pattern. Only a single burial has been recovered from the entire complex thus far and it was too fragmentary to determine posture. It was however marked by a single inverted milling slab (Basgall and True 1985).

Discussion

The orgins and the time depth of the milling stone pattern still remains unknown. Claude Warren (1968) tried to address this problem in his re-synthesis of southern California archaeology. Following the same general cultural scheme as Wallace, Warren redefined the horizons into five cultural traditions. Warren's "Encinitas Tradition" was ascribed for Wallace's "Milling Stone Horizon" (Warren 1968). The Encinitas Tradition, according to Warren at the time he published, ranged in time from 7500 B.P.-5000 B.P. in the Santa Barbara area, later appeared in the Los Angles area around 5000-4500 B.P., and in the San Diego area began at about the same time as it appeared on the Santa Barbara coast but persisted until about 1 A.D.

Since Warren's article there has been a profusion of new dates that has generally pushed back the age for the inception of the milling stone pattern. For example, Kaldenberg (1982) reports--from the Rancho Park North in San Diego county--radiocarbon dates obtained from shell of circa 8000 B.P. for the earliest milling stone component of the site. An earlier date was reported by Ike et al. (1979) where:

> ...bone collagen from a skeleton buried under a cairn of "killed" millingstones yielded a 14 C age of 8360 +/- 75 years. (cf Moratto 1984:147)

In northern Santa Barbara county many new early dates for milling stone sites have been generated by salvage programs spurred by massive energy and defense related projects. Research on the Vandenberg Air Force Base has produced a series of dates from six milling pattern sites that range from 7990 +/- 350 years to 7580 +/-300 years B.P. Erlandson (1988a) has excavated shell middens on the coast with milling equipment that date to between 7800 and 8500 carbon years B.P.

Further north, in San Luis Obispo County, Greenwood (1972) recovered milling tools from two coastal midden sites. At CA-SLO-2 deeply buried manos were found but due to poor association can not be tied to two dates of 9320 +/- 140 B.P. and 8960 +/- 190 B.P., derived from human bone and a red abalone respectively. But at CA-SLO-585 several grinding tools were located below a shell lens that was dated to 8410 +/- 190 B.P. (Greenwood 1972). These sites are believed to be a northern expression of the Oak Grove culture.

The association between Oak Grove and the milling stone pattern at the two sites reported by Greenwood may be correct but there is also the possibility that it belongs to a new and as of yet unidentified milling stone manifestation of the central coast. Evidence for such a pattern is examined in the following section of this paper.

The apparent antiquity of the milling stone pattern has brought into question the origins of this widespread subsistence strategy. Some have attributed it to an influx of new peoples from the Mojave desert, arguing that such movement was a response to the onset of the Altithermal, which made the deserts increasingly difficult to inhabit. The desiccation of the once vast inland lakes of the Mojave is thought to have forced a general population shift to the coastal areas. Upon arrival to to this new environment these interior groups became "littoral collectors" (Erlandson 1988a:10) practicing a mixed economy of shellfish collecting and plant processing. Warren et al. (1961) describes these desert dwellers as:

> ...simple gathering people....that brought with them a way of life adapted to areas where large game was scarce and where a greater dependence was placed on gathering vegetable foods...(1961:28).

A similar model for the origins of the milling stone complex has been proposed by Kowta (1969). Kowta drawing upon data he collected from the Sayles site (CA-SBr-421) in San Bernardino county agrees with Warren that Altithermal conditions were the driving force in a general western migration of desert groups. Kowta also ties this movement to the initial spread of agave exploitation. Kowta came to this conclusion due to the vast numbers of scraper planes and milling equipment he found at the Sayles site, which in his view are :

> ...importantly involved in the preparation of agave for fiber and food, regardless of other functions they may have had...(1969:56)

Another alternative has been suggested by Moriarty (1967), that applies to the La Jollan complex. Citing evidence from the Agua Hedionda Lagoon site (UCLA-M-15), Moriarty found a transitional phase that links the San Dieguito and La Jollan complexes. If Moriarty's transitional phase is correct, then the shift from San Dieguito to La Jolla was an economic and technical response to an environmental change, rather than the milling stone pattern resulting from the influx of new desert groups. Moreover, it points to a continuous occupation of the south coast with an "in situ" change of subsistence strategies Kaldenberg (1982) supports this idea based on his work at Rancho Park North Site A. In Kaldenberg's view the La Jollans are seen as the descendants of the San Dieguito peoples who have added a milling economy to their generalized hunting/gathering strategy. What is clear is that there is as of yet no definitive theory on the origins of the milling stone pattern. The difficulties resolving this issue are due to the gaps in the chronological record, and the overall lack of integration of the cultural sequences between each subregion for the pattern as a whole.

Archaic Milling stone Patterns of Central and Northern California

Firm evidence of milling cultures such as those documented along the coast of southern California is sporadic at best in the rest of the state. Although milling tools were used throughout California over a wide expanse of time, very little data have been accumulated on sites or cultures that compare in age or reflect the intensity of grinding equipment usage of the south coast. Despite this general lack of data there are some indications of intensive early archaic milling activity. Figure 2, locates some of the principal sites discussed in this chapter.

The Central Valley

In the southern San Joaquin Valley, along the shore of ancient Buena Vista Lake, a deeply buried strata containing milling equipment was unearthed by Wedel and Walker (Wedel 1941) at two sites: Ker-39 and Ker-60. This same component was exposed again in the mid 1960s by Fredrickson and Grossman (1977) at Ker-116. This component has yet to be absolutely dated, yet its relative stratigraphic position between a late prehistoric midden and a cultural stratum dated between 7,600 and 8,200 radiocarbon years B.P., suggests that it falls within the time frame of many milling sites found on the south coast.

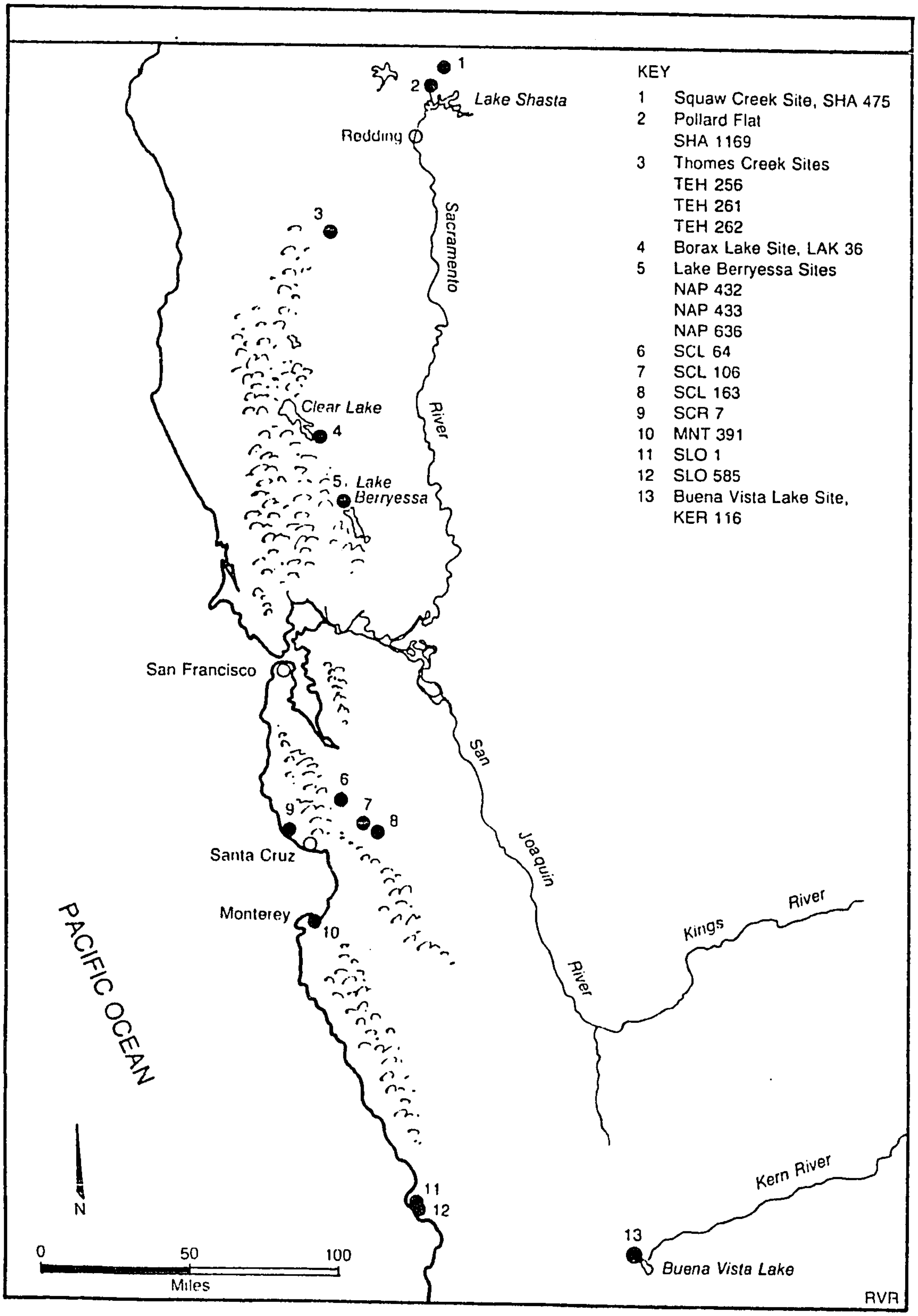


Figure 2. Map of Selected Sites of Northern and Central California.

Further north in the Sacramento Valley it has been hypothesized that the Early Horizon Windmiller culture of Lillard, Heizer, and Fenega (1939) evolved from earlier milling stone cultures (Baumhoff, and Olmsted 1963; Wallace 1954). Proof of this contention has yet to be found, but a few undated sites have been found that do resemble the milling stone pattern of the south. These include: the lower component of the Llano Seco site, the Wurlitzer site, and Arcade Creek site (Chartkoff, Miller, and Johnson 1970; and Curtice 1961). Further north in the valley Chartkoff (1969) also found two sites in the Funks Creek area in Colusa county that contained heavy core tools and handstones. Two similar sites were recorded in the same area by West and True (West, Levulett and True, 1975). In the Thomes Creek area in Tehema county Edwards (1968), tested three sites which produced handstones, milling stones, basalt flakes, and a few rare mortars and pestles.

Clewett and Sundahl (1983) have identified an early archaic component along Squaw Creek a tributary of the Pit River at a site of the same name. Component I at the Squaw Creek site produced a number of unshaped handstones and a smaller number of crude millingslabs which were radiocarbon dated between 6530 +/- 300 and 7580 +/-230 B.P.

Nearby in the Sacramento River Canyon extensive excavations at four sites revealed an early dated component with a large milling assemblage. Dubbed the Pollard Flat Phase after the site of the same name, this component dated to 5300 -2700 years B.P. and contained 98 typable handstones and 102 fragments, along with 15 diagnostic and 272 fragmented millingslabs (Mikkelsen in Basgall and Hildebrandt 1989).

North Coast Ranges

Milling tools have long been recognized as an important aspect of the archaeological record of the North Coast Ranges. With the initial work at the Borax Lake site in the Clear Lake Basin by Harrington (1948a), followed by Meighan's (1955a) excavation of the MEN-500 site near Willits, it quickly became evident that milling stone technology was widespread early on in the prehistory of the North Coast Ranges. Drawing upon Meighan's proposed Mendocino and Borax Lake complexes, Fredrickson (1973) formed the Borax Lake Pattern. This pattern, according to Fredrickson, represents a shared lifeway found over a wide geographical setting that is characterized by wide stem projectile points and a seed collecting adaptation well suited to a dry ecological setting. The Borax Lake Pattern of the the Lower Archaic Period, suggested to be from between 8,000 to 5000 B.P., is viewed as a shift in adaptation in response to a period of reduced precipitation and warmer temperatures experienced over many areas of

California. The success of this adaptation is evident in the wide distribution of sites containing the Borax Lake Pattern and its persistence in some regions up through the Upper Archaic Period, which runs from 3000 B.P. to 500 A.D. (Hildebrandt 1983). Considerable debate has centered around settlement pattern change in regards to the presence of milling stone sites found at high elevations in the North Coast Ranges, and how these sites relate to subsistence activities through time (Hildebrandt and Hayes 1983; Hildebrandt and Swenson 1982;Jackson 1976; King 1974a). Of particular interest in regards to a early milling stone presence in the North Coast Ranges is the work of D.L. True at Lake Berryessa in Napa county.

Unlike Fredrickson, who views the milling assemblages found throughout the North Coast Ranges as part of a general adaptation not particularly linked to the milling cultures of the south coast, True believes that the "Milling Stone Horizon was widely present in northern California rather than merely sporadically" (True, Baumhoff, and Helen 1979: 153). Furthermore, True states that milling cultures will ultimately be found in equal abundance in the north as they are in the south, and that the milling stone pattern "represents a single group of people with substantially similar culture" (True et al.1979). The basis of these claims is derived from True's fieldwork along the shores of Lake Berryessa during the drought years of 1976, and 1977. Following exposed wave cut terraces along the shores of the man made lake, True and his colleagues found a number of isolated scatters of prehistoric tools. A small number of milling tools (nine handstones, six milling slabs) and a much greater number of cobble tools in the form of various scrapers were collected. A subsequent survey of a larger portion of the lakeshore revealed a greater number of spatially scattered isolates, and low and high concentrations of cobble tools and milling equipment. These aggregates of artifacts were in True's opinion not small campsites, due to the limited array of artifact types, but rather were resource collecting and processing areas that were adjacent to major camps (True and Baumhoff 1982, 1985). The general lack of chipped stone tools in conjunction with the overwhelming preponderance of cobble tools with a functional emphasis on scraping, chopping, and cutting led True initially to believe that they were part of a northern California milling stone pattern. However, many problems exist with this notion, most notably the lack of any temporal control. The few extant diagnostic projectile points found on the survey were of Excelsior forms widely considered to be contemporaneous with the introduction of the mortar pestle complex. A related problem, as True, notes is the distribution of the artifacts is possibly the "reflection of temporal as well as (or instead of) differential subsistence level activities" (True and Baumhoff 1982:51).

Central Coast and The San Francisco Bay Area

Until recently little archaeological work has been conducted on the rugged central California coast. One exception is the previously cited work of Greenwood (1972) at Diablo Canyon in San Luis Obispo county. Greenwood's discovery of deeply buried early archaic age milling equipment suggests that similar sites may exist to the north. Current research along the Big Sur coast by Jones (1987,1988), amongst others, may reveal as has been suggested in theory a series of milling stone pattern sites originating from the south coast. This notion, according to King and Hickman (1973), states that milling stone sites in the north could result from the progressive budding off of subpopulations from relatively sedentary villages that have produced surplus populations, forcing a northward migration of peoples. To date no clear evidence of these pioneer milling stone sites have been documented for the central coast. There have been a number of coastal sites dated generally to what has been considered the latter end of the south coast milling stone pattern, but solid evidence of connections to the south has yet to found.

Many small excavations (Dietz and Jackson 1981) and two large scale excavations (Cartier 1984, and Dietz, Hildebrandt, and Jones 1986) have failed to yield any evidence of milling stone manifestations. Site Mnt-229, or the ElkHorn Slough site where over a 100 cubic meters of soil as excavated, was determined to be largely a seasonal residential base most intensively occupied from circa 700 B.C. to 1100 A.D. (Dietz et al.). Of the total of 28 radiocarbon dates produced from the site several were from 6000 to 7000 years old, but because these dates were derived from shellfish found within the midden they were dismissed as being excessively old due to the reservoir effect, where shellfish accumulate ancient carbons by virtue of living in a sheltered environment such as a bay or slough. The Saunders site (Mnt-391), where a massive sample was excavated, produced a cluster of dates ranging between 4020 +/- 100 to 4910 +/- 100 years B.P. (Breschini, Haversat, and Erlandson 1986). This intensively occupied site contained evidence of a mixed hunting and gathering economy with no evidence of a milling stone pattern. The earliest dated site on the central coast is the Sand Hill Bluff site (SCr-7), located just north of Santa Cruz. Mussel shell from the lower of two midden components was radiocarbon dated to 5390 +/- 100 years B.P. This important site has only been minimally excavated by a biologist searching for faunal remains (Morrato 1984). The outskirts of this dune covered site have recently been tested and reported by (Jones and Hildebrandt 1990). Certainly this site holds great research potential due to its size and antiquity.

San Francisco Bay Region

Turning inland, data supporting early archaic milling stone pattern are still faint, but more conclusive than on the coast. In order to best examine these data a brief background on the history of prehistoric research in the Bay Area is warranted.

Most models of San Francisco Bay prehistory have been tied to the Central California Taxonomic System of Lillard, Heizer, and Fenega (1939). The Bay Area was considered by Heizer to be a "local, marginal, culturally backward area into which outside influences either failed to spread or spread slowly" (Heizer 1949:39). Beardsley (1948) concluded that there was little evidence in the bay for the "Early Horizon" in the form of the Windmiller culture dated to 4500 to 2800 B.P. Beardsley's ideas thus supported Heizer, and reinforce the notion that the region was no more than a recipient of cultural influences emanating from the Delta. Gerow has rigorously challenged this view for three decades based on evidence from his excavations at University Village. (Gerow with Force 1968).

Gerow coined the phrase "Early Bay" to describe the materials he found at University Village dated as early as 3400 B.P. At this site Gerow found 43 burials of which 34 had grave goods. A careful analysis of the burials and the grave-lot data indicated that many differences existed between the archaeological record of the Delta and the Bay Area. Contrary to the distinctive mortuary pattern of the Windmiller culture of ventrally extended burials with a westerly orientation, the University Village burials were nearly all tightly flexed with no defined preference for body orientation. Furthermore, the grave-lots of the burials were different from the Early Horizon with regard to: (1) the high incidence of red ochre relative to ornamental artifacts of stone, bone, or marine shell; (2) the preponderance of simple whole shell beads over drilled fractions; (3) the general absence of quartz crystals; (4) the rarity of either slate or mica artifacts; (5) and the relative and absolute numbers of flaked stone points to crudely flaked core implements. Also in contrast were the lack of plummet charmstones, and the profusion of cobble mortars, flat-ended pestles, bone awls, antler wedges, and rib side scrapers (Gerow with Force 1968). These dissimilarities coupled with anthropometric comparisons between the burial populations led Gerow to conclude that there were greater differences between the prehistoric cultures of the bay and the Delta, rather than less, at an earlier date. Citing as additional evidence data from the lowest levels of the West Berkeley mound (Ala-307) dated to 3700 B.P., Gerow postulated the existence of two distinct cultures in Central California between 3500 and 3000 B.P. which gradually converged culturally and biologically. In a later study titled Co-Traditions and Convergent Trends in Prehistoric California (1974B), Gerow expanded his comparisons of anthropometric data and cultural data to include the southern California coast. Gerow found that:

> ...Early Lower Sacramento Valley populations were both physically and culturally distinct from the Early Southern Coast populations" (Hildebrandt 1983:1-13).

However, Gerow also concluded that these differences grew smaller over time thus refuting prevailing models of unilineal or parallel change between the two culture areas. These conclusions by Gerow connected the "Early Bay" culture more firmly with those of the early south coast and their hypothetical assignment to the Hokan lingustical stock. Gerow's findings seemingly refute the links seen between the Early Horizon of the Delta and the milling stone pattern of the south coast as envisioned by Baumhoff and Olmsted (1963). The importance of lingustical affiliation of these various archaeological traditions in regards to the milling stone pattern lies with the economic changes that are assumed to have occurred with the arrival of new lingustical stocks. Linguistic models of the Bay Area tend to attribute either Hokan or Penutian affiliations to one or more of the archaeological traditions known to have existed. For instance Fredrickson (1974a) agreed with Gerow's contention of two separate cultures during the Early Horizon for Central California, but he attributed the introduction of the mortar and pestle complex to a new archaeological manifestation that he named the Berkeley Pattern (Fredrickson 1974a). According to Fredrickson the Berkeley Pattern, represented by the materials from the lower levels of the West Berkeley mound including Gerow's assemblage from University Village, were the product of a new group of Penutian speaking people moving in from the north. These new arrivals, in Fredrickson's model, brought with them the acorn technology which later in time is found throughout much of California. Fredrickson's ideas contrasted with Gerow's in that he attributed the mortar and pestle complex to the Berkeley Pattern not the Windmiller culture of the delta as Gerow believes. Breschini (1981) proposed yet another model that agrees somewhat with Gerow's. He attributes the Windmiller people to being Penutian speakers who possess the acorn tool kit, who moved from the Delta into the Bay Area absorbing the Hokan (or pre-Esselen) people already occupying the region. According to Breschini this took place between 4000 and 3000 B.P., yet another model that follows along similar lines to Fredrickson was proposed by Whistler (1977, 1980). Whistler, a linguist, utilized glottochronolgy, comparative linguistics and the archaeological record to build his model of prehistoric change for the Central California. Like Baumhoff and Olmsted (1963), Whistler thought that a undocumented milling stone group of Hokan speakers occupied Central California by about 7000 B.P. By 5000 to 4500 B.P. a group of Penutian (Miwok-Coastanoan) related peoples had moved into the Bay Area bringing with them the mortar and pestle as evidenced by Fredrickson's Berkeley Pattern. About the same time another Penutian related people (Yokuts) moved into the Central Valley (cf. Hildebrandt 1983).

Bickel (1981) questioned the validity of all these models in her dissertation on data from three San Francisco Bay shell mounds. Although she agrees with Gerow and Fredrickson on the differences between the early cultures of the bay and the delta, she stopped short of endorsing the convergent model. Rather, she believed that changes in both areas were evident and complex and that neither model of convergent or parallel change could explain the archaeological data generated from the excavations of the shell mounds. Instead she perceived evidence of interplay between them. Elsasser (1986), in reference to the whole question of Penutian migration into Central California, states that no single date can be assigned to the event and probably consisted of many migrations in what was a complex process "probably involving lags and accelerations by different groups at different times" (1986:20).

Hildebrandt (1983) in a succinct summary of the various competing models and their problems, identified a series of general research domains. Foremost, Hildebrandt states that if any of the competing models of prehistoric population replacement or merger in the Bay Area are to be tested, "the population being replaced or merged with must be identified" (Hildebrandt 1983:1-22). This, according to Hildebrandt, means the definition of a pre-mortar and pestle tradition or, in other words, a cultural pattern that predates the intensive use of acorns as the main means of subsistence.

The importance of the transition from a seed grinding economy to an acorn economy is stated by Elsasser:

> ...The transition reflects more than than a change from one set of tools to another. In fact, we are dealing with a change from seeds (e.g. grass seeds), that are easily gathered and prepared for the eating, to acorns. The latter present a number of complex problems especially in processing for consumption. Further, in California, acorns are the only plant food which can be compared with the importance of a modern agricultural crop (cf. Heizer 1958). Thus an acorn economy, besides giving rise to a different and more complicated set of exploitation techniques, could be expected to lead to a more complex social organization and a concomitant increase in population (1986:36).

Despite the importance of documenting a milling stone pattern for the San Francisco Bay Area very few sites have been found that contain well dated early assemblages of milling equipment. One problem Elsasser (1986) points out is that milling stone pattern sites may have been overlooked in site surveys. Another problem has been the rapid development of the Bay Area in the last 40 years. The destruction of archaeological sites went unimpeded until environmental laws came into effect in the early 1970's. Since that time a handful of sites have come to light that have held potential data on the milling stone problem in the Bay Area. Two of the more important sites in this group are SCl-64, and SCl-106, excavated by Cartier (1980b) for a water project. Located on the southwestern edge of the Santa Clara Valley up against the base of the Santa Teresa Hills both these sites were dated to circa 6000 B.P. A radiocarbon date derived from charcoal excavated from the 100-120 cm level of the site was reported by Winter (1977b) to be 6590 +/- 200 years old. Two dates in excess of 6000 years B.P. were reported by Cartier for site 106. Taken from a single unit in a 50 x 50 cm column sample charcoal samples were "floated" from the 220-250 cm and the 250 cm level of the site. The dates from these charcoal samples were 6199 +/- 1060 and 6349 +/- 570 years B.P., respectively. Although these dates were calibrated with tree ring dates the sample sizes were very small and thus have large plus or minus factors. Nevertheless, seven crude handstones and 14 edge battered cobbles were collected from SCl-106, while five handstones and four edge battered cobbles collected at SCl-64. However, only two small milling fragments were found at SCl-64 (Bocek cf. Cartier 1980B:90-91). Unfortunately, these artifacts are not assigned to any assemblage nor are there any depths given for them, thus rendering this data equivocal. It should be mentioned that mortars and pestles were a large part of the groundstone assemblage from SCl-106, and mortars were also found at SCl-64. Fortunately, according to Cartier, " relatively few excavation units were placed within the primary midden deposits" (1980b:72) offering hope that still significant data may yet be retrieved from these two sites. The presence of both milling tools and the mortar and pestle complex at SCl-64, and 106 although problematic because of the lack of crucial provenience data, is intriguing. Sites that contain well dated assemblages of both milling equipment and the mortar and pestle complex, are essential if answers as to the timing of shifts in economic mode are to be found. In the general San Francisco Bay Area there are dozens of sites which have both handstones and/or milling slabs and mortars and pestles. Yet in most cases these sites are ascribed to the middle or late periods of Bay Area prehistory by which time the assumed economic switch to an acorn intensive economy had already occurred. Insofar as this shift can be determined there are few sites that contain both sets of tools which span the time period when it is thought to have occurred. This shift has been suggested (Miller et al.1982) to have occurred at Ala-60, a large site in the East Bay foothills, dated via obsidian hydration to circa 6000 B.P. However, a subsequent re-examination of the groundstone from the site by Bard, Busby, and Kobori (1989), rejected nearly all of Miller's data for a milling complex assemblage.

Another intriguing but inconclusive site is SCl-57 located near SCl-64 and 106, just to the northwest of the town of Gilroy in the extreme southern end of Coyote Valley. Gucrke (1970), in a brief description of some test excavations at the site, makes mention of two extended burials found in loose association with "manos and metates plus a worked abalone shell" (Gurcke 1970:10). Found in the same trench that held the burials, Gurke also reports the presence of manos, metates, and stone bowls. Located nearby to the millingstones a group of bedrock mortars and broken pestles were found. Gurke's short report offers no description of these tools and no radiocarbon dates were generated from the excavation. Yet a rough date based on obsidian hydration data indicates the site was occupied as early as circa 3300 B.P. (Elsasser 1986). Unlike Ala-60 and SCl-57, SCl-163 located just a few miles to the northeast of SCL-64 and 106 offers better data on the timing of a possible shift from milling to acorns.

SCl-163 was one of several sites excavated as part of a mitigation project funded by the California Department of Transportation for the highway 101 expansion project. Two components were identified at this site by Hildebrandt (1983) utilizing geologic strata, diagnostic projectile points, and radiocarbon dates. Component I, was dated between 2800 B.P. and 4500 B.P. Component II represented the time period between 2800 B.P. and A.D. 1. Although the groundstone assemblages for each component were numerically small (28 specimens for component I, and 44 for component II) a slight shift in subsistence is discernible.

This shift is indicated by the increasing formal nature of the mortars and pestles and the replacement of the milling tools with anvilstones and cobble tools in Component II (Hildebrandt 1983).

Research Concerns

Three explicit points can be drawn from the preceding discussion of Central California and San Francisco Bay prehistory. First and foremost there exists the problem of identifying a milling stone pattern for Central California.

As has been demonstrated, millingstone technology was widespread during the period between 8000 to 5000 B.P. This archaeological pattern is a integral part of the paradigm of the evolution of subsistence practices in California as outlined by Wallace (1978). Secondly, the documentation of a pre-mortar and pestle pattern would alleviate some of the confusion revolving around the competing models of culture change in the San Francisco Bay Area. An adjunct benefit of the documentation of an early millingstone pattern for the Bay Area lies in the possibility of conducting an inter-regional assessment of this adaptation. It is through broad integrative comparisons of the temporal and material variations of millingstone sites that a fuller understanding of this lifeway will be gained.

Lastly, clear documentation of a site with both a milling stone pattern and the mortar and pestle complex would go far in evaluating the emergence and the intensity of the shift to a balanophagous economy. Concomitantly, data concerning direct evidence of changes in subsistence practices would aid in viewing the mechanisms that govern settlement pattern shifts evident in the archaeological record. The following discussion outlines the specific research objectives and the methods that will be employed to address those objectives.

Each research goal is followed with a description of the type of analysis and data necessary to best address the goal. A caveat should be stated at this point, due to the nature of the collection procedures at the Saratoga site: some of the goals that follow may be unresolvable. In those cases where particular limitations are encountered they are noted and discussed to the extent permissible by the data.

As stated earlier the primary objective is the identification of temporally discrete archaeological components which exemplify a subsistence primarily based on the processing of nonacorn vegetal foods. In order to fullfill this objective the following steps are required. First, the environments of each of the three sites under study are characterized. The environmental background surrounding each site underscores the availability, abundance, and diversity of resources during the prehistoric period in question. Second, the historical background of the excavations of each site is reviewed. The purpose of these reviews is to shed further light on the context of the data gathered from each site. Third, the methods used for the descriptions, and functional analysis of all the artifacts from the SCl-65, (the Saratoga site) are given. This is followed by the chronologically unsegregated descriptions of the artifacts from the Saratoga site. Fourth, the chronological ordering of the sites and component definitions are presented. Chronological ordering is accomplished through the use of radiocarbon dating, obsidian hydration rim readings, temporally diagnostic artifacts and geological data, when available. Once chronological order has been established component definition will be possible. Artifact assemblages will be formulated by the definition of the temporal components they correlate with. Lastly a comparison of the defined components from the sites is made. With these data in hand it will be possible to assess how these components fit within the framework and models of prehistory for the Bay Area. A related objective is an interregional evaluation for the purpose of assessing the temporal and material similarities with other sites. Meeting this objective requires an examination of a variety of pertinent data from sites outside of the Bay Area. Specifically, data on socio-religious behavior (burial mode and grave goods) chronology, diagnostic artifacts, and features will be used. This broad scale evaluation will integrate the three sites into a larger more meaningful context.

The final goal is to determine if the shift in economic mode from a milling focused subsistence to an intensive acorn economy can be detected at any or all of the three sites.

Chapter III

ENVIRONMENTAL SETTING

All of the sites are located within the general area of the southern reaches of San Francisco Bay and yet each represents a distinctively different environment that would have, in prehistoric times, offered a variety of resources to chose from (Figure 3). Any reconstruction of past resource procurement strategies is dependent on understanding the relationships between the spatial distribution of resources, their distance from the site, and the amount of energy needed to exploit them. The seasonality of plant, and animal, resources, their spacing, and their abundance are the principal determinants in site location. The assessment of the environment around a site must not reley on the present day environmental conditions as a means to understanding the past environmental setting. Therefore wherever possible, data that attempts to reconstruct ancient environments will be used.

CA-SCl-178 (The Blood Alley Site)

The Blood Alley site sits on a small alluvial fan near the mouth of Metcalf Canyon along the eastern rim of Santa Clara Valley. Metcalf Creek, a small seasonal stream, flows by the site and joins the larger Coyote Creek to the northwest. The site is 82 meters above mean sea level and

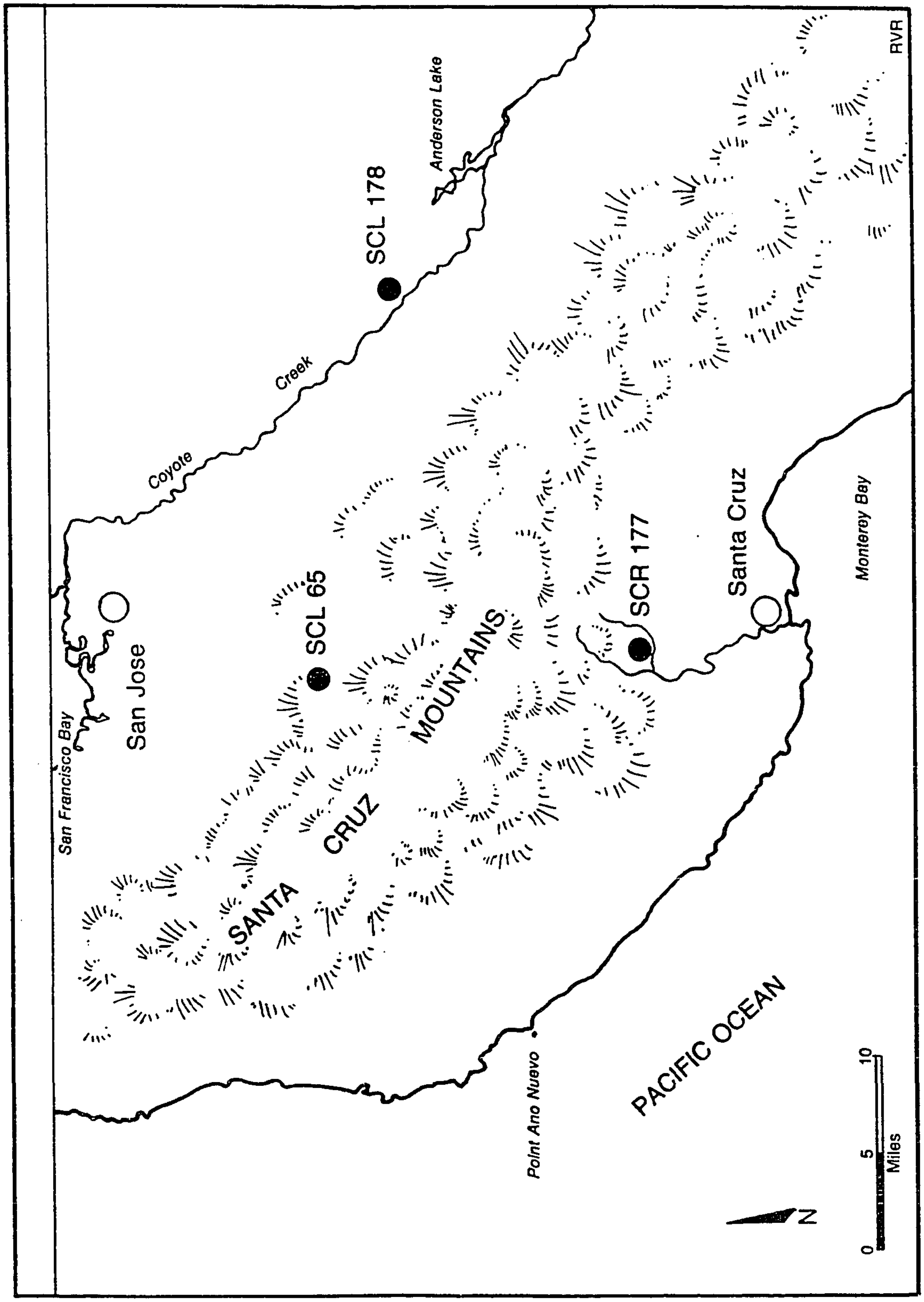


Figure 3. Site location map for SCl-65, SCl-178, and SCr-177.

is located where the Santa Clara Valley narrows down to less than half of a kilometer (Hildebrandt 1983). The contemporary vegetation on the site consists of various introduced European grasses, poison oak (Rhus diversiloba), willow (Salix spp.), live oak (Quercus agrifolia), elderberry (Sambucus spp.) and thistle (Cirsium spp.) Up Metcalf Canyon and in the surrounding uplands vestiges of mixed hardwood still exist while narrow strips of riparian vegetation are found along Coyote Creek. Patches of chaparral also can be found in Metcalf Canyon (Hildebrandt 1983). Historical accounts from the first Spanish explorers and missionaries who traveled through the site area, nearly all make the same observations about the vegetation as it appeared over 200 years ago. Repeated references are made of numerous stands of oaks on the valley floor. In fact, the Spanish name for the Santa Clara Valley was Llano de Los Robles, or Plain of Oaks. The Spanish also remarked on the presence of cottonwoods, (Populus fremontii), sycamores, (Platanus racemosa), along the major drainages. The hills are described as grass covered but otherwise are much as they appear today. A significant difference between the environment of the Spanish period and that of today was the presence of La Laguna Seca, a large shallow seasonal lake and associated marshland. This body of water had its northern shore near the point where the valley narrows and extended 5 kilometers or so to the south towards the current town of Morgan Hill. Global studies of climatic change indicate that during the late Pleistocene, and early Holocene cooler and moister conditions prevailed. In western North America this cool period was followed by a warm dry epoch that lasted roughly from 7,500-4,000 years B.P. After 4000 B.P. a cooling trend began that has lasted up until today (Antevs 1955). In the Santa Clara Valley and the coastal areas of California in general, these trends were, however, somewhat modified by two factors. The first factor is the presence of the Pacific ocean that would have kept the region warmer during the cool/wet period relative to the interior of California and wetter during the dry/warm period that followed. The second factor was the development of San Francisco Bay which began to form circa 11,000 B.P. with the most rapid filling occurring between 8,000 to 10,000 B.P. (Bickel 1978). The formation of the San Francisco Bay acted as it does today in that it regulates the temperature extremes on either end of the thermometer. Given these two factors the area around SCl-178, and much of the Santa Clara Valley, would not have experienced dramatic changes in climate and therefore vegetation.

In a summary of the vegetal communities found around the Blood Alley site, Hildebrandt (1983) found the two dominant communities to be Oak savanna and California prairie. A variety of animal species inhabit these communities as well as a wealth of seed producing plants. The economic importance of seed bearing plants to prehistoric cultures can be partially viewed through ethnographic accounts of the extensive burning that took place in order to increase seed yield (Mayfield 1978, Lewis 1973). Assuming that a warming trend did not adversely effect the prairie areas in the southern Santa Clara Valley, due to moderating influence of the Pacific, then the period following the early Holocene--approximately 7500 B.P.--would have supported a rich assortment of seed bearing grasses and native forbs. Some of these important native grasses include: wild rye, (Elymus spp.): purple needlegrass, (Stipa pulchra): milicgrass, (Melica imperfecta) junegrass, (Koeleria cristata) hairgrass, (Deschapsia elongata) and oatgrass, (Danthonia calfornica). A few of the forbs include: wild onion, (Allium spp.): soap root, (Chenopodium californicum), indian potato, (Craum gairdneri) tarweed, (emizonia spp.) and clover, (Trifolium spp). (Burcham 1981). Before the introduction of European grasses--which are annual grasses--the small list given above of perennial grasses and bulbs provided a wealth of vegetal foods to choose from nearly all year long.

Certainly the presence of a marshy environment was a major draw for the earliest prehistoric populations, providing a large productive habitat that would have attracted an assortment of wildlife. The importance of the numerous acorn bearing oak trees found on the valley floor obviously can not be ignored as a potential resource. Yet acorns are a high cost food item in terms of the labor needed to make them edible (Basgall 1987). Considering the vast stretches of California prairie in the hills around SCl-178, a subsistence based on the collection of seeds and other plants in conjunction with small game hunting may have been a productive alternative to the collection and the processing of acorns.

CA-SCr-177 (The Scotts Valley Site)

CA-SCr-177 "is located approximately ten kilometers inland from the Santa Cruz coastline in a north-south oriented valley" (Cartier 1984:2) at 192 meters above sea level. The site lies on a small alluvial fan on the south end of Scotts Valley about 300 meters to the northwest of Carbanera Creek. The current environment of the site area lies in on the edge of the redwood forest (Sequoia Pseudotsuga) and either the mixed hardwood forest (Arbutus Qucercus) or the redwood border forest (Barbour and Major 1988). In the recent past Scotts Valley was dominated by redwoods before logging activities opened the way for an invasion of hardwood species and its related understory. Redwood forests offered little in the way of economically important plants for aboriginal cultures. Some of the understory found in redwood forests include: huckleberry, (Vaccinium ovatum); sword fern, (Poystichum munitum), and redwood sorrel, (Oxalis oregana). Redwood trees owe their distributional pattern to cool moist coastal fogs, sedimentary soils, and recent alluvium (Mayfield 1978). Thus the presence of the redwoods is indicative of a cool moist climate. Paleoenvironmental data derived from studies of pollen profiles taken from the nearby Laguna de las Trancas (Adam, Byrne, and Luther 1981) and covering about 30,000 to 5,000 B.P. has identified shifts in the local climate. Adam, et al., found predominantly pine and fir pollen during the last full glacial period indicating a lower mean annual temperature of two-three centigrade with a greater amount of rainfall. After the start of the Holocene a warming trend began that increased coastal temperatures but still was cool and moist enough to support redwoods. Building on this and other data Jones and Wilson (1986) have posited an argument on the existence of a pluvial lake in Scotts Valley. Citing an extensive peat deposit found in the southwest portion of the valley, that was mined during the 1930's, these authors proposed that a lake may have been the main attraction for early pehistoric cultures. According to their model the lake was the result of the increased rainfall at the end of the last glacial period. They further suggest that the lake grew and nearly reached the present elevation of the site.

Ultimately Jones and Wilson conclude that the damn which formed the lake eroded away, draining the lake and causing the settlement to move away for more favorable habitats. This scenario, if correct, would have made for a lacustrine environment that would attract a rich array of plant and animal resources. Some of the edible plants found in lake or wet settings include: arrowhead, (Sagittaria latifolia), prairie bulrush, (Scrpus robustus), cattails,(Typha latifolia), and nut grass (Cyperus esculentus). The site's proximity to the coastal prairie and its wide variety of bunchgrasses and forbs, as well as the ocean, would have given hunters and gatherers a wide selection of resources to exploit.

CA-SCl-65 (the Saratoga Site)

The Saratoga site is situated at the base of the eastern flank of the Santa Cruz mountains immediately adjacent to California State Highway 9, in the town of Saratoga. Figure 6 presents the exact location of the site. The site sits on a low stream-cut terrace that lies directly above the southern banks of Saratoga Creek, which is approximately 50 meters away. The terrace is 156 meters above sea level and is about two and one half acres in size. Saratoga Creek is a large perennial stream with a wide corridor of riparian vegetation. According to Kuchler's (1977) natural map of vegetation the site area falls under mixed hardwood forest (Arbutus quercus) classification.

According to Kuchler mixed hardwood forests are a "broad-leaved evergreen forest with an admixture of broad-leaved deciduous and needle-leaved evergreen trees" (1977:925). The dominant species are listed as madrone, (Arbutus menziesii), coast live oak (Quercus agrifolia), and canyon oak (Quercus chrysolepis). An important tree also found in this environment is California buckeye, (Aesculus californica), which was edible after leeching much in the same way acorns were leeched. A field survey of the vicinity of the site found all these species in abundance. A unique feature of this site is its proximity to a number of diverse environments. Directly down stream from the site the wide expanse of the Santa Clara Valley begins and its valley oak savanna and its valley oaks, (Qercus lobata), which produces the largest acorn of all the oak species of California (Mayfield 1978). Still further downstream but still within a days walk or less was the very rich environment of the tidelands and marshes of San Francisco Bay. Up stream from the site in the hills to the north and still only a days hike from the site lies an area of chaparral. The chaparral offered yet another community of plants which were economically important including: toyon, (Heteromeles arbutfolia): manzanita, (Arctostaphylos glauca), holly-leaved cherry,(Prunus ilicfolia), California bay, (Umbellularia califonica), and chia, (Salvia columbariae). Besides these important plants, chaparral also provided an excellent habitat for deer and other wildlife. Like the California prairie, the chaparral underwent periodic burning by the Indians to ensure the productivity of its resources.

There are no paleoenvironmental studies that are directly applicable to the Saratoga area; however it can be safely assumed that microclimatic fluctuations not withstanding, the general patterns as outlined earlier were in force at the Saratoga site. One possiblly significant change in the vegetational patterns in the area around the Saratoga site could have been an expansion of the chaparral zone during the warm/dry period that peaked sometime between 7500 and 4000 B.P. (Moratto, King, and Woolfenden, 1978). If it can be assumed that the vegetation patterns present around the Saratoga site approximate those of the past, then the proximity of the mixed hardwood forest, oak savanna, riparian forest, bay tidelands, and the chaparral --all within a days walk of the site--made it an ideal location for prehistoric hunters and gatherers.

Chapter IV

HISTORICAL BACKGROUND OF EXCAVATIONS

In order to put the data presented in chapter number six in the best perspective a few comments are warranted on the nature of the excavations that produced the data from each of the three sites.

CA-SCl-178 (the Blood Alley Site)

Like SCl-163, the Blood Alley site was part of a data recovery program generated by the construction of a new corridor for Highway 101. Although nearly 170 cubic meters of soil were excavated at this site (Hildebrandt 1983), the data recovery procedures at SCl-178 involved a cumbersome two-staged approach that resulted in a number of problems. Because the excavation design for the site was not flexible enough to allow for adjustments in the field a considerable amount of invaluable data was needlessly lost. This is especially true in regards to the deeply buried archaic components of this site that are so rarely found in the San Francisco Bay Area.

CA-SCr-177 (the Scotts Valley Site)

Excavation of the Scotts Valley site, like SCl-178, was conducted because a major construction project was slated to impact the site. The City of Scotts Valley chose the site for construction of a new city hall complex. Test excavations conducted in 1980 by a local cultural resource firm revealed a deep an extensive deposit. Regrettably, further excavations of the site in near pristine condition was compromised in 1981, when the then mayor of Scotts Valley bulldozed the top layers of the site to make way for a parking lot (cf. Moratto 1984). A suit brought to bear on the City of Scotts Valley by the local archaeological society forced a settlement out of court that resulted in the funding of a major salvage project conducted on Memorial Day weekend 1983. Drawing upon students and professionals from a number of academic institutions, as well as local historical and archaeological groups, two hundred square meters of the deposit were excavated from the site. The success of this excavation prompted a similar effort on Memorial Day in 1987, that tested new areas of the site as well as excavating the remaining portions of the deposit unexcavated from the 1983 dig. The combined efforts of these excavations have been reported in a variety of papers (Cartier 1980a, 1982, 1983, 1984a, 1984b, 1985, and 1987) with a final report still pending. Pertinent data from the SCr-177 in regards to this thesis will be drawn from both the 1983 and 1987 excavations. Without the salvage excavations much of the prehistory of Scotts Valley and its role in central California archaeology would have been lost.

CA-SCl-65 (the Saratoga Site)

Credit for first bringing attention to SCl-65 belongs to Frank Dutro Jr., who, back in 1972 as a high school freshmen, brought his collection of artifacts from the site to a meeting of the Saratoga Historical Society. Dutro's collection was brought to the attention of archaeologists Linda and Chester King, who subsequently surveyed the property in question. After the survey they deemed it worth trying to salvage because the site was due to be developed. After gaining permission from the developers a salvage excavation headed by the Kings was started coincidentally enough on the Memorial Day weekend of 1973. Volunteers from the now defunct Bay Area Archaeological Cooperative, with additional help coming from several academic institutions and the Santa Clara County Archaeological Society, came out on two consecutive weekends to excavate the site. Unfortunately, the site was graded after the second weekend, but several members of the crew were on hand during the grading and they recovered many unearthed artifacts. The leveling of the site was the third known disturbance of the site. In the past the site area had been previously a saw mill and a church. At the time of the leveling it was a vacant lot used for parking on one portion. Due to these disturbances there is no way to estimate the amount of material removed or destroyed from the site prior to the excavation. It can only be

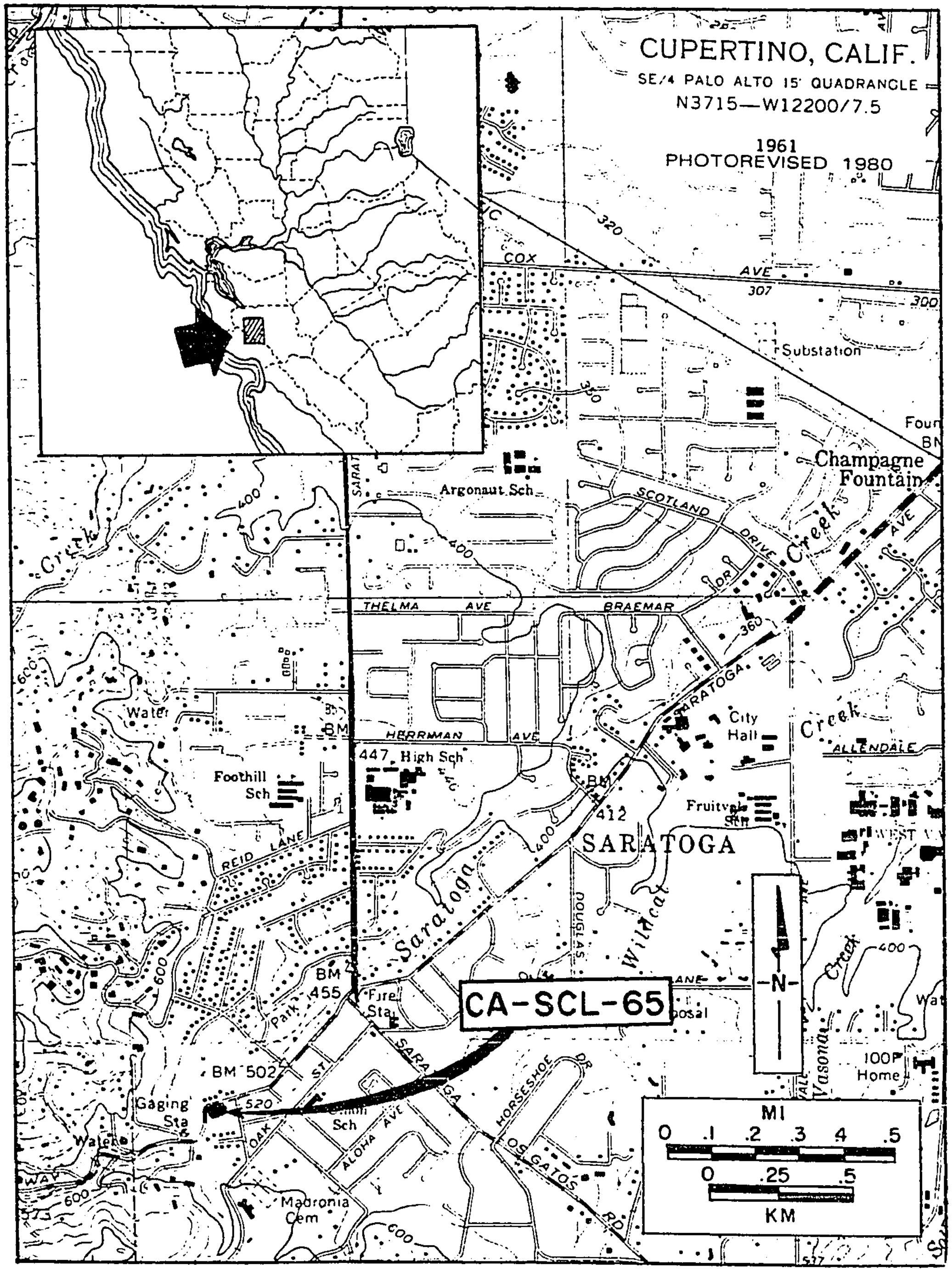


Figure 4. Site Location of CA-SCl-65.

surmised that the remaining sample of artifacts reflects but one small part of a much larger and probably more complex deposit. Fortunately, as will be detailed later in chapter six, a portion of the site remains intact. Besides the various disturbances to the site a considerable amount of data has been lost since the excavations took place. Because the excavation was a last minute salvage operation certain aspects of a normal excavation were either overlooked or forgotten. Furthermore, once the site was graded and the artifacts produced from this grading collected, and the initial cataloging completed, the site was essentially forgotten for over a decade. During that time field notes, taken by the crew and its supervisors, were either lost or thrown out. The site map which was never completed was misplaced and some artifacts were reported to be missing. All these factors along with the dimmed memories of those who excavated the site made it exceedingly difficult to reconstruct an accurate account of the site and its excavation. Despite these problems with the written record of the site, by utilizing the extant notes, several black and white photos as well as color slides, the fortuitous relocation of the site map and the generous assistance of those who were involved with the site, a fairly accurate picture of SCl-65 may be drawn. Regrettably, due to the elapsed time since the completion of the fieldwork and the final analysis, the overall integrity of the data from the Saratoga site has been greatly reduced. Although it is apparent from the preceding discussion that the data from the Saratoga site has suffered in various ways, every attempt has been made by the author to account for them wherever possible.

Chapter V

METHODS

Before describing the tools from the Saratoga site it is essential to establish specific definitions and terms for the different tools described and discussed in this thesis. The first set of tools described are generically classified as groundstone, based upon their main function of pounding and grinding various materials. They are also commonly referred to as millingstones. This term is frequently used in association with certain southern California cultures (described below), in this thesis it will be used as general term to describe certain forms of groundstone as well as a generic term for all cultures that used milling equipment.

The term groundstone is used here to describe the four most basic forms these tools normally take. The terms for the four forms are usually grouped in two pairs, grindingslab-handstone and mortar-pestle. Grindingslabs and mortars represent the:

> ...larger lower stones, set upon the ground and upon which the resources are processed...distinguished on the basis of form and assumed function (Mikkelsen 1985:5).

Handstones and pestles are "generally smaller, upper stones, used to process resources that are on or in the lower stones, that are also separated by form and assumed function" (Mikkelsen 1985:5).

Grindingslabs and handstones are associated with grinding and rubbing, while the mortars and pestles are primarily used for pounding. These functions are not exclusive to either pair of these basic tool types, nor is there an absolute concrete relationship with the function of these tools with an associated specific resource. Both pairs have many terms for the different types and classes of groundstone commonly found in California archaeology. Table 2 presents the terms most frequently used.

Table 2: Groundstone Terms

GRINDINGSLABS	HANDSTONES	MORTARS
Milling Slab	Muller	Bowl Mortars
Metate(s) Basin and Slab	Mano	Boulder Mortars
Grind Stone	Grinder	Cobble Mortars
Milling Trough	Grinding Stone	Deep Mortars
Millingstone	Rubber	Hopper Mortars
Nether Stone	Upper Stone	Basket Mortars
Quern		Slab Mortars
Seed Slabs		Bedrock
Mortars		Flower Pot Mortars

Many forms of mortars exist in California. The basic difference is between portable mortars and bedrock mortars. The portable mortars are generally broken into two main types, basket mortars or hopper mortars and bowl mortars. The difference between the basket types and the bowl is that the basket type holds the contents of the material being processed compared to the bowl shape type. Pestles lack the profusion of names applied to the other forms of groundstone tools and are usually mentioned in conjunction with the various forms of mortars. The main purpose of mortar and pestle is the pounding of food stuffs which may include small animals as well as vegetal materials.

The other main pair of grinding implements found in California archaeology have been most commonly referred to as manos and metates. The use of these terms is borrowed from Mexico where the mano and metate are still in use for the grinding of corn. There is an increasing tendency among American archaeologists to confine the usage of this term:

> ...to its original Mexican meaning a rectangular slab on which maize is ground with either one-or two-hand mano,entirely with a back-and-forth motion (Wallace 1954:7).

In place of the term mano and metate the most common term used is handstone and milling stone or slab. Also used is the term handstone and grindingslab or any combination of the terms listed in Table 2. Overall the many names applied to groundstone tools have created much confusion that often can be found in a single publication without definitions of why the terms were used (Mikkelsen 1985). The abundance of terms that can be found in the archaeological literature can make the task of interpreting and evaluating archaeological assemblages on issues of site function, temporal sequence, settlement pattern change, and culture change exceedingly difficult. In order to avoid confusion this analysis will refer to pounding tools as mortars and pestles and the lower and upper rubbing tools as handstones and millingslabs. Within these two main groups further definitions are based upon the apparent distinctions in form between the various classes of groundstone tools that represent either tools for pounding or grinding. Recognizing the relative importance of the groundstone tools from the Saratoga site they were subjected to a careful analysis. Following the method as given by Mikkelsen (1985), specific attributes were chosen for the classification of the groundstone tools. Each class of groundstone tools had a series of attributes that measured the type, shape, maximum length, width, depth, number, and placement of each discernible wear pattern, as well as standard measurements of weight, thickness, and size of each specimen. These data were collected on 4 x 6 inch cards, one card for each tool. Information concerning the form and material for each specimen was also collected.

Special attention was given to visible striations on handstones and millingslabs. Data on the direction of the striations relative to the long axis on handstones and millingslabs were taken. Handstones also were measured for their plan view arch on each wear facet by using an architect's curve and polar coordinate graph paper, which provided the definitions for convex, slightly convex, and flat surfaces for each ground or polished surface of each handstone. The worked ends of pestles were measured in the same fashion. Distinctions on the degree of formal shaping were made on both mortars and pestles and handstones and grindingslabs. Data on the amount of shaping are important in making inferences on the level of expediency a particular activity might have had. It also can offer clues to functional use (for example ceremonial or medicinal), Mikkelsen (1985). Dimensions for each specimen were measured in centimeters from the exterior surfaces at generally right angles from each other: length was recorded as the largest dimension, width as the next largest and thickness as the smallest dimension. Fragmentary groundstone artifacts were measured in the same fashion relative to what remained of the discernible length, width, and thickness. A summary of all these data are presented in Appendix A with a key explaining all the various data collected for each class of groundstone artifact. In some specimens more than one function was present, in these cases the terms used indicate both functions of the tool.

Albeit that often the function of a piece of groundstone could not be determined, its basic configuration, weight, and size were recorded along with the type of wear represented and their location.

Other categories of artifacts described are chipped stone and shell beads. The shell beads numerically comprise only a small fraction of the total assemblage of artifacts from the site SCl-65. Yet they are highly diagnostic artifacts and therefore were given close scrutiny. Two species of shell were represented in the shell beads from SCl-65. These beads were measured in millimeters weighted in grams and illustrated. They were typed according to the classificatory scheme of Bennyhoff and Hughs (1987). All the chipped stone artifacts from SCl-65, which include projectile points, drills, bifaces, scrapers, flake tools, and the by-products of their manufacture in the form of cores and debitage were reviewed and placed into morphological categories. Formal tools which are the result of a series of manufacturing stages, such as projectile points and bifaces, were measured, weighed and nearly all illustrated. Besides the standard measurements of maximum length, width, thickness, and weight in grams, additional measurements based on morphological attributes were made on the projectile points. These measurements follow Thomas's (1981) method which include basal width, proximal shoulder angle, distal shoulder angle, and length-width ratio. The points once measured were compared to other morphologically similar points from sites in and around the San Francisco Bay region. Informal tools such as flake tools, borers, and drills, were measured and weighed. All other chipped stone artifacts were placed into one of six categories reflecting either the primary or secondary stage of reduction in the tool making process. The primary category includes: cores, decortication flakes, and primary flakes. The secondary category: thinning flakes, and pressure flakes. The last category is shatter which occurs at both stages of tool manufacture. All chipped stone tools and their by-products were identified as to material type. Informal tools were counted and weighed by category and level for each unit excavated from the site. These data provides information on the intensity of site use over time. A summary of the chipped stone tools by unit is presented in appendix C.

Chapter VI

DATA FROM CA-SCl-65

This chapter has two basic purposes: first to provide the classification and description of a large assemblage of chipped and groundstone tools from SCl-65, and second to place these tools into a temporal framework so that they may be compared to the assemblages of sites SCl-178 and SCl-177. In order to accomplish the first goal an analysis of the assemblage from SCl-65 is presented in the following order: groundstone tools, chipped stone tools, and ornamental artifacts. Following these sets of data the feature and the burial data from the Saratoga site are presented. An examination of the temporal data from SCl-65 will be used to place the assemblage into three or four temporally discrete components. Once this has been done a comparison of temporally discrete components from SCl-178, and SCr-177, will be conducted.

Before describing the groundstone tools from SCl-65, a few essential facts on the excavation techniques and their yield should be made. A total of 20 units were dug, of which 18 were 3 x 5 foot, and two of 5 x 5 foot in size. Additionally, a 2 x 50 foot trench was excavated along with six exposure units dug into a cut bank created by the leveling of the site. The trench was excavated in five, ten foot segments labeled one through five. All the units were excavated in six inch increments and passed through 1-4" screens. Not counting the six exposure units--which had no depths recorded--approximately 26 cubic meters of soil were from the site. Table 3 presents the amounts of soil excavated for each unit converted to cubic meters.

Figure 5 presents the locations of the excavation units, trench, and exposure units dug at the site. Inexplicably, unit 19 was left off the original map and therefore has no precise location. As stated earlier there is no way to estimate the amount of material destroyed after the grading of the site was completed. Monitors were present at the site when the bulldozing began which resulted in the salvage of many elements of the assemblage. A total of 678 artifacts of the 2462 known artifacts collected from the site or 29% of the total assemblage, are without provenience. All artifacts will be discussed in each of the major tool classes; however the artifacts without provenience will be noted and considered only as indicators of the overall patterns that exist on the site.

Table 3: Summary of cubic meters excavated at SCl-65

Unit #	Unit size in Cm.	Depth in Cm.	Vol. Cubic M.
1	90 x 150	105	1.49
2	"	"	"
3	"	"	"
4	"	75	1.06
5	"	60	0.85
6	"	45	0.64
7	"	60	0.85
8	"	90	1.27
9	"	45	0.64
10	"	75	1.06
11	"	75	1.77
12	"	30	1.06
13	90 x 150	75	1.06
14	"	60	0.85
15	"	45	0.64
16	"	45	0.64
17	"	60	0.85
18	90 x 150	75	1.06
19	90 x 150	105	1.48
20	"	45	0.64
T1	60 x 300	45	0.85
T2	"	120	1.70
T3	"	30	0.57
T4	"		0.57
T5	"	75	1.42

TOTAL 26.00

Groundstone Tools of CA-SCl-65

A total of 406 whole and fragmentary specimens of ground, pecked, battered, and pitted artifacts were recovered from the Saratoga site. These groundstone tools make up 16.5 percent of the total assemblage of the site. Of these 406 artifacts 264, or 65 % have either no provenience or minimal provenience. Table 4, presents a summary of all the groundstone artifacts from the Saratoga site.

Table 4: Summary of groundstone tools from CA-SCl-65

	With Provenience	No/Minimal Provenience	Total
Handstone	36	50	86
Millingslabs	14	49	63
Mortars	10	52	62
Pestles	3	36	39
Pitted stones	15	16	31
Anvils	3	6	9
Hammerstones	19	21	40
Edge B. cobbles	2	1	3
Stoneballs	1	3	4
Misc G.& P. St.	39	30	69
TOTALS	142	264	406

Key: Edge B. = Edge Battered, Misc G. & P. St. = Miscellaneous Ground and/or Pitted Stone.

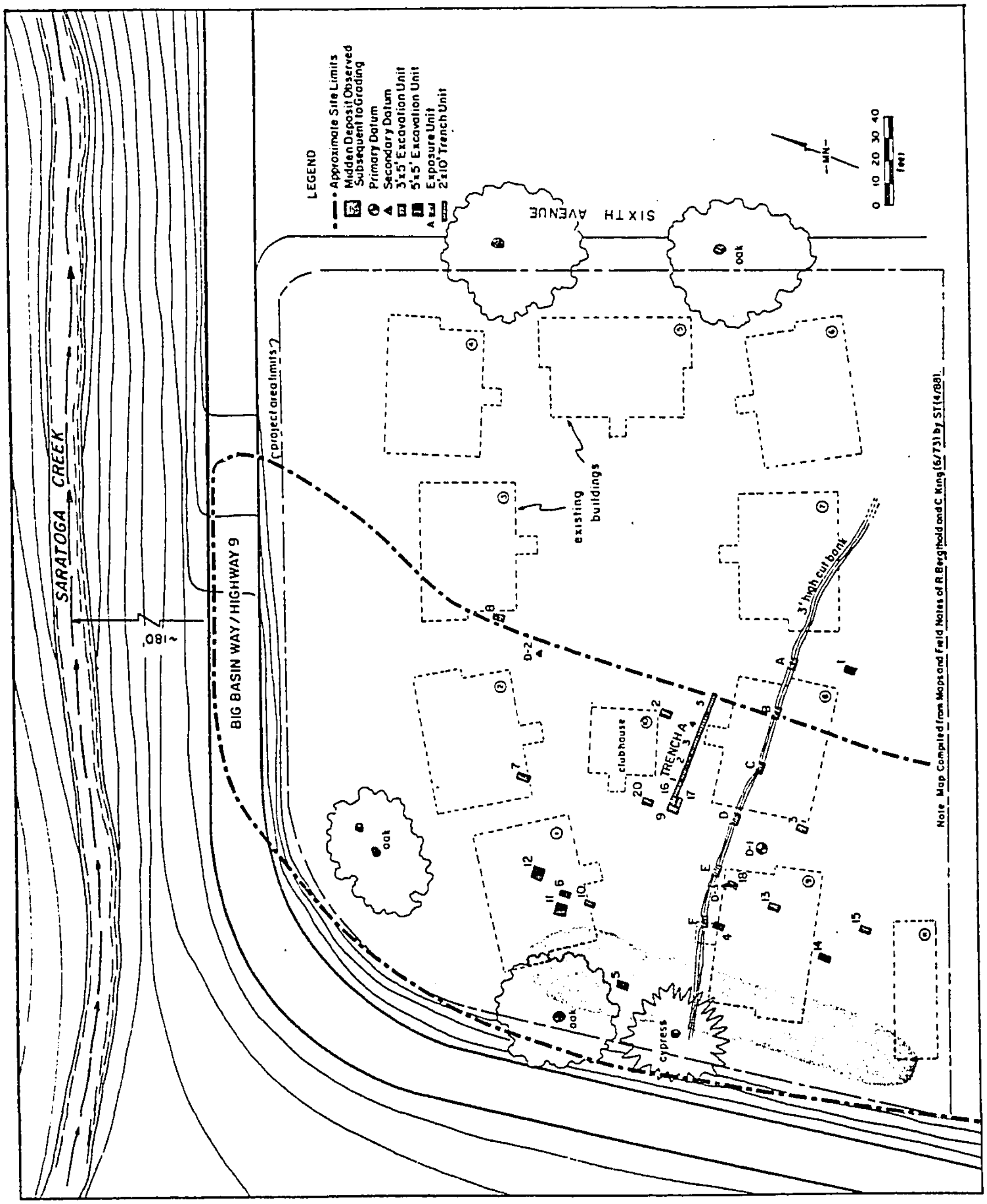


Figure 5. Site Map of CA-SCl-65.

Artifacts that have no provenience at all were catalogued as surface finds with a general reference as to where on the site they were found. These locations were given in terms of the staked-out sites of the planned building (see Figure 5). Artifacts with minimal provenience were given an approximate depth and more exact position relative to a building, for example SW corner of building #9, 10-20 inches below the surface. These locations are very rough and were collected after bulldozing thus these artifacts were still considered without provenience. Undoubtedly many groundstone tools were either destroyed or lost during the leveling of the site.

Handstones

Handstones constituted the largest population of groundstone artifacts from SCl-65, with 86 complete and fragmentary specimens, or 21% of the total groundstone assemblage. A total of 37 of these were complete while 49 were fragments. The predominant material of these handstones was a local sandstone found in abundance in nearby Saratoga Creek. Only nine specimens were made of other rock, three of quartzite, two of ryholite, and four of a granitic rock.

The handstones from the Saratoga site were classified into basic morphological types based on three major classes of attributes. These attributes were based on three observed distinctions noted in the assemblage. The attributes utilized in this study were: the degree of shaping, the number of wear surfaces, and the shape of those surfaces. The degree of shaping was:

> ...selected as an attribute to determine whether, and to what extent artifacts were purposefully modified for particular methods of use (Mikkelsen 1989: B2).

Two variations were recognized. Handstones which exhibited any form of deliberate or purposeful modification (eg.) pecking or battering along the margins or ends which tended to add symmetry to the tool were considered shaped. Handstones that lacked these characteristics were considered unshaped.

A traditional method in typing handstones is counting the number of wear faces per specimen. This attribute is used to distinguish the amount of use any one handstone received. Three classes were identified: unfacial, bifacial, and the trifacial handstones that display wear on three distinct faces.

The last attribute is more closely related to the specific functional aspects of handstone use. The shape of the wear facets in cross-section indicates the motion or method a handstone is rubbed or pushed across a millingslab. This curvature or arc varies with the amount of pressure being applied on the wear surface. These arcs, as measured with the methods described in the last chapter, were broken down into three shapes. Surfaces with more than 122mm of arc were considered to be flat. Flat wear surfaces are indicative of constant pressure and contact with the grinding slab.

Slightly convex surfaces were determined to fall between 76 mm and 122 mm of arc. Convex surfaces were gauged to be between 45 mm to 75 mm of arc. Both convex and slightly convex shapes are formed when less pressure and contact is applied to the lower stone. Besides these basic attributes each handstone was examined for the following secondary attributes: beveling, center depressions, pecking, striations, and the number of wear facets for each wear face. The striations were measured relative to the long axis and termed as either perpendicular, parallel or angled. The sides and ends of each specimen were also examined for battering and shaping and were described as to their general shape (i.e. flat, convex, irregular, rounded and squared), using the same method that was used on the wear faces. These data were collected in order to form the best possible body of data on the handstones from the site. All the raw data for each of class of groundstone are presented in Appendix A.

Based on the three major attributes five basic types each with two or three subtypes were developed for the handstones from SCl-65. Table 5 presents these types without segregating out those without provenience.

Table 5: Morphological Types for all Handstone from SCl-65

	Convex	Slightly Convex	Flat	Total
1. Unshaped/Unifacial	10	13	19	42
2. Shaped/Unifacial	1	1	4	6
3. Unshaped/Bifacial	6	5@	6#	17
4. Shaped/Bifacial	1	6~	12*	19
5. Shaped/Trifacial	0	1	1	2
				86

(Key: ~ = two specimens that have one face that are convex, * = four specimens that have one face that are slightly convex and/or convex, # = two specimens that have one face that are slightly convex. @ = one specimen with one flat face) Note: These types have some variation as noted in the following tables. Specimens were lumped into secondary types according to the surface with the most visible wear.

The handstone types without provenience which represent 59% of the total assemblage of the handstones from SCl-65, are presented in Table 6. Figures 6, 7, 8, 9, and 10 provide some illustrations of these types.

Table 6: Morphological Types for Handstones without provenience

	Convex	Slightly Convex	Flat	Total
1. Unshaped/Unifacial	5	8	9	22
2. Shaped/Unifacial	0	0	4	4
3. Unshaped/Bifacial	4	2	5#	11
4. Shaped/Bifacial	0	3~	9*	12
5. Shaped/Trifacial	0	1	1	2
				51

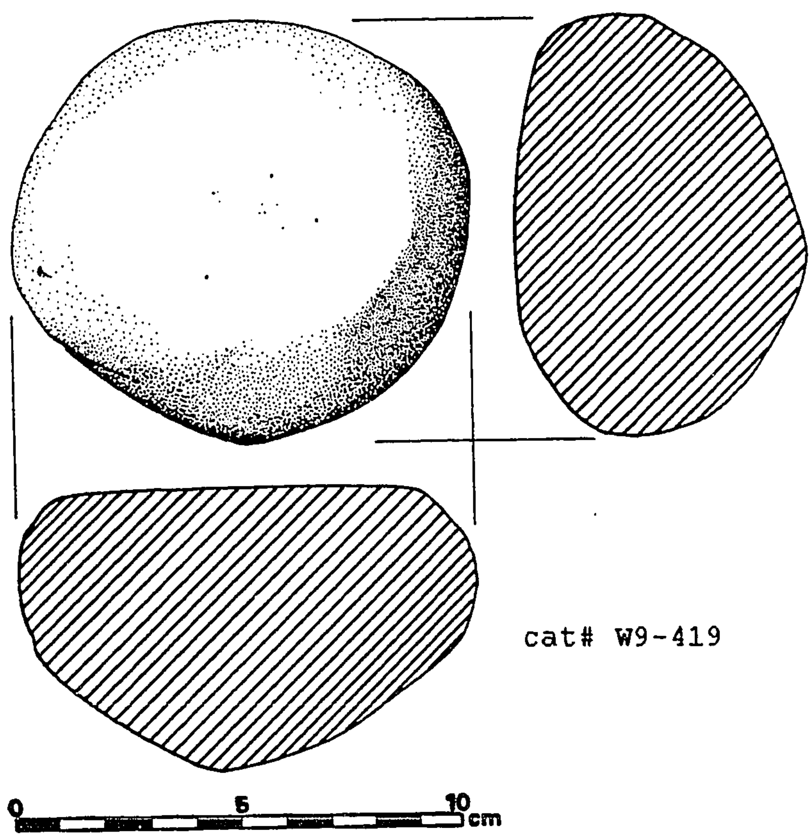


Figure 6. Unshaped unfacial (flat) Handstone.

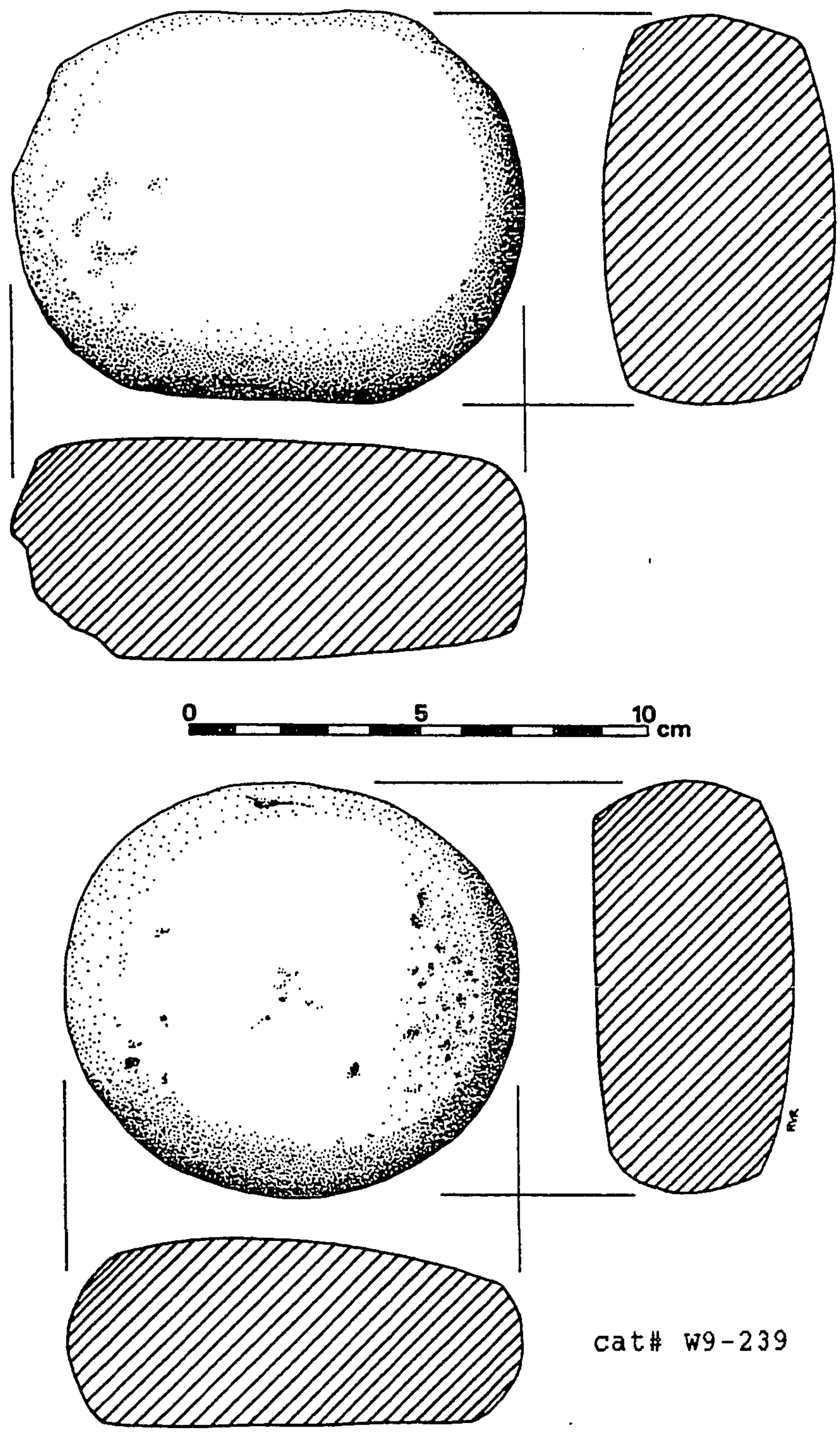


Figure 7. Shaped Bifacial (flat) Handstones.

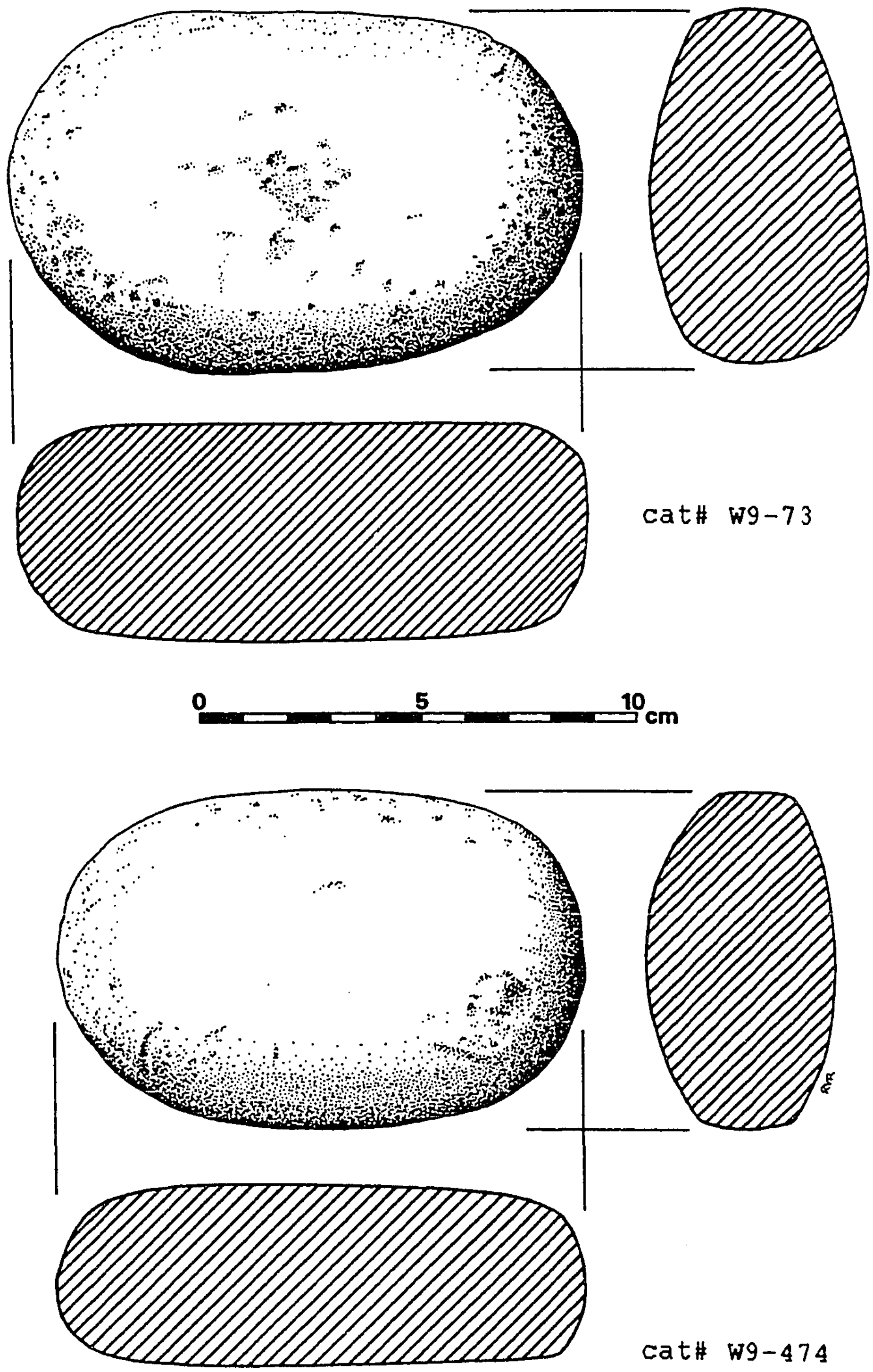


Figure 8. Shaped Bifacial Convex and Slightly Convex Handstones.

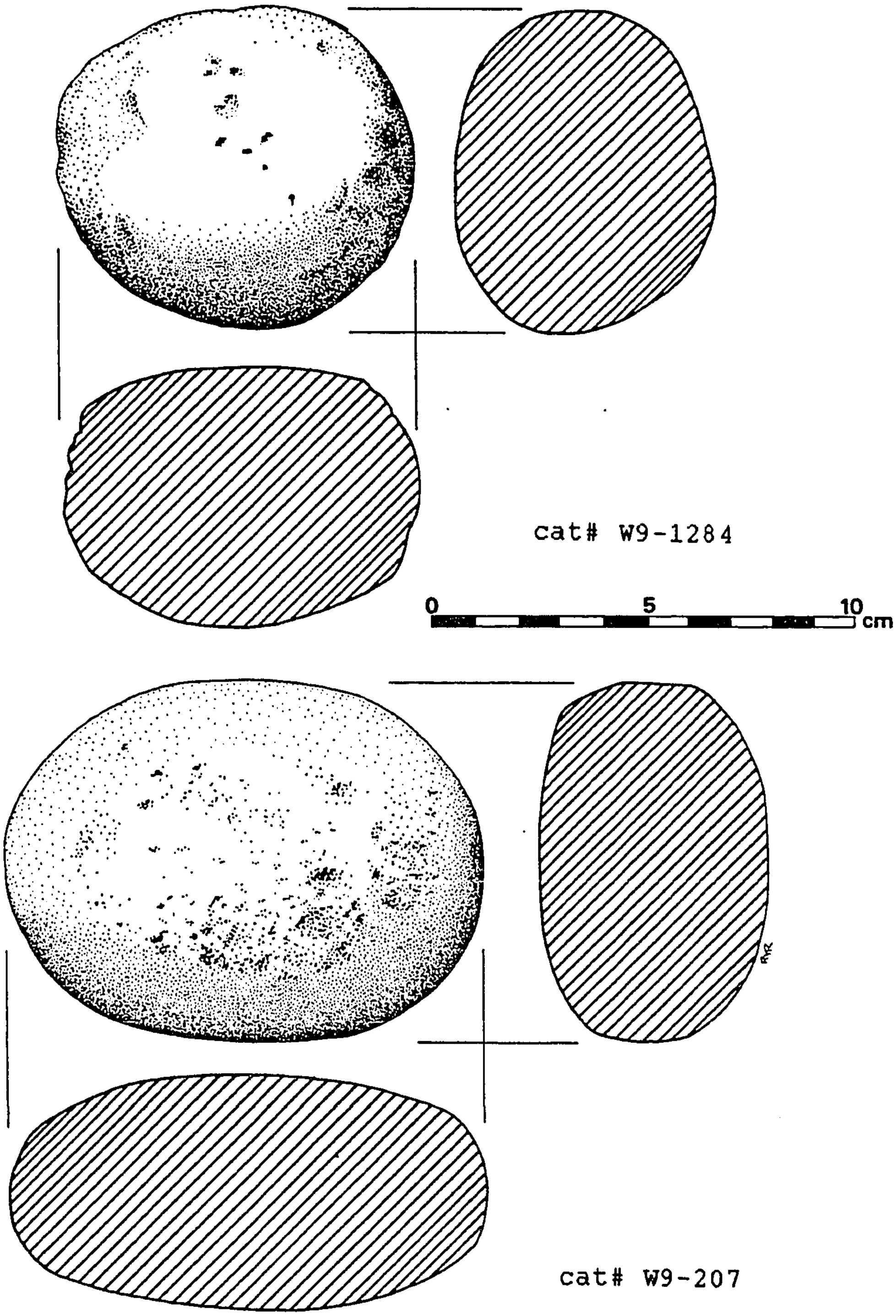
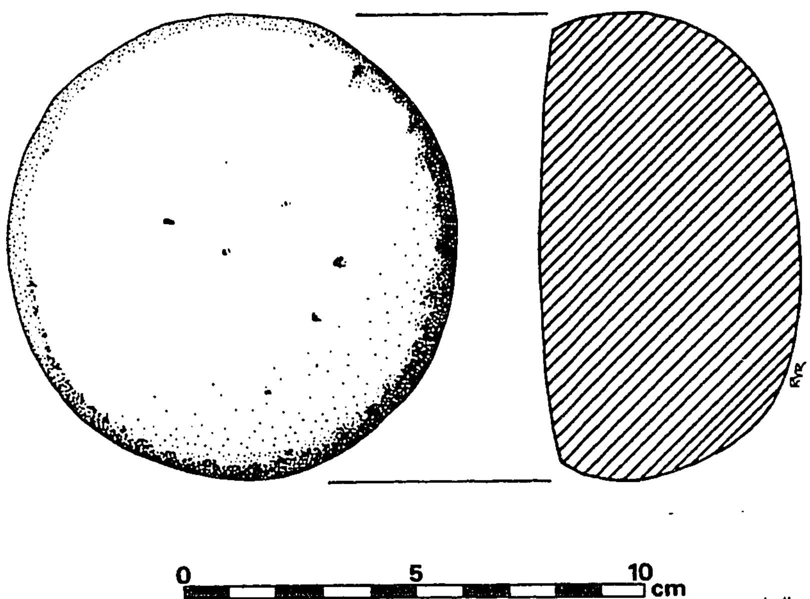


Figure 9. Shaped Unifacial Convex and Shaped Slightly Convex Handstones.



cat# W9-208

Figure 10. Shaped Unifacial (flat) Handstone.

A total of 27 (54%) of these non-provenienced specimens are whole while 23 (46%) of them were fragments large enough to be classified. The unshaped unifacial specimens make up 43% of the non-provenienced handstones, the shaped bifacial type 24%, the unshaped bifacial 21%, shaped unifacial 8%, and the unshaped trifacial 4% .

Table 7 presents the handstones with provenience, a total of 41% of the handstone assemblage from the Saratoga site.

Table 7: Morphological Types for Handstones with provenience

	Convex	Slightly Convex	Flat	Total
1. Unshaped/Unifacial	6	5	9	20
2. Shaped/Unifacial	1	1	0	2
3. Unshaped/Bifacial	1	2@	3	6
4. Shaped/Bifacial	1	3~	3*	7
5. Shaped/Trifacial	0	0	0	0
				35

(Key: @ = one specimen that has one flat face, ~ = one specimen with one convex face, * = one specimen with one face that is slightly convex.

Twenty-five (69%) of these artifacts are fragments while 11 handstones (31%) are whole. Unshaped unifacial handstones comprise 57% of the provenienced handstones, shaped bifacial 20%, unshaped bifacial 17%, and shaped unifacial 6% of the assemblage from the site.

It is apparent from these two tables that the numbers of each type parallel each other fairly well between handstones with and without provenience. The unshaped unifacial tools are the predominant type of handstone from SCl-65.

The flat surfaced types are only slightly more numerous than the combined unshaped unifacial convex and lightly convex handstone types, a pattern which is reflected in the non provenienced handstones as well.

An examination of the secondary attributes of the flat unifacial handstones reveals an uneven distribution of wear patterns. All of the specimens in this subtype exhibited polish, and or pecking. Beveling along the margins of the wear surfaces was evident on six provenienced specimens, while only three of the non-provenienced handstones showed some beveling. Combining both provenienced and non provenienced unshaped unifacial flat surfaced handstones a total of 56% had striations, 28% had perpendicular striations, 17% had angled, and 11% had parallel striations. The uneven distribution of striation patterns on these handstones probably is the result of their use on many different resources each requiring a different grinding process. The overall lack of distinctive patterned wear indicates that these tools served generally in a variety of immediate tasks seemingly not related to each other.

The slightly convex and convex unshaped unifacial handstones are more problematic. Most of the provenienced specimens from these two types exhibit polish and pecking and yet few are beveled. This is in contrast with the same subtypes from the non provenienced handstones, where several are beveled, one is bifacted, and another has a central depression. Overall the tools of these subtypes were probably used for many tasks, but perhaps were kept in use longer than many of the flat unshaped unifacial tools before being replaced or disregarded.

The next most numerous class of handstones are the shaped bifacial specimens, seven provenienced and 12 with no provenience. These tools all have wear on both faces and have been altered enough to be considered shaped beyond their original form. The provenienced specimens contained two with all flat surfaces, one with a flat surface and a slightly convex surface, one with a convex and slightly convex surfaces, one with two convex surfaces, and two specimens with all slightly convex surfaces. Only a single handstone of this subtype had a central depression, while all but three had visible striations. The striations were either angled or parallel to the long axis of the wear surface or both. All the ends of these handstones were shaped by pecking and/or battering and two had squared ends. Oddly only one handstone was bifacted. The shaped bifacial handstones without provenience follows the same pattern as those with provenience exhibiting a variety of arc wear on each face of the handstone. Flat surfaced specimens are the most numerous (5), while four had both flat arcs and slightly convex and/or convex surfaces on either side of the handstone. Only three of these shaped bifacial handstones had slightly convex arcs on each wear surface. In keeping with the pattern of the provenienced handstones of this type, only one specimen of the non-provenienced handstones had a central depression. However, there were three bifacted specimens and a greater variety of striations found in this group. Two specimens had squared ends and all were pecked on the sides or the end, which is an attribute requisite for inclusion to the type. In terms of the shape the most common was a general oval shape with 68% of the handstones from both the provenienced and non-provenienced having that form. Only 21% had squared or "loafed" ends while 26% exhibited battering on the ends. Striations were visible on 63% of the combined specimens for this type of handstone, of which 42% had parallel and/or angled striations while the remaining 21% had striations perpendicular to the long axis.

The frequent pairing of flat surfaces with slightly convex or convex opposite faces suggests that: (1) they were used for different unrelated activities; (2) or were used for different tasks or stages of a single processing activity (Mikkelsen 1989). Flat surfaces are thought to be indicative of heavy grinding, while convex surfaces are attributed to lignt grinding or shelling. Only a total of four specimens were bifaceted. The presence of multifacets on a single wear surface is indicative of intensive grinding because of the uneven pressure placed on the handstone during the grinding action. The handstones with transverse or perpendicular striations, and/or angled striations, are also indicative of a heavy grinding action. Significantly only two (10%) of this type of handstone had central depressions.

When viewed together the provenienced and non-provenienced handstones of this type represent the most formal handstones in the assemblage and probably were associated with specific resources that required differential processing tasks.

The unshaped bifacial handstones are the next most numerous class of handstones from SCl-65. A total of 17 were recognized in this class, six with provenience and 11 without provenience. The distribution of subtypes of the non-provenienced handstones of this type is as follows: four (36%) have convex faces, two (18%) slightly convex faces, three (27%) with flat faces and two (18%) with both both flat and slightly convex surfaces. The provenienced subtypes were: one (17%) with convex faces, one (17%) with a slightly convex face and flat face, one (17%) specimen with a flat surface and a convex surface, one (17%) with two slightly convex surfaces and two (33%) with a flat faces. When the two are combined the distribution of subtypes is fairly even: five (29%) convex, three (18%) slightly convex, five (29%) with flat surfaces, and the remaining four (24%) with a mixture of different surfaces. Five of the six provenienced specimens have striations, four of which are parallel to the long axis and two perpendicular. Two handstones have central depressions and one handstone exhibited some beveling along the edges. Seven of the non-provenienced handstones had striations, five with either parallel or angled striations and two with perpendicular striations. Four of these had central depressions, and four had some beveling along the edges.

The presence of the striations on 70% of the combined provenienced and non-provenienced handstones of this type, along with the beveling found on 29% of the specimens, indicates longer retention and use of these tools than other unshaped handstones from the site. However, none of these tools were multifacted which suggests that they were not used for heavy grinding activities. Of note in this type is the relative high number of handstones (six) with central depressions. Central depressions are thought to be related to the use of the handstone as a anvil stone in the cracking of nuts or similar hard resources. These wear patterns may have resulted after the tool was disregarded as a grinding implement, or may have resulted from a sequential resource processing activity that required both cracking and grinding.

Shaped trifacial handstones are the last type represented at the Saratoga site. Only two specimens--both without provenience--are in this type. The first one is made of ryholite material with polished surfaces on the two principal faces and on one edge. The other edge is missing and may have also been ground. All the ground surfaces were convex, and the one existing edge was beveled. The main faces were centrally pecked and one end was battered. The second specimen is made of sandstone and has wear on two faces and one side. This tool is less shaped with only some pecking along the edges. It has no central depressions and is not battered. Neither of these tools had any striations on them. It can be speculated that the ryholitic specimen may have been a multifunctional tool of some sort, while the sandstone handstone seems to be a more expedient tool.

The following observations pertain to the assemblage as a whole. Forty five handstones (52%) had some manner of striations visible on the wear surfaces. Of these tools with striations 22 (49%) were unifaces, while 23 (51%) were bifaces. Only eight of the bifacial specimens had striations on both sides, while 15 had striations on one face.

Forty two handstones (48%) showed some form of bevelling, 23 had some degree of battering (27%), 11 (13%) had centıal depressions, nine (10%) were thermally affected, and one had traces of red ochre on it.

These figures seem to suggest that the handstone assemblage from SCl-65, although diverse in nature is essentialy dominated by expedient tools evidenced by the lack of well formed and well worn "curated" handstones. The differential wear surfaces found on the handstones from the site suggests a variety of resources were processed that required a number of dissimilar tasks for consumption. Wear evidence indicates secondary or final processing of foods as well as heavy grinding was practiced at the site.

Millingslabs

Sixty-threes millingslabs were recovered from the Saratoga site, including 33 complete specimens and 30 fragments. These tools represent nearly 16% of the total groundstone assemblage from the site. Unfortunately only 14 of these artifacts have provenience while the rest of the assemblage was unearthed by bulldozers and can only be roughly located on the site. All 63 millingslabs are made of the locally abundant sandstone. Like the handstones from SCl-65, the millingslabs were classified into morophological types based on a series of attributes.

The first attribute used for classifing millingslabs was the amount of shaping a tool had. Slabs which had been modified by reducing the bulk by removing portuberances, or had been pecked, battered, or spalled along the margins or bottom that increased either their symmetry or stability were considered shaped. Milling tools that had little (10% or less) alteration along its margins or bottom were considered unshaped.

The second attribute used was the number of wear faces the grindingslabs had. Slabs that had wear which includes grinding, battering, or pecking on two distinct faces were considered bifacial millingslabs. The presence of more than one worn face on a millingslab suggests either a favored status for a particular tool, or that it may have had dual functions in the processing of certain resources.

The third attribute utilized was the depth of the grinding area as measured below a plane that intersected two points on the outer rim of the tool to the deepest part of the wear pattern. The depths of milling tools has been tied to several implications: (1) the type of resource being processed, (2) the kind of movement being used, (3) the amount of material being processed, and (4) the amount of time a tool has been in use.

Grinding equipment with no depth on their wear surfaces up to 0.3 cm of depth were considered grinding slicks. There is little agreement in the archaeological literature on what consitutes a shallow basin slab from a deep basin slab. This is in part due to the fact that milling tools come in such a wide variety of forms across the state. What would be considered a deep millingslab in northern or central California might well be considered shallow compared to "classic" specimens found in southern California. For the present collection distinctions of shallow verses deep were based upon a distribution curve of all the depths. Based on this distribution pattern all grindingslabs ranging from 0.3 cm to 1.2 cm in depth were considered shallow. Specimens 1.3 cm deep and below were considered deep.

A related attribute is the shape and size of the wear pattern or basin. These attributes of the basin relates to the motion being used to process resources and what those resources might have been. Besides these attributes consideration was given to the pattern of striations, pecking, polish, as well as the overall thickness, size, and weight of each specimen.

In addition the whole millingslabs were divided into types that reflected differences in their sizes in order to address if a particular specimen was portable or not. The question of portablity of groundstone tools could have direct implications on the function and duration of site use. It is the author's belief that due to the abundance of materials suitable for use as groundstone artifacts found around the site, that it is unlikely that there was any real need to transport groundstone tools from site to site. Nevertheless there exists two primary types of grinding slabs according to size and weight: block for the larger heavier specimens and slab for the smaller lighter forms. Millingblocks tend to be irregular in shape and range in length from 30 to 48 cm, and 16 to 35 cm in width. Their thickness range is quite variable, even within a single specimen. Their weight range is from 13 to 36 kilos. Millingslabs have more of a regular shape, and tend to be less thick than the millingblocks. Their lengths range from 18 to 29.5 cm and their widths 6.5 to 16 cm. They range in weight from 3 to 12 kilos. Based on the attributes listed above the grindingslabs from the Saratoga site were placed into 4 basic types and 6 morophological subtypes, as presented in Table 8.

Table 8: Morphological Types for Millingslabs from SCl-65

	Unf. Slk.	Bif. Slk.	Unf. Sh.	Bif. Sh.	Unf. Dp.	Bif. Dp.	Total
1. Unshaped Blocks	7	3	3	-	2	-	15
2. Shaped Blocks	-	3	3	2	1	1	10
3. Unshaped Slabs	10	2	11	2	2	-	27
4. Shaped Slabs	1	4	5	-	1	-	11
							63

Key Unf. Slk.= Unifacial slicks, Bif. Slk.= Bifacial slicks, Unf. Dep.= Unfacial shallow, Bif. Sh.= Bifacial shallow, Unf. Dep.= Unfacial deep, Bif. Dep.= Bifacial Deep.

Table 9 presents the grinding tools without provenience from the Saratoga site.

Table 9: Morphological Types for Millingslabs without provenience

	Unf. Slk.	Bif. Slk.	Unf. Sh.	Bif.Sh.	Unf. Dep.	Bif. Dp.	Total
1. Unshaped Blocks	7	3	3	-	2	-	15
2. Shaped Blocks	-	3	1	2	-	-	6
3. Unshaped Slabs	8	1	6	2	2	-	19
4. Shaped Slabs	-	4	4	-	1	-	9
							49

Of these 49 specimens 23 (47%) were typeable fragments, while 26 (53%) were complete. Unshaped slabs consituted the largest group with 19 specimens (39%), while unshaped blocks were the next largest with 14 specimens (29%), followed by 9 shaped slabs (18%) and lastly shaped blocks with 7 (14%) specimens. Those with provenience are presented in Table 10.

Table 10: Morphological Types for Millingslabs with provenience

	Unf. Slk.	Bif. Slk.	Unf. Sh.	Bif. Sh.	Unf. Dp.	Bif. Dp.	Total
1. Unshaped Blocks	-	-	-	-	-	-	-
2. Shaped Blocks	-	-	2	-	1	1	4
3. Unshaped Slabs	2	1	5	-	-	-	8
4. Shaped Slabs	1	-	1	-	-	-	2
							14

Of the 14 specimens with provenience eight (57%) were whole, while six (43%) were typeable fragments. As with the non provenienced grinding slabs, the unshaped slabs were the most numerous with eight specimens, or 57% of the total. This type is followed by the shaped blocks with four specimens (28%), followed by two shaped slabs (14%). Due to the overall lack of provenienced specimens any discussion of the types found at the site must include the non-provenienced grinding tools. When viewed as a whole the most numerous general type of millingslab found at the Saratoga site is the unshaped slabs, with 27 examples representing 43% of the total assemblage. The next largest group are the unshaped blocks with 15 specimens (24%), followed by 11 shaped slabs (17%) and lastly 10 shaped blocks for the final 16% of the assemblage. Figures 11, 12, and 13 present a sample of the types represented at SCl-65. A closer examination of the grinding slabs reveals that the unshaped unifacial shallow slabs and the unshaped unfacial slicks are the predominant subtypes of grinding tool at the Saratoga site. The two closely related types represent 35% of the entire assemblage of millingslabs. The only distinction between these two subtypes is depth of wear. The signifcant secondary attribute of these subtypes is the lack of distinctively shaped wear patterns. Of these 21 specimens only six had wear patterns that were other than irregular. Of these six, three were oval shaped, while three were angled. The bulk of the tools in these two subtypes exhibited a variety of different wear ranging from striations, pecking, and polish to simple polishing or pecking. The remaining six specimens from the unshaped slab type are evenly divided between bifacial slicks, bifacial shallow basin slabs and unfacial deep basin slabs.

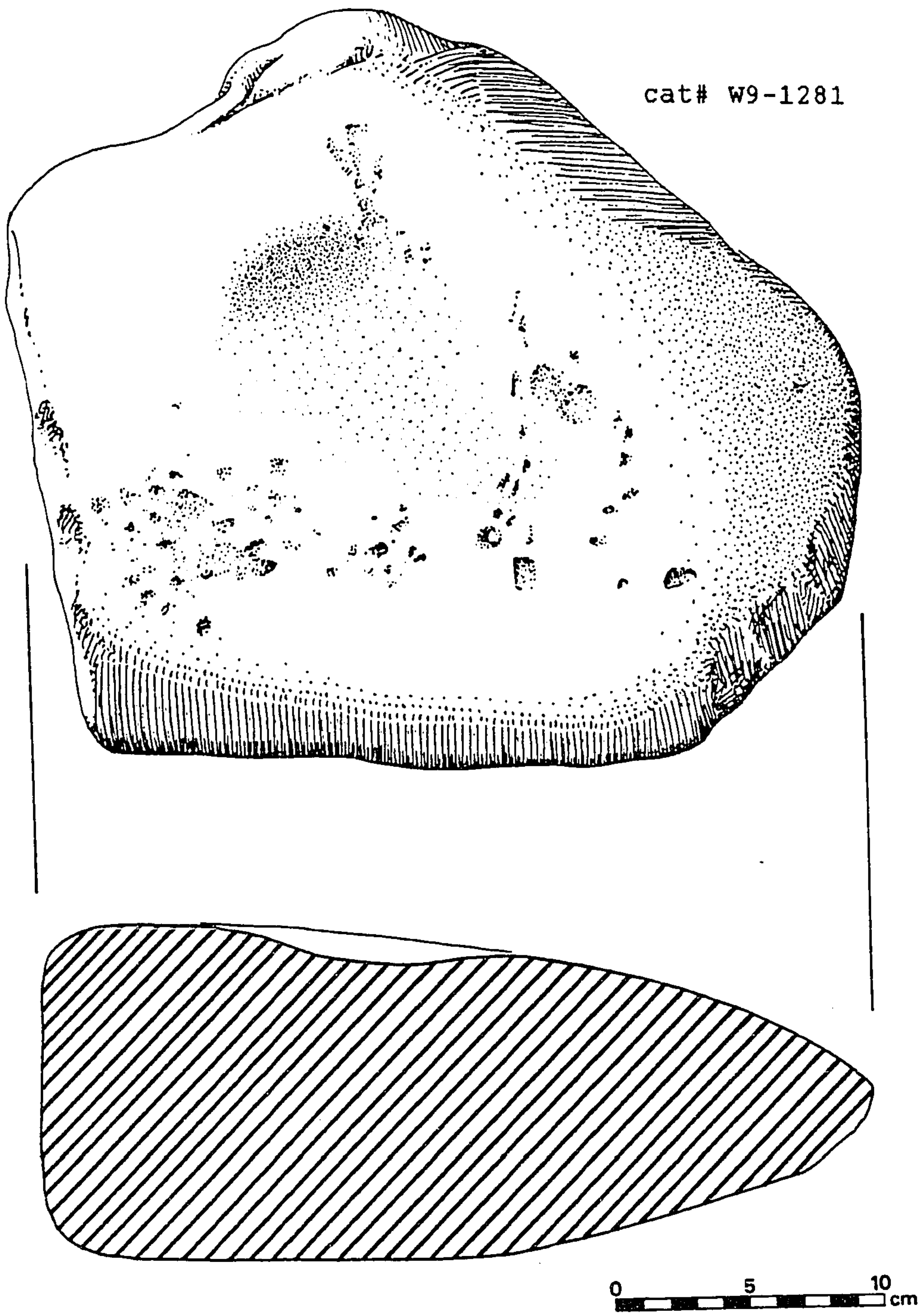


Figure 11. Shaped Unifacial (shallow) millingblock.

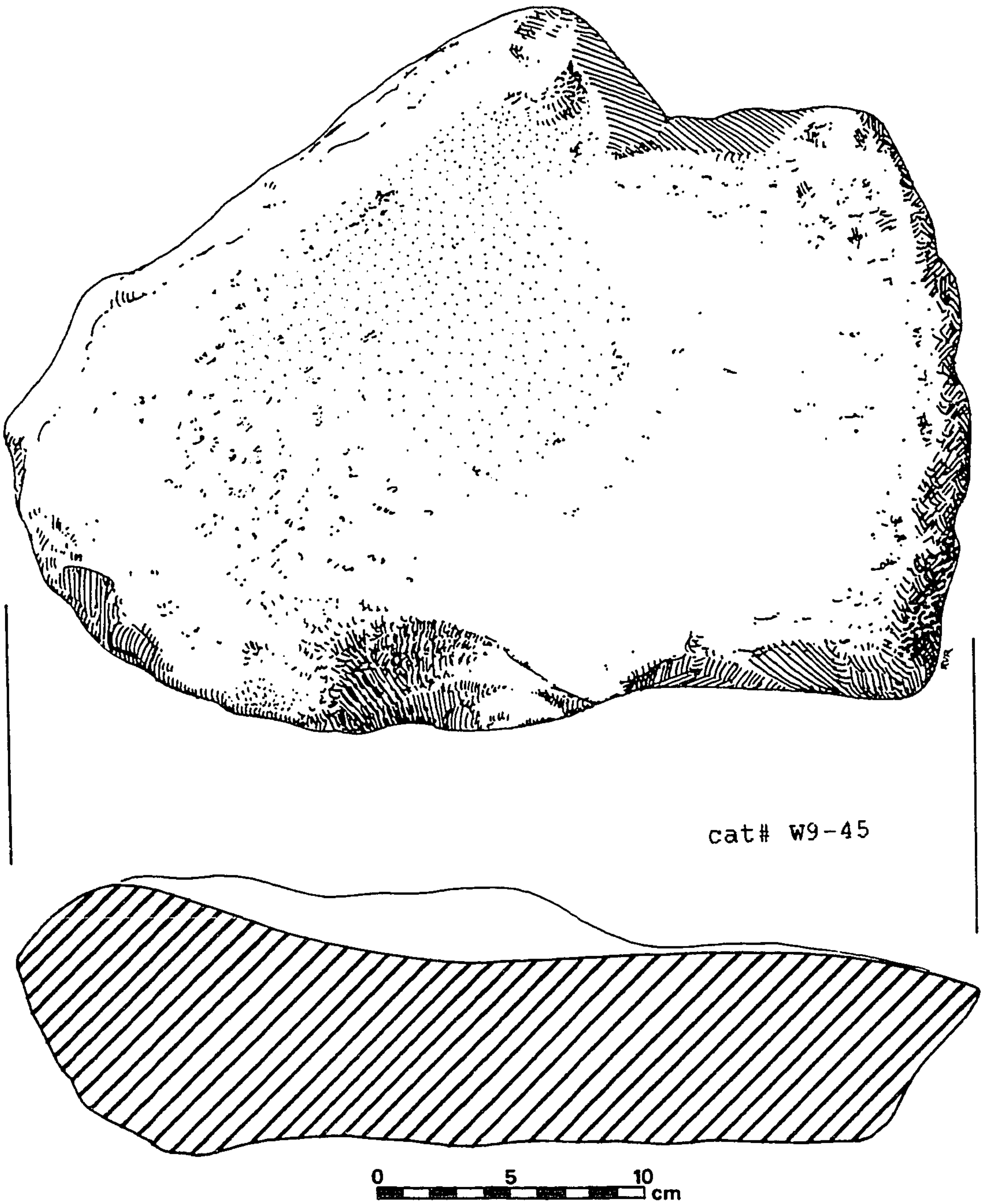


Figure 12. Shaped Unifacial (shallow) millingslab.

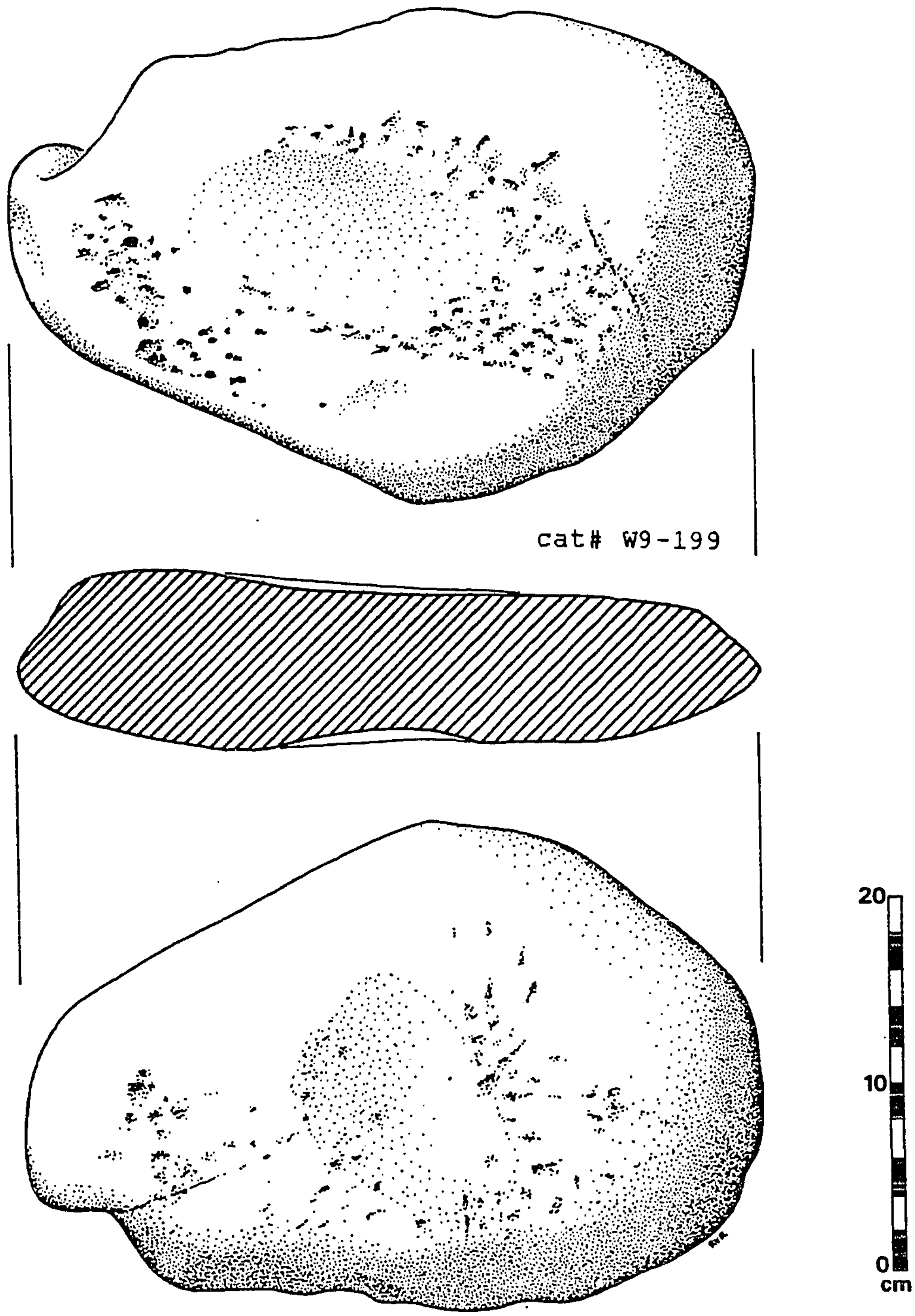


Figure 13. Shaped Bifacial (shallow) millingblock.

The next largest type of grinding implement found at the Saratoga site is the unshaped millingblock. These specimens are characterized by their bulk and weight. Fifteen of these specimens were recovered representing 24% of the entire assemblage. Only one of which has provenience. The most numerous subtype of this group are the unfacial slicks. Seven specimens consitute this subtype all without provenience. Six of these seven specimens were complete. The largest specimen (catalog # W9-427) weighted over 24.5 kilos, the smallest (cat # W9-365) 9.6 kilos. As with the unifacial slabs there was a general lack of distictive wear pattern on their grinding surfaces. Each of these specimens had polished surfaces but only three exhibited pecking.

Pecking is indicative of at least three activities: use of the milling tool as an anvil, use as a mortar, and re-roughing of a surface to increase the efficiency of the grinding (Mikkelsen 1989). It may also be indicative of shaping which is not applicable to the type being discussed. None of this group of milling tools had any striations or traces of residues. Only two of the seven had wear patterns that were not simply irregular. One tool (cat # W9-370) had a oval shaped wear pattern and another (cat # W9-142) had a angled pattern. A corresponding attribute to the irregularity of their wear surfaces was the small size of these surfaces. The other eight unshaped millingblocks are spread between three subtypes, bifacial slicks (3), unfacial shallow basins (3), and two unfacial deep basin tools. The unshaped bifacial slicks were all complete with the largest weighing over 28 kilos. In concert with their greater use the wear surfaces were larger, more distinct, and exhibited a greater variety of wear patterns than the unfacial types. Specimen W9-48 had an oval shape to its wear pattern, was 33 x 20 cm in size and was highly polished. The backside of this tool also had a large grinding area (31 x25 cm). The other two specimens (W9-319 and W9-399) both exhibited polish and pecking with large wear areas on each 25 x 15 cm and 18 x 10 cm respectively. The backside of W9-399 had been used as an anvil and W9-319 was polished on both sides. The unfacial shallow basin millingblocks are represented by three specimens, only one of which was complete. This millingblock represents the largest specimen in the assemblage which measures 48.5 cm by 35 cm by 17 cm and weighs over 35 kilos. Its grinding surface is oval in shape and measures 42 by 26 cm and is 0.5 cm deep. The other two tools are less massive but had deeper basins of 1.0 and 1.2 cm and are considerably smaller wear surfaces. The last of the millingblocks are two unfacial deep specimens (cat #'s W9-42 and W9-270). Specimen 270, has a basin 2.8 cm at its deepest point, is roughly circular in shape, and has striations, polish and pecking on its surface. This is the deepest basin in the assemblage. Specimen 42, has a basin of 1.4 cm which is only polished.

The next most numerous type of milling tool found at the Saratoga site are the shaped slabs with a total of 11 examples. Unlike the previously discussed types these tools indicated a deliberate degree of shaping. In most cases this shaping took the form of pecking along the margins and/or flake scars where protuberances were removed. As might be expected the shaped milling tools were less bulky and had a higher degree of utiliziation. Two of these 11 have provenience while the rest were surface collected "apres" bulldozing. These 10 fall into three subtypes. The most abundant of these subtypes are the bifacial slicks and unfacial shallow basin slabs with four and five examples respectively. The unfacial shallow slabs are all complete specimens. All are both polished as well as pecked and all but one have irregular wear on their surfaces. One specimen (cat # 1282) is of particular importance due to its association with an important feature found at the site. This complete tool weighed a relatively light 5.6 kilos and had a irregular wear pattern that was large (18 x 18 cm) and was 0.5 cm deep. The only one of this subtype with a discernible wear pattern was tool 389, which had a circular pattern. In contrast all the shaped bifacial millingslicks are fragmentary which may be the result of extensive use. None of these four pieces were found to match, thus are presumed to be four different tools. All four were polished and pecked. Two of the four have striations as well and one of these is thermally affected. The last two subtypes of this group are the unifacial slicks and the unifacial deep slabs each with only one representative each. The single shaped unfacial slick is tool 1208, which is a fragment 15.9 cm long, 8.4 cm wide and 7.4 cm thick. It was polished as well as pecked and has a irregular wear pattern. The single unfacial specimen was also a fragment (26.7 x 17.3 x 12.1 cm), was also pecked and polished in an irregular pattern, but had a depth of 1.6 cm. The least numerous group of grinding tools at SCl-65 are the shaped blocks with a total of 10 examples. The shaped blocks were placed into five of the six morphological subtypes. Only unifacial slicks were not represented in this general type. Six of these 10 had no provenience while the remaining four did. The two most numerous subtype were the bifacial slicks and the unfacial shallow basin each with three specimens apiece. The bifacial slicks (cat #'s W9-48, 319, and 399) were all without provenience, each weighed over 12 kilos. They all were polished and two of them were pecked as well. Each had large wear surfaces, yet all had different patterns of wear, (oval, angled, and irregular). Of the three unfacial shallow specimens (cat #'s W9-150, 1280, and 1281) one was without provenience while two had provenience. The specimen without provenience (150) weighed over 21 kilos, had an irregular basin 1cm deep and was pecked. The other two tools (1280 and 1281) are signifcant--like the shaped milling slab (1282)--because of their direct association with a feature. One of these two is illustrated in Figure 12. Both of these specimens are complete and each weighed over 25 kilos, and both have irregular wear patterns of approximately the same size and depth (1cm). Tool 1280 had striations and polish on its surface while 1281 was pecked as well as polished. Additionally tiny bits of red ochre were observed around the basin of 1280, the only grinding tool on the site with direct evidence of red ochre use. These tools along with of a host of other groundstone tools found with this important feature will be discussed in concert with the other data. The remaining subtypes within the shaped blocks type include bifacial shallow (2), unfacial deep (1), and bifacial deep with one specimen. Bifacial shallow specimen W9-199 (Figure 14) is complete, with an oval pattern of polish and pecking on both sides. The basins are 0.6 and 0.4 cm and are farily large. The second shaped bifacial shallow block specimen W9-200 is a fragment (36.5 x 23 x 13.5) that weighed 14.8 kilograms. Both faces of this tool were polished with pecking along the edge. One wear surface was oval in shape while the other was irregular. The depths of these faces were 1.0 and 0.5 cm respectively. The unifacial deep shaped milling block (W9-1356) had provenience, is complete and had striations, was highly polished and was pecked. The basin is 1.5 cm deep with a groove in the center of the wear area, suggesting that it had a special function. The final specimen of the shaped milling blocks is tool W9-481, the second largest and third heaviest groundstone tool from the site. This complete tool weighs 24.6 kilograms, has an irregular wear pattern that is polished, and pecked, and is 2cm deep.

A review of all the data on the millingtools from the site reveals that unshaped blocks and unshaped slabs outnumber shaped blocks and slabs two to one. Forty-six of the 63 milling tools (73%) are unfacial while only seventeen peices of the assemblage (27%) have bifacial wear. Irregular shaped or ill defined wear patterns are found on 46 specimens, while just eight specimens (13%) have a combination of irregular and angled oval or circular wear patterns.

Clearly shaped wear patterns are found on but nine (14%) of the milling assemblage. Five specimens (8%) had oval shaped wear, two (3%) are angled, and two (3%) have circular shaped patterns. The vast majority of the tools (59 specimens or 93%) have some form of polish while 33 (52%) have both pecking and polish. Thirteen of these tools (20%) have striations in combination with pecking and/or polish. It is evident from these figures that shaped milling tools with well defined wear patterns are in the minority at the Saratoga site.

The lack of shaping on most of the these tools matches rather closely with the results from the handstones where the most numerous type represented was the unshaped unifacial handstone. Furthermore, the millingslabs and blocks by virtue of their lack of well defined wear patterns seemed to have been used in a variety of dissimilar processing tasks probably involving a wide array of resources.

Mortars

Sixty-two mortars were recovered from the Saratoga site, representing 15 % of the total groundstone assemblage. Fifty-three of these mortars were picked up after the site was graded, while the remaining ten were excavated from the site. Thirty-nine of the 62 mortars were fragmented while 23 were complete. All but three mortars were made of sandstone (specimens W9-214, 283, and 289). Following the same type of procedure used on the millingslabs and the handstones, mortars were classified into morphological types. The two most important attributes were the depth of the concavity, and the degree of shaping. Also important are the shapes of the concavities (oval, round, etc.), the presence of a rim, and the type of wear in the concavity. Other attributes used included thickness of the rim, type of wear surrounding the concavity, wear on the base, and the maximum length, width, thickness and weight of each tool.

The depths of each concavity were measured in the same fashion as the millingslabs (the lowest point as measured below two points on the outer rim). The depth of a mortar is a potentially important indicator of the type of food processed and the method employed. In addition to the depth of the concavity, the amount of shaping a mortar receives suggests the amount of time and energy invested in making the tool. The time, energy, and skill involved in forming a mortar indicates the relative role it played in the subsistence routine of its owners. In other words the degree of formal shaping these tools received is some indication of the importance placed on the function they served.

There are three basic types and four subtypes of mortars represented at SCl-65. The basic types are hopper or basket mortars, cobble mortars, and bowl mortars. The subtypes are unshaped and shaped hopper mortars, and unshaped and shaped cobble mortars. Bowl mortars by definition can not be unshaped. The hopper mortar is any stone with a mortar depression on it that does not have sufficient enough depth to retain the materials that are being processed. In lieu of a concavity an open ended basket was used to keep the materials being processed in place. Cobble mortars are simple river cobbles often with water worn depressions or pockets that have been expanded by pecking and battering into deeper, wider concavities. Bowl mortars which by late prehistoric times became very large finely made items, are cobbles that have been pecked, battered, and polished into deep bowls with well defined rims. As with the millingslabs any specimen with 10% or less shaping was considered unshaped. On many of the cobble specimens only rudimentary pecking or battering was in evidence on the otherwise unmodified cobbles. Table 11 presents the three basic mortar types and the four morophlogical subtypes found at the Saratoga site.

Table 11: Morphological Types for Mortars from SCl-65

	Unsh.	Shaped.	Total
1. Hopper Mortars	24	7	31
2. Cobble Mortars	16	13	29
3. Bowl Mortars		2	2
			62

Key: Unsh. = Unshaped.

As is readily apparent from Table 11, hopper and cobble mortars dominate the assemblage, with 24 (39%) unshaped hopper mortars as the single most numerous mortar type. Unshaped cobble mortars are the next most numerous, with 16 (26%) examples closely followed by 13 (21%) shaped mortars. Only seven (11%) of the assemblage were shaped hopper mortars, while bowl mortars constituted the smallest group with only two (3%) specimens. Table 12 presents the mortars without provenience from the site.

Table 12: Morphological Types for Mortars without provenience

	Unsh.	Shaped	Total
1. Hopper Mortars	20	6	26
2. Cobble Mortars	14	10	24
3. Bowl Mortars		2	2
			52

Of these 52 mortars, 30 (57%) were incomplete, while 23 (43%) were whole. The distributions of the types are essentially the same with the non-provenienced mortars, as with the provenienced mortars seen in Table 13.

Table 13: Morphological Types for Mortars with provenience

	Unsh.	Shaped.	Total
1. Hopper Mortars	4	1	5
2. Cobble Mortars	2	3	5
3. Bowl Mortars		-	0
			10

Of these ten specimens only two were whole. As with the non-provenienced mortars, unshaped mortars were the most numerous with four (40%), followed by three shaped cobble mortars (30%), two (20%) unshaped cobble mortars, and one (10%) shaped hopper mortar. Given that the distribution of types between the provenienced and non-provenienced mortars is similar the following discussion reviews the assemblage as whole. Figures 14, 15, 16, and 17, provide a sample of the types of mortars recovered from SCl-65.

The single most important characteristic of the unshaped hopper mortars is their shallow concavities. The average depth of the concavities is only 1.12 cms. There is no clear apparent pattern in the shape of these concavities as might be expected with hopper mortars, although the majority (16) have oval shapes. There are 13 whole

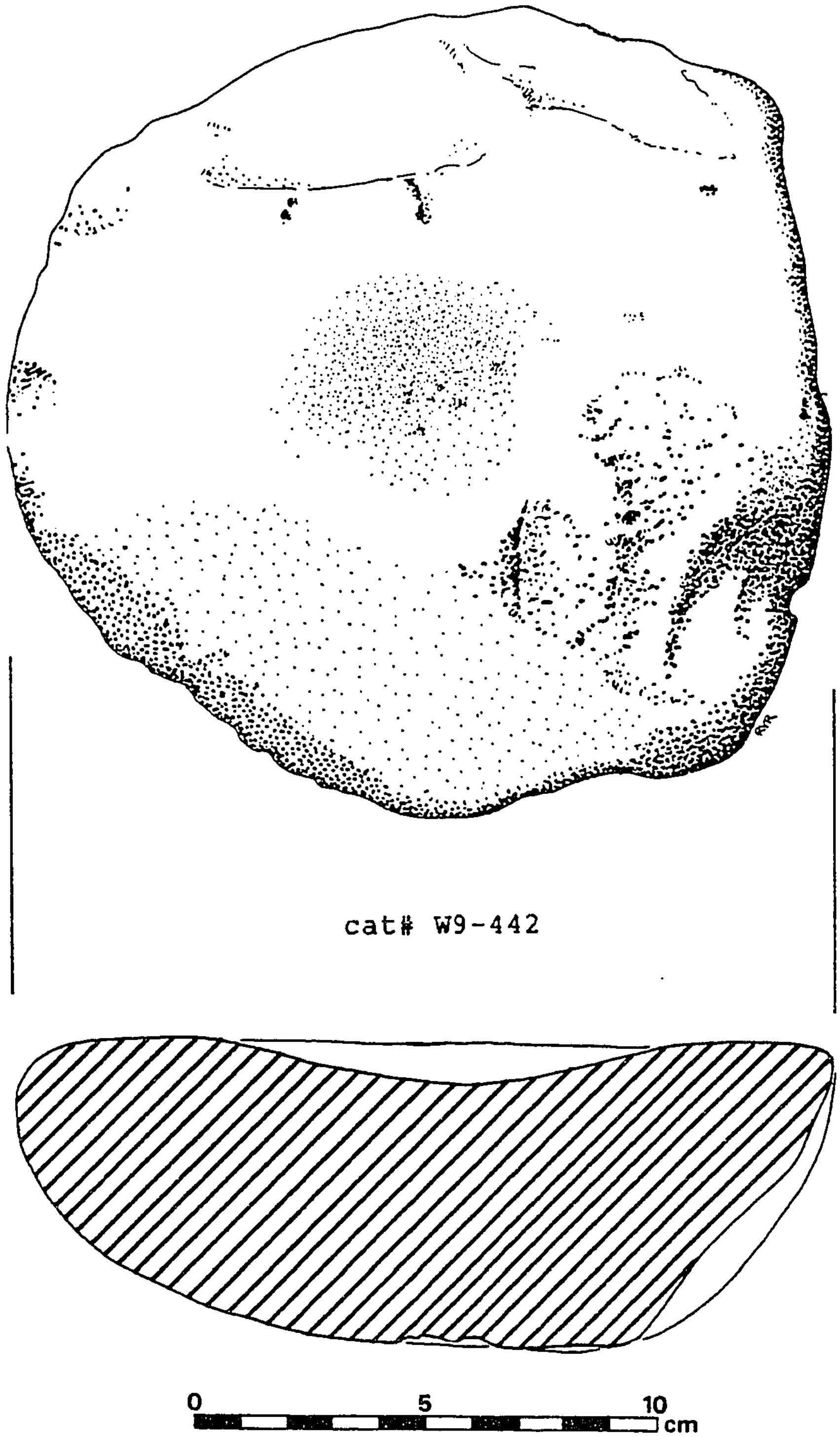


Figure 14. Shaped Hopper Mortar.

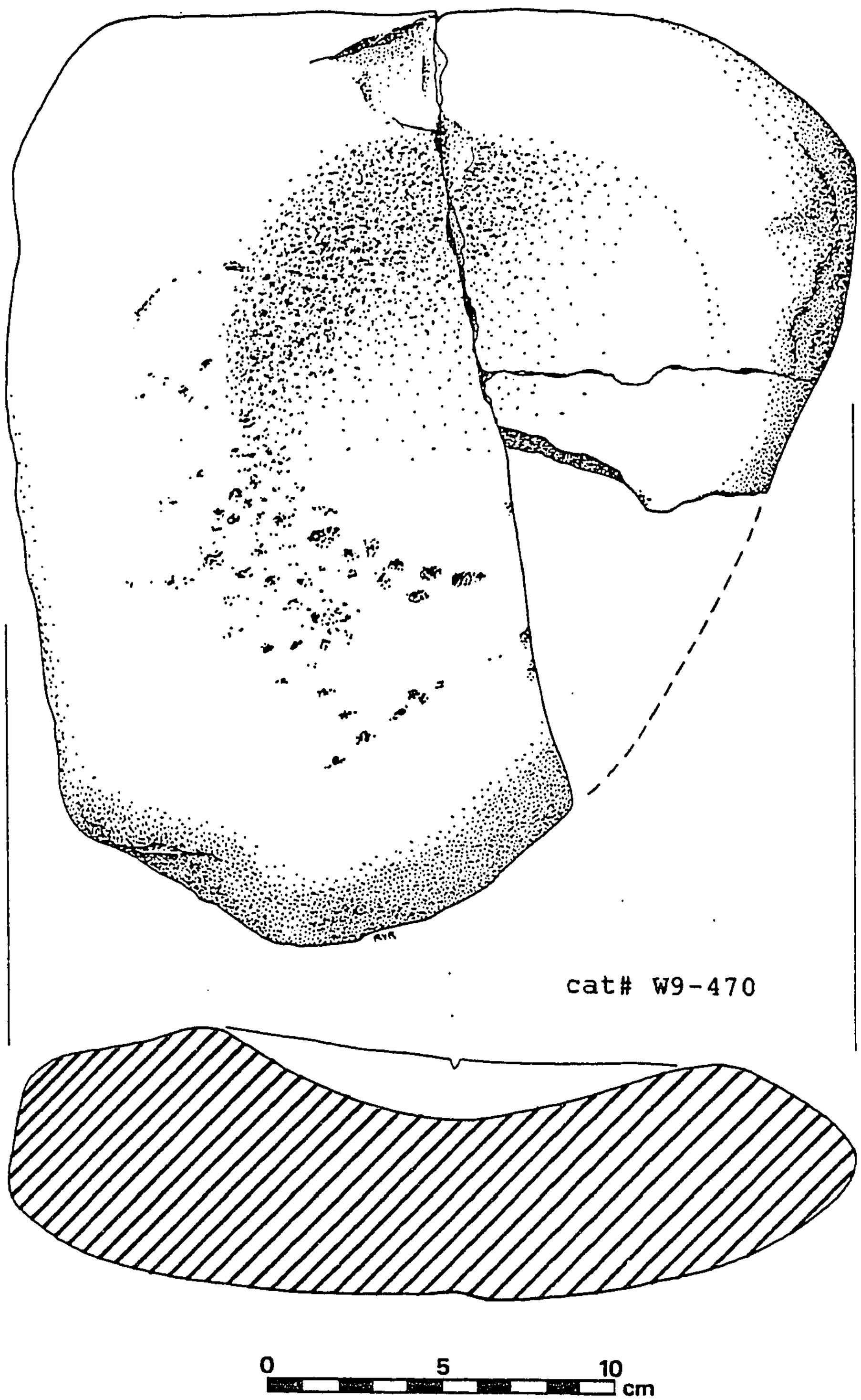


Figure 15. Unshaped Hopper Mortar.

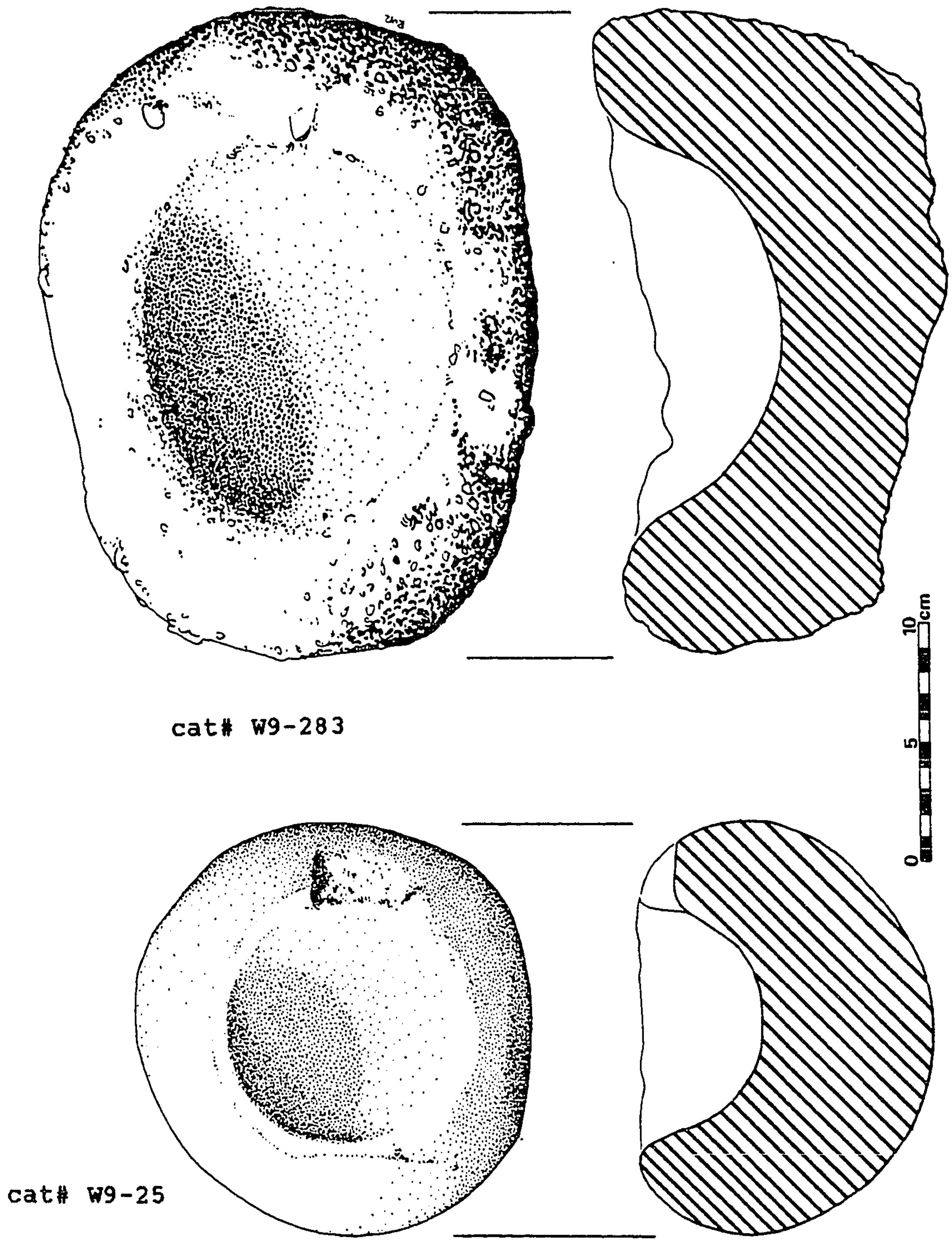


Figure 16. Shaped Cobble Mortars

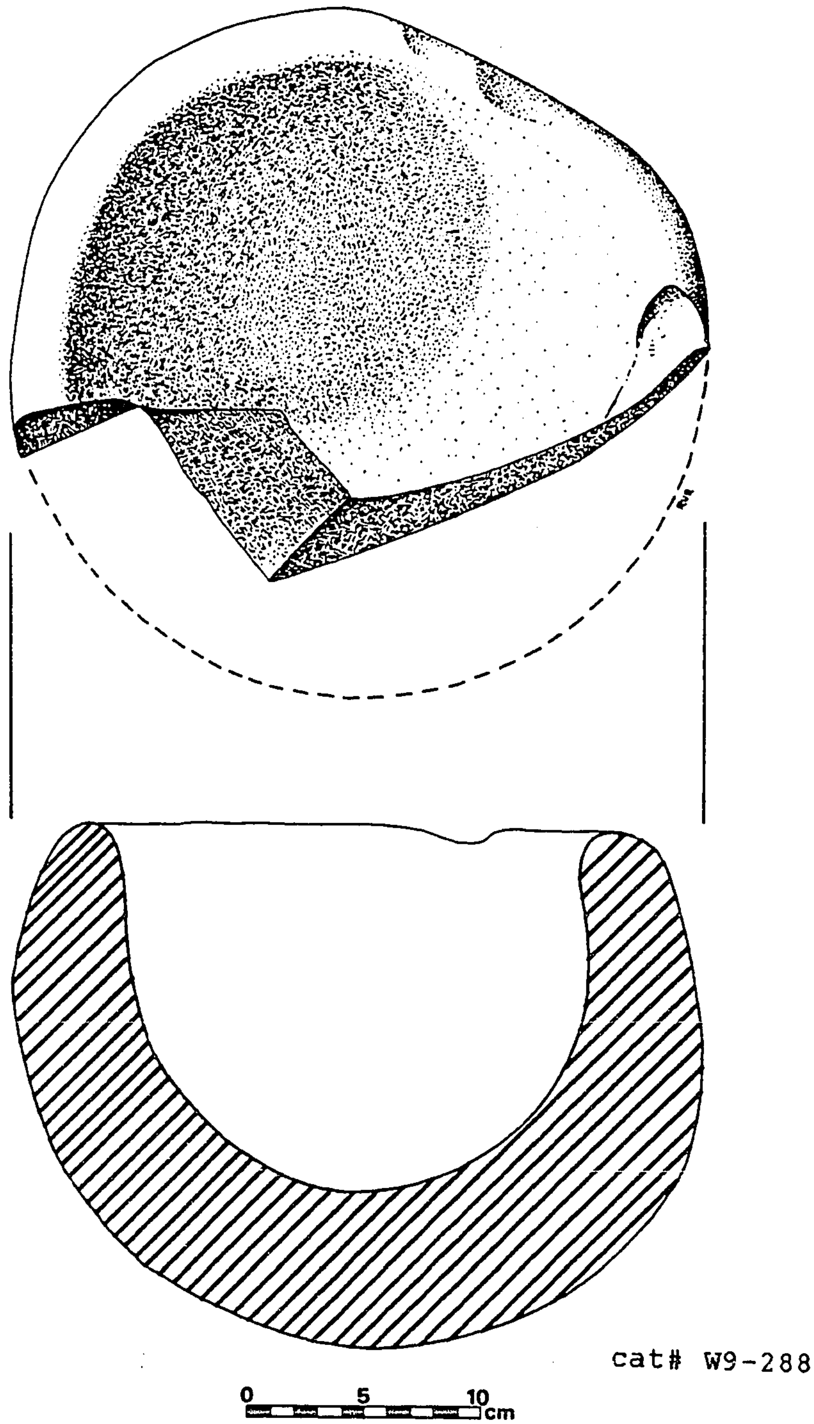


Figure 17. Bowl Mortar.

specimens with the heaviest weighing 31.4 kilos (cat# W9-1416), and the lightest weighing 3 kilos (cat# W9-391). The average weight of these specimens is nearly 11 kilos. All of the specimens this subtype are made of sandstone.

The second most numerous subtype, the unshaped cobble mortars, have only four complete specimens. The lack of complete specimens makes it difficult to evaluate any patterns in this subtype. The few complete specimens are generally smaller and lighter than the whole unshaped hopper mortars. Two of the complete unshaped cobble mortars have irregular concavities (W9-482, and 197) with depths of 0.4 cm and 4 cm, respectively. The other two (W9-290 and 337) have oval concavities of 8.5 cm and 0.6 cm respectively. Two fragmentary specimens with provenience (cat# W9-691 and 976) have irregular shallow concavities of 1.2 cm and 1.1 cm respectively. Mortar 976 is unusual in that it has bifacial mortar concavities with the flip side probably representing an incipient mortar concavity with a depth of only 0.5 cm. All of the mortars of this subtype are made of sandstone.

The shaped mortars are the next largest subtype of mortars from the Saratoga site, with 13 examples. Only two of the 13 are whole. These two (W9-25 and 283) are illustrated in Figure 16. Mortar 283 is unique to the entire assemblage of mortars. It is made of a soft conglomerate rock that is extremely fragile. Despite this it was used rather extensively judging by the depth (7 cm) of its well formed oval concavity. It weighs 10.4 kilos has a shaped rim and a flat base. Another unusual but fragmentary mortar of this subtype is mortar W9-214. All that remains of this mortar is a portion of the base, rim, and concavity. It's made of tuffa which has been burned to a pink and white color. The small area of the rim that is left, is highly polished and is rather flat relative to the curve of the concavity. This configuration suggests that it may have served as millingslab before being converted to a mortar. Mortar 25 depicted in Figure 16 is perhaps the finest made mortar of this subtype. Its weight is relatively light, 4.2 kilos, and has a more or less round concavity that is 5.4 cm deep. Its small size and weight would have made it very portable. It also has the distinction of being found in association with a feature (features are discussed below).

A very similar mortar is specimen W9-22 which is nearly complete. Its base has been made flat by pecking, it has a deep (7 cm), well formed oval concavity and weights 6 kilos. This mortar was also found in a feature. In general the shaped cobble mortars have deeper better formed concavities than the unshaped cobble mortars.

The average depths of the shaped cobble mortars is 4.2 cm.

The next largest subtype of mortars from SCl-65 are the shaped hopper mortar. A scant seven of these were collected of which five are complete. One of the best specimens of this subtype is illustrated in Figure 14 (cat # W9-442). It has an irregular but deep (5.4 cm) concavity and weighs 5.4 kilos. This mortar was either a multi-functional tool or was a curated or re-salvaged tool that once was a millingslab. The area surrounding the concavity is highly polished from one edge of the tool to the other. It also has been extensively shaped by percussion flaking around all the margins and has a flat base due to pecking. Perhaps the single most important mortar in the assemblage is specimen W9-548 a very crude but complete tool found in direct association with a burial (burials are discussed below). It has a shallow (1.5cm) but well formed concavity. The base of this tool was made stable by considerable pecking that formed a relatively flat surface. A considerable range of concavity depths exist in this subtype, with a high of 5.4 cm and a low of 0.5 cm. The average is 1.9 cm. All of these tools are made of the local sandstone.

The final type of mortar found at the Saratoga site are the two bowl specimens (cat# W9-288 and 289). Mortar 288 is illustrated in Figure 17 and is the larger of the two mortars. This severely broken mortar has a wide, well formed concavity that is 17 cm deep. The existing rim around this tool is well polished with a wide lip. Although it is split almost in two it weighs 13.2 kilos. The base is round. The second tool of this type (cat# 289) is also a fragment of a much larger mortar split in half. It is made of ryholite and has a concavity that is 16.5 cm deep. Only one edge of the lip remains but is well formed by polishing. The weight of this mortar is 8.8 kilos.

In overview the assemblage is dominated by unshaped types consituting 64% of all mortars from the site. This figure has three implications. The first, and most obvious is that although well formed mortars exist at the site they were not as important in the processing of food at SCl-65 as the far more numerous unshaped crude mortars. The second implication is that the unshaped casual mortars are the result of a more infrequent, sporadic occupation of the site. Lastly, by the time well formed mortars came into heavy use the site was abandonded.

Pestles

A total of 39 pestles were retrieved from SCl-65 representing roughly 10% of the groundstone assemblage. Of these only three were found during the excavation. Fifteen of these 39 (39%) were fragmented in some fashion while 24 (62%) were complete. Thirty-two (82%) of the pestles are made of sandstone, with six (15%) made of greywacke, and one of granite (3%). Based on the major attributes of form, length, and degree of shaping the pestles from the Saratoga site were classified into morphological types. Other attributes recorded for this analysis included the shape and type of distal and proximal ends, as well as the maximum length, width, thickness, and weight of each tool.

Three descriptive shapes were used in ascribing the form of each pestle. They were as follows: cylindrical for tools with straight sides, conical for pestles with steady tapering sides, and bulbous for those with flaring ends. Shape versus cobble distinctions were made on the amount of pecking and/or polish a tool received that served to create a purposeful form. Divisions based on length, which are important because they can "possibly distinguish modes of use, association with resources, and perhaps association with mortars" (Mikkelsen 1985:155), were made on the distribution of length measurments for the whole assemblage. Following this data pestles longer than 20.5 cm. were considered long, pestles 13-20.5 cm were considered medium and pestles under 13 cm were considered short. Pestles that were either too incomplete, such as medial fragments were not assigned lengths but rather given the designation N/A for nonapplicable. This term was also used when the basic form and/or the ends could not be identified. Following the method described above the pestles from SCl-65 were placed into six basic types and three subtypes. These types are presented in Table 14.

Table 14: Morphological Types for Pestles from SCl-65

	Cylindrical	Convex	Bulbous	N/A	Total
1. Long/Sh.	5	1	-	-	6
2. Long/Cob.	2	-	-	-	2
3. Medium/Sh.	6	5	2	-	13
4. Medium/Cob.	1	1	3	-	5
5. Short/Sh.	1	-	-	4	5
6. Short/Cob.	1	1	1	2	5
7. N/A	-	-	-	3	3
					39

Key: Long/Sh. = Long shaped, Long/cob. = Long cobble, Medium/Sh. = Medium shaped, Medium/Cob. = Medium cobble Short/Sh. = Short shaped. Short/Cob. = Short Cobble. N/A = non applicable

As mentioned before only three of the 39 pestles from the site were found during the excavation, thus the data from Table 14 will serve as the main unit of analysis. The three pestles that have provenience are numbers W9-13, 518, and 558. Pestle W9-13 is an untypable fragment, pestle

W9-518 falls into the long shaped cylindrical type and was associated with a burial, and pestle W9-558, is a short cobble bulbous type. As is evident from Table 14, the medium shaped pestles are dominant with 13 examples which comprised 33% of the assembalge. Long cylindrical pestles are the next most numerous type with six specimens which represents 15% of the assemblage. This is followed by three types (medium cobble, short shaped, and short cobble) all with 5 specimens each representing a combined 39% of the assembalge. Three specimens that could not be typed make up 8% of the assembalge, with two long cobble pestles consituting the final 5% of the assemblage. A few examples of these types are presented in Figures 18 and 19. The medium shaped cylindrical pestles are the single largest subtype from the site with six specimens. This is closely followed by the long shaped cylindrical and the medium shaped convex pestles each with five specimens. Remarkably all the medium shaped cylindrical pestles are complete with the heaviest weighing 1.7 kilos and the lightest 1.0 kilos. All except one pestle (W9-146) of this group has convex or slightly convex ends. The most interesting pestle of this group is illustrated in Figure 19 (W9-447). This pestle is unique because it is the only pestle made of granite, a nonlocal rock. Four of the five medium shaped convex pestles are complete and all have convex or slightly convex ends. The heaviest complete specimen of this group weighs

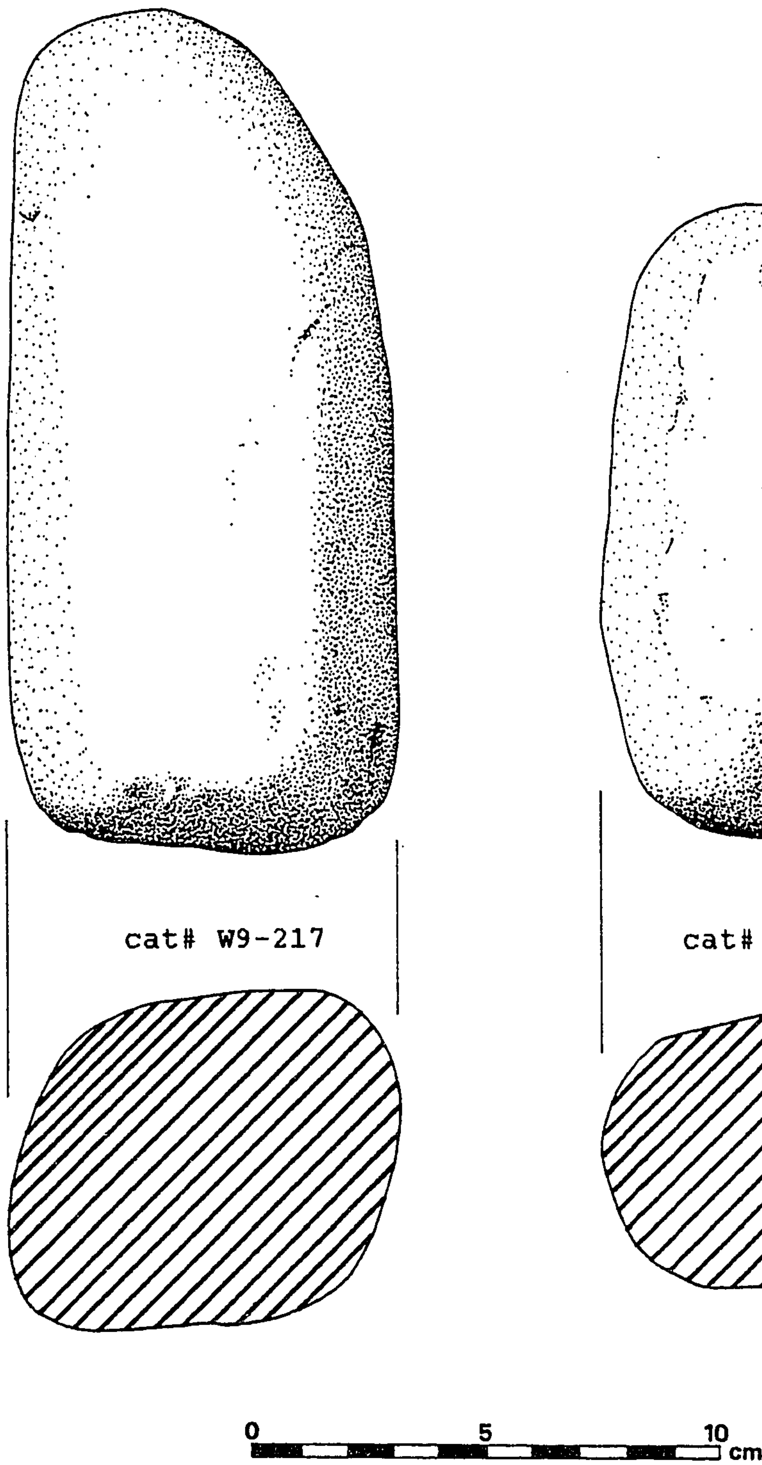


Figure 18. Medium Shaped Convex pestle and Medium Cobble Bulbous pestle.

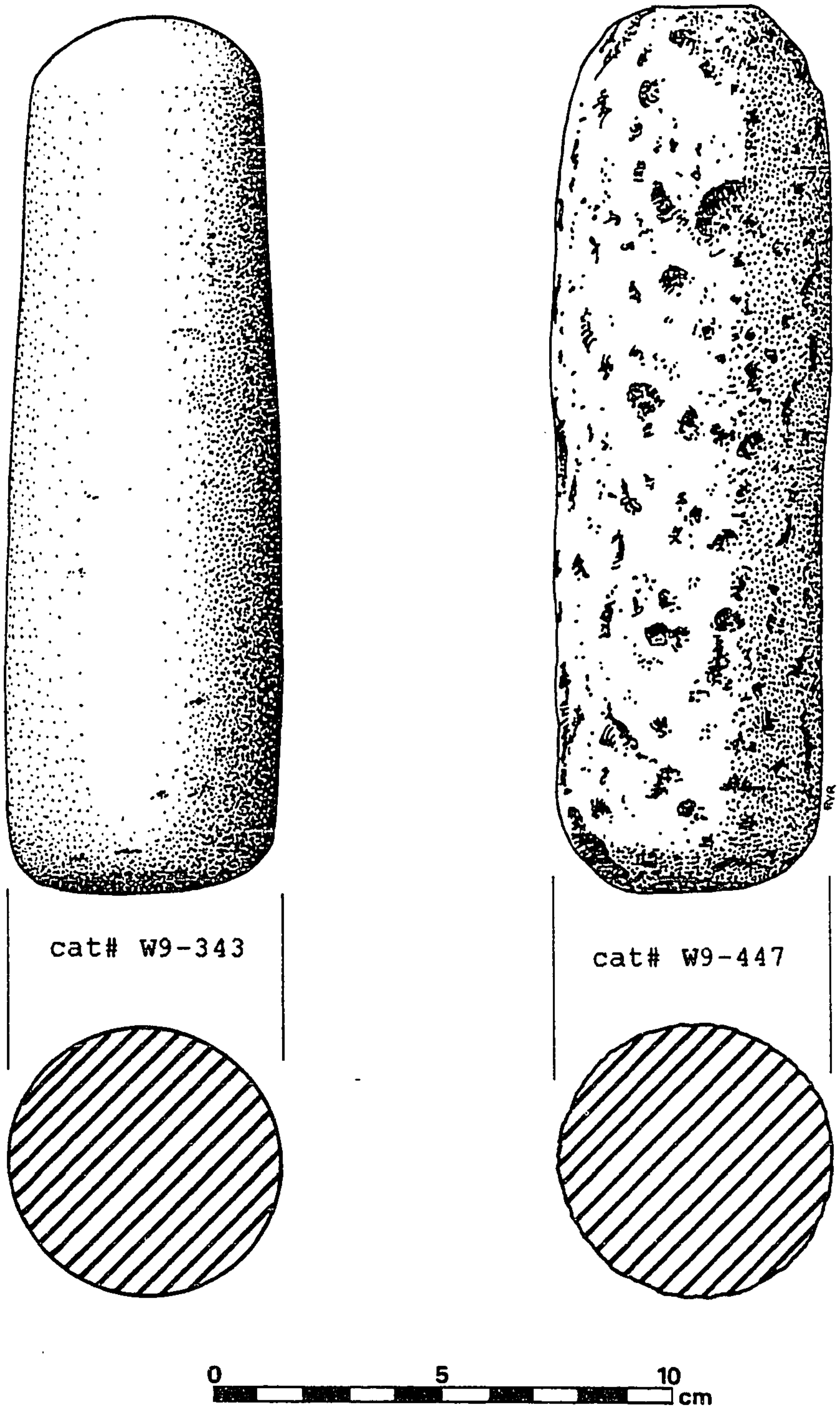


Figure 19. Medium Shaped Cylindrical Pestles.

1.2 kilos and the lightest 898 kilograms. The long-shaped cylindrical pestles are more fragmented with only two whole pestles each weighing 2.2 kilos. The most intriguing pestle of this subtype is W9-518 which was found in association with one of the burials from the site. This pestle is obviously an unfinished preform that was much too large and bulky to be of practical use in its unfinished state. The last three subtypes with more than one specimen are the following: medium shaped bulbous pestles (2), medium cobble bulbous forms (3), and finally the long cobble bulbous pestles with two specimens. The long and medium cobble bublous specimens are especially crude and are no more than elongated river cobbles that were probably plucked from the nearby creek and used in a casual fashion. The two medium shaped bulbous specimens (W9-176 and 177) are both complete, have slightly convex ends and weigh .87 and 1.1 kilos respectively.

The following comments relate to the assemblage as a whole. Of the 30 pestles with intact distal ends 27, (90%) were pecked, while six (20%) of these were also battered, with three of these being spalled as well. Nine (30%) of the 30 with intact distal ends also had some polish on the ends. Overall the pestle assemblage from the Saratoga site is dominated by the medium sized type with 18 specimens representing 46% of all the pestles. This followed by the short pestles with 10 (26%) examples, and lastly the long pestles numbering 8 (21%) of the total. This data seems to re-enforce the data from the mortars which points to the greater useage of cobble and hopper mortars over the deep bowl type. Finally shaped pestles outnumber cobble pestles two to one, indicating that pestles were of considerable importance, worthy of a certain amount of time and energy in their manufacture.

Pitted Stones

Thirty-one pitted stones representing 7.6% of the total assembalge of groundstone tools were recovered from the Saratoga site. Sixteen (51%) of these were found with provenience, while 15 (49%) were found without provenience. Twenty (65%) of the pitted stones were complete while 11 (35%) were fragmented. All of the 31 pitted stones were made from sandstone. The pitted stones from SCl-65 were classified into morphological types based upon their shaping, their form, the number of faces with pits, and the number of pits. Other attributes taken into consideration included: the shape of the faces, the types of wear other than pits, as well as the maximum length, width, thickness, and weight of each tool. Pitted stones were considered shaped if a tool was pecked, polished, or otherwise altered to create a purposeful form. Pitted stones have been assigned to a number of different functions including: anvil stones for acorn processing, shellfish cracking and pounding, and heating stones for cooking. Given the variety of functions that these simple tools could have served it is important to document the various kinds of wear they exhibit in order to help identify or distinguish what food resource was being processed. Thus the types offered below place emphasis on shaping, the number of pits and other types of wear patterns observable on each tool. The following tables present the types found at SCl-65.

Table 15: Morophological Types for Pitted Stones from SCl-65

	Unipitt.	Bipit.	Tripit.	Quadpit.	Total
1. Sh./Unifacial	3	-	-	-	3
2. Sh./Bifacial	-	3	-	-	3
3. Cob./Unifacial	8	1	-	-	9
4. Cob./Bifacial	1	13	1	1	16
					31

Key: Sh./Unifacial = Shaped Unifacial, Sh/Bifacial = Shaped Bifacial, Cob./Unifacial = Cobble Unifacial, Cob/Bifacial = Cobble Bifacial, Bipit. = Bipitted Tripit. = Tripitted Quadpit. = Quadpitted.

Table 16 presents the pitted stones from SCl-65 without provenience.

Table 16: Morphological Types for Pitted Stones without provenience from SCl-65

	Unipitt.	Bipit.	Tripit.	Quadpit.	Total
1. Sh./Unifacial	-	-	-	-	0
2. Sh./Bifacial	-	2	-	-	2
3. Cob./Unifacial	4	-	-	-	4
4. Cob./Bifacial	1	7	1	1	10
					16

Table 17 presents the pitted stones with provenience.

Table 17: Morphological Types for Pitted Stones with provenience from SCl-65

	Unipitt.	Bipit.	Tripit.	Quadpit.	Total
1. Sh./Unifacial	3	-	-	-	3
2. Sh./Bifacial	-	1	-	-	1
3.Cob./Unifacial	4	1	-	-	5
4. Cob./Bifacial	-	6	-	-	6
					15

A sample of these types are presented in Figure 20. The most numerous type represented of the non-provenienced pitted stones are the cobble bifacial specimens with ten examples representing 32% of the total assemblage. The most numerous subtype of this type are the bi-pitted specimens with seven specimens. One of these is illustrated in Figure 20 (cat# W9-332). This is followed by the cobble unifacial uni-pitted subtype with four specimens. The next most numerous type and subtype are the shaped bifacial bipitted specimens with two examples (Figure 19 cat# W9-943). The final two specimens represented of the non-provenienced pitted stones are the unusual cobble bifacial tri-pitted, (Figure 20 cat# W9-296), and the bifacial quadpitted specimen.

As with the the non provenienced pitted stones the best represented type of the provenienced pitted stones are the 6 cobble bifacial bipitted specimens specimens constituting 19% of the assemblage. This is followed by four cobble unifacial uni-pitted specimens. The shaped unifacial type unipitt subtype are the next most numerous with 3 specimens. One of these is illustrated in Figure 20 (cat# W9-519). The last two provenienced specimens are a shaped bifacial bipitted stone and a cobble unifacial bipitted specimen. As can be seen from the preceeding tables and discussion the distribution of the types of pitted stones--between those with provenience and those without--is fairly even. The similarity between the two groups lends credence to the conclusion that the pitted stones recovered are a fair representation of the pitted stones used at the site. Due to the similarity of the two sets of data, the secondary attributes of the pitted stones (ie. polish, battering, pecking, etc.) are discussed for the assemblage as a whole. Sixteen (51%) of the pitted stones had no shape to their wear surfaces. Twelve (39%) had convex faces, while three (10%) were flat. These few flat specimens had a variety of secondary wear including polish, pecking, battering, and bevelled edges. One tool had striations as well. The 12 pitted stones with convex surfaces had no less than seven specimens with polish, four of which had striations. Three of the 12 had bevelled edges, while yet another was battered and bevelled and another was bevelled with striations. Only one of the 12 exhibited no secondary wear at all. This combination of secondary wear and the pecked depressions (i.e., pits) suggests that this class of tools served a wide variety of functions. Several of these tools certainly are multi-functional with perhaps the best example illustrated in Figure 19 (cat# W9-65). This tool is pecked along all its edges, battered on both ends and highly polished on both faces. The most specialized pitted stone is specimen 943. This cylindrical shaped stone is convex on one end and flat on the other giving it a cupcake appearance. On either end there are very well defined nearly identical deep pits. Despite these well formed examples the most common type of pitted stone are the cobble unifacial and bifacial forms that represent 81% of the entire assemblage. The presence of the secondary wear, on the majority of the pitted stones from the site seems to confirm their all-purpose function.

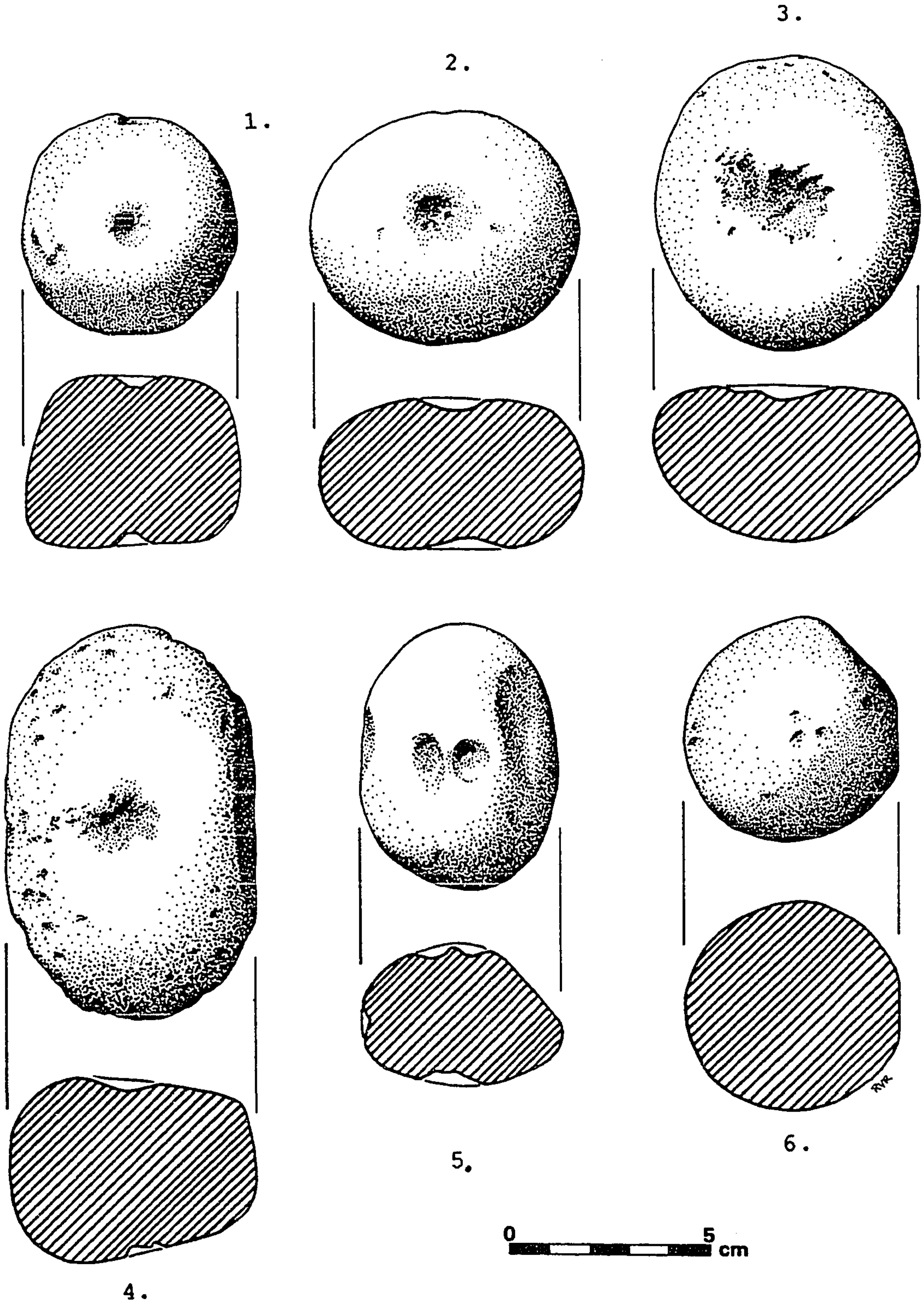


Figure 20. Pitted Stones.

Key to Figure 20

1. Shaped Bifacial Bipitted Stone cat# W9-943
2. Cobble Bifacial Bipitted Stone cat# W9-332
3. Shaped Unifacial Unipitted Stone cat# W9-519
4. Shaped Bifacial Bipitted Stone cat# W9-65
5. Cobble Bifacial Tripitted Stone cat# W9-296
6. Stone Ball cat# W9-183

Stone Balls

The final group of truely formed groundstone objects to be discussed in this chapter are the stone balls. Four spherical stone objects, two large and two small, were recovered from the site. Only the smallest "ball" (not illustrated) was found during the excavation, while the other three were picked up on the surface of the site. Three of the four are made of sandstone while the fourth is made of granite. All are complete. Figure 21 presents the two large specimens (cat# W9-143 and 144). The third stone ball is illustrated in Figure 20 (cat# W9-183). The function of these unusal artifacts is not known but all four of the Saratoga spheres were deliberately shaped either through polishing, pecking, and battering, or a combination of all three. Specimens 143 and 1209 have the truest spherical forms with each having nearly identical measurments for length, width, and thickness.

Specimen W9-183 has more of a lemon shape or nipple shape to it. Adjacent to the protrusion that forms the nipple there is a small, flattened spot that may be viewed as a base giving the object stability. The other small "ball" (cat# W9-1209) has been thermally affected and also has a small groove on its side. The most obvious alteration to any of the four belongs to specimen W9-444

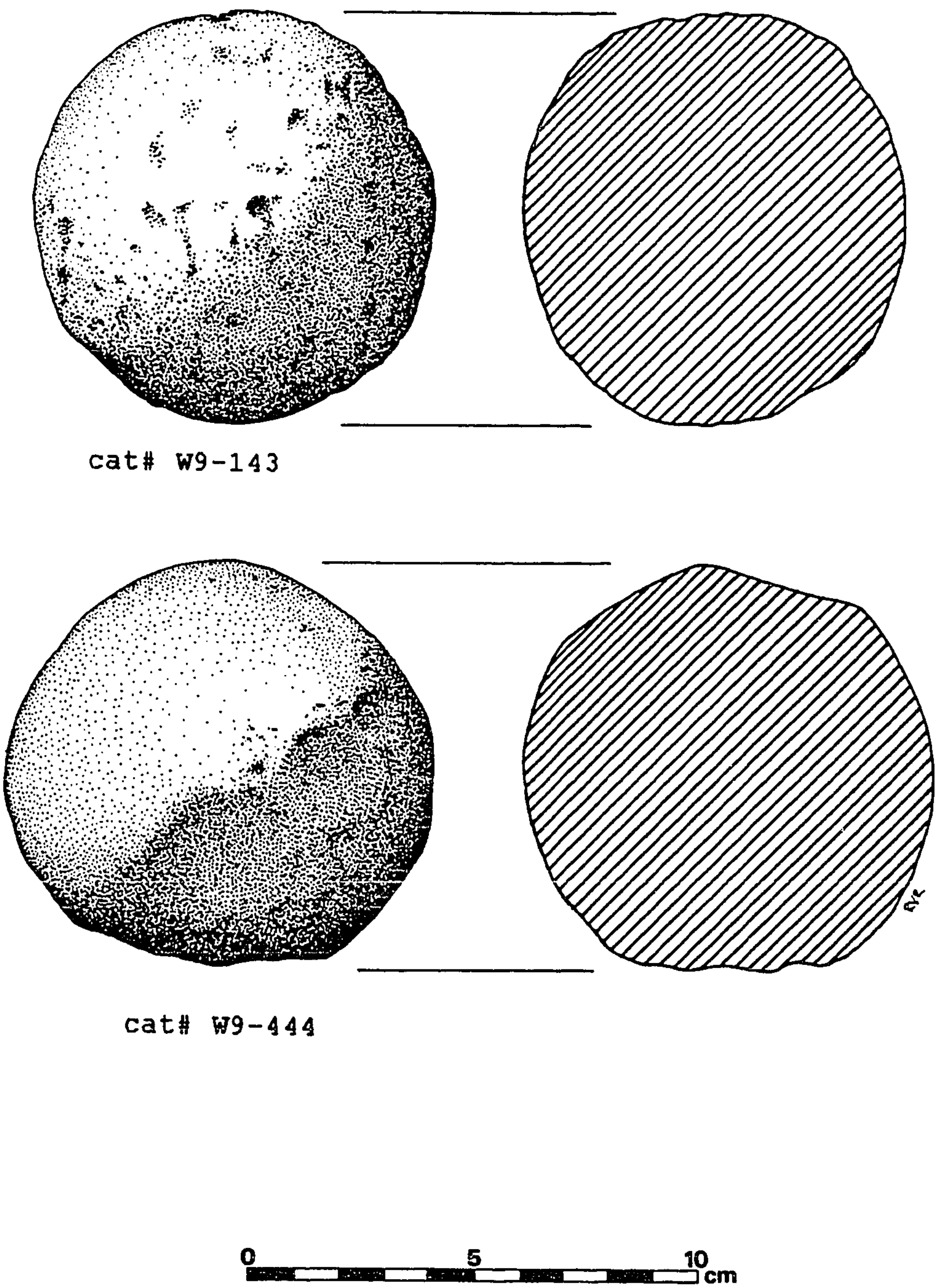


Figure 21. Stone Balls.

which has a large, flat spot on it. Whether this area was formed by use or by design is unclear. This ball is in such a high state of deterioration that it crumbles to the touch. Table 18 presents the measurments in centimeters and the weight in grams for each of the four specimens.

Table 18: Measurments and Weights of the Stone Balls from SC1-65

Specimen #	Maximum lenght	Maximum width	Thickness	Wt.
W9-143	9.1	8.9	9	947
W9-183	5.7	5.3	5.3	116
W9-444	8.6	9.1	9.1	864
W9-1209	4.7	4.8	4.7	107

Key: Wt. = weight

As stated earlier there is no clear or known function for these objects. They may have served as gamestones in sporting activities, or as cooking stones used in the preperation of food, or possibly as props for ritualistic practices or events.

Anvil Stones

A total of nine anvil stones were recovered from the Saratoga site representing 2.2% of the assemblage of ground and pecked stone. Due to the general lack of distinctive morphological attributes of these crude tools no types were formed. It is assumed here that the sole function of these tools was to receive blows during the processing of resources or the manufacture of other stone tools. Five of the nine anvils were complete and all were made of sandstone and unshaped. All nine of the anvils were pecked with one specimen (cat# W9-325) exhibiting a little polish. Three of the nine anvils had circular patterns to their pecking surfaces (cat#'s W9-292, 325, and 844). The other six anvils had irregular pecking on their surfaces. Seven of the nine anvils had no measurable depths to their pecked surfaces, while two anvils (cat#'s W9-844 and 385) had depths of 1.1 and 0.6 cm respectively. One of the nine anvil stones (cat# W9-292) has a slight oval form but this is the natural form of the stone and was not shaped. All of the measurements of length, width, thickness, along with the weights for these tools, are reported in Appendix A.

Miscellaneous Ground and Pecked Stone

Fifty-four miscellaneous ground and 15 miscellaneous pecked stones were recovered from SCl-65. These 69 mostly fragmented items represent a total of 27% of the entire assembalge of ground and pecked tools from the site. In all cases these tools were too informal or fragmentary, or naturally occurs in nature to be classified under types of groundstone. Of the pecked items only three appeared to be complete stones, while five ground specimens seemed to be intact. All but two ground items were made from sandstone, while four pecked specimens were made of something other than sandstone. Several of the miscellaneous ground items had multiple types of wear pattern which probably represented exhausted formal tools, such as millingslabs. Four of these miscellaneous tools were found in direct association with a burial while a slightly larger number (6) were found within features at the site. Certainly a great number of these items represented casual tools that were used sparingly or only for situational tasks and then discarded. All of the measurements of length, width, thickness, along with the weights for these tools, are presented in Appendix A.

Hammerstones, Cobble Tools and Edge Battered Pebbles

A total of 40 hammerstones, representing approximately 10% of the assemlbage of ground, pecked, and battered stone were recovered from the Saratoga site. Sixteen of these 41 were found during the excavtion. As with the anvil stones no types were developed for these crude all purpose tools. The function of these tools probably ranged from the processing of food resources to lithic reduction, including the manufacture of groundstone tools. Although the majority of the hammerstones are made of the ubiquitous sandstone, with 24 (60%) made of the locally abundant stone, a variety of lithic materials are present. Eight of the of the hammerstones are made of Franciscan chert (20%) with two each of granite, ryholite, and greywhacke, each representing 5% of the assemblage. One of the hammerstones is made of dolomite and one of quartz. One of the chert hammerstones is illustrated in Figure 22 (cat# W9-1016). The variety of lithic materials represented reflects the need of generally harder rock to reduce or shape other lithic tools. The majority of these hammerstones (26) have irregular shapes, followed by 13 oval shaped, and lastly, three round hammerstones. As is expected the dominant wear pattern found on the hammerstones is battering, with nine specimens exhibiting pecking as well as battering.

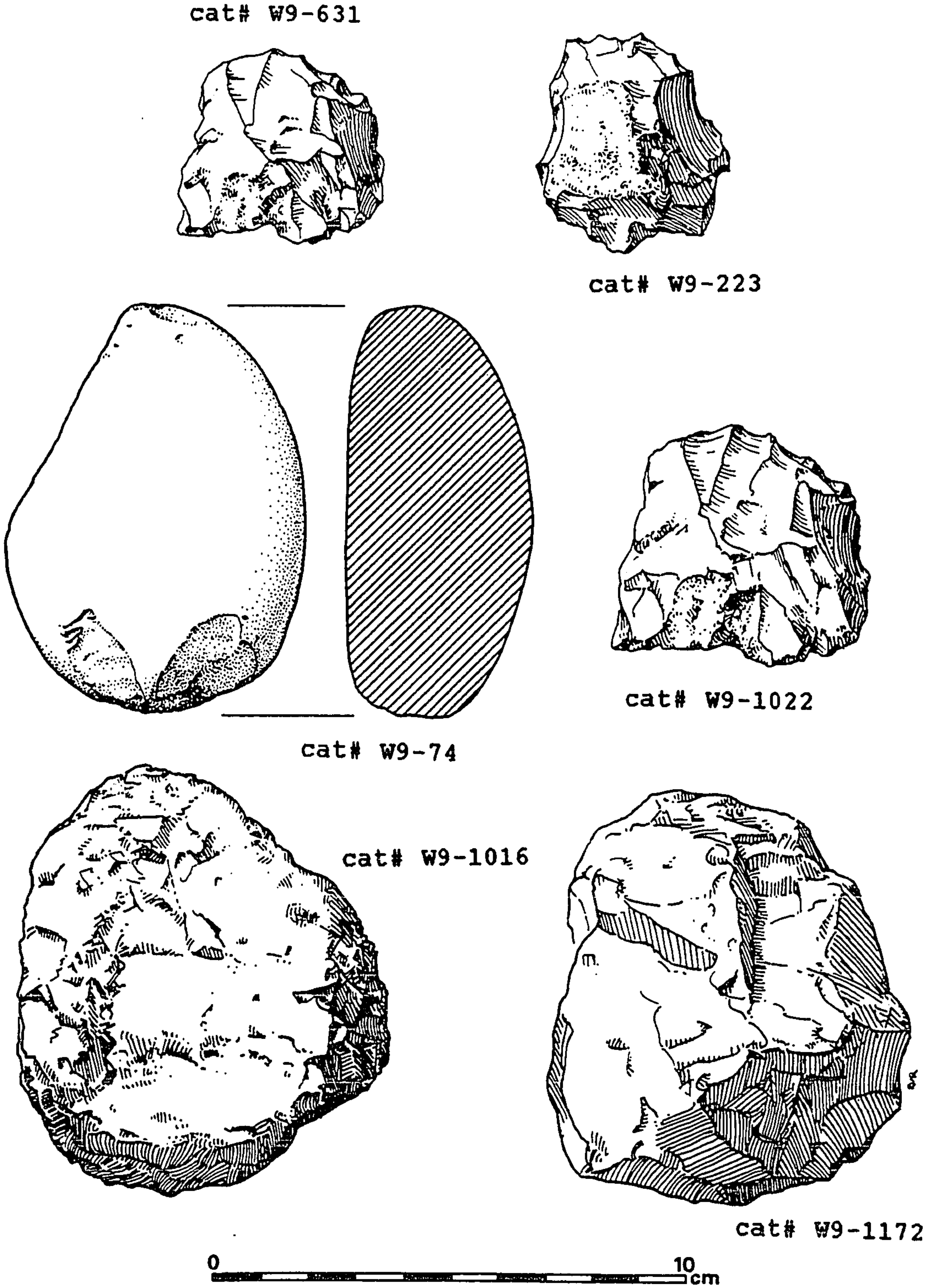


Figure 22. Hamerstones and Cores.

The amount of heavy battering on some these tools is indicative of of heavy flaked stone reduction.

Cobble Tools

An odd variety of cobble tools were found at SCl-65. These 14 tools are very informal in nature and are rather enigmatic in terms of their function. Table 19 presents their provenience and measurements.

Table 19 Cobble Tools of SCl-65

Cat#	Unit#		Description	Mat.	Lg.	Wd.	Th.	Wt.
W9-554	20	0-6"	Knp. Cbl.	?	9.7	5.3	4.6	479
W9-628	18	0-6"	Knp. Cbl.	Bs.	8.8	7.5	4.7	453
W9-810	3	12-18"	End Batt.	Sept.	7.1	5.5	2.9	232
W9-846	13	12-18"	Knp. Cbl.	ss	5.4	5.3	4.2	191
W9-925	11	18-24"	Cbl. Spall	ss	6.9	5.8	1.5	61
W9-1002	10	12-18"	Knp. Cbl.	ss	9.1	6.1	5.2	435
W9-1003	10	12-18"	Knp. Cbl.	ss	12.4	9.3	8.1	1.2
W9-1020	10	18-24"	Knp. Cbl.	ss	8.5	7.9	4.2	437
W9-1137	6	0-6"	End Batt.	ss	7.4	5.2	2.8	168
W9-1175	6	14-18"	Knp. Cbl.	ss	8.9	3.5	3.6	243
W9-1190	5	12-18"	Knp. Cbl.	ss	13.3	8.5	6.5	811
W9-1205	4	6-12"	Knp. Cbl.	ss	6.3	4.7	3.6	140
W9-1283	3	19-30"	Edg. Batt.	ss	10.9	5.3	2.5	248
W9-1286	3	19-30"	End Batt.	ss	5.7	6.2	4.9	256

Key: Knp. Cbl. = Knapped Cobble, Cbl. Spall = Cobble Spall
End Batt. = End Battered, Edg. Batt. = Edge Battered,
ss = sandstone, Bs. = Basalt, Sept. = Serpentine.

Eleven of the 14 are made of sandstone (79%) while one is made of basalt, one of serpentine, and one of an unknown substance. As can be seen from the table majority of these artifacts are termed knapped cobbles, three are end or edge battered, and one is a cobble spall. The end battered and edge battered cobbles are more less pounding implements for expedient tasks, however the knapped cobbles are more problematic. Outside of the knapping along one or both ends of these cobbles no wear is apparent. They may have served as chopping tools or simpley as cores for the production of spalls or large flakes to be used as cutting or scraping activities. Three edge battered pebbles are functionally similar, but slightly different artifact is also represented at the Saratoga site. One of these is illustrated in Figure 22 (cat# W9-74). These three tools are all small, smooth pebbles with battering and/or pecking along their margins. All three were found after the site was bulldozed. Two are made of a quartzite material, while the third is made of ryholite. Specimen W9-63 is especially pecked and battered along both sides and ends suggesting that it served some special function in the processing of resources or the manufacturing of lithic tools. A great number of these tool types have been found in sites along the Central California coast in San Mateo and Santa Cruz counties (Hylkema 1990); which suggests that they may have been used in processing marine resouces such as shellfish.

Chipped Stone

A total of 1754 chipped stone artifacts were recovered from SCl-65. Of these 386 (21%) were recovered from the surface without good provenience. This number would be only 184 if it were not for the 200 chipped stone artifacts excavated from unit 19. This unit however was not placed on the site map and therefore must be counted as items with no provenience. All the chipped stone found during the excavation was collected from 1/4" dry screens. No 1/8" dry or wet screening was done at the site which is reflected in the number of pressure flakes (33) recovered from the site. This figure is certainly below what would be expected from a site of this size and nature. Nine classes of chipped stone were segregated on the following basis. Projectile points are bifacially shaped tools that were obviously hafted. Bifaces are also bifacially worked items that are missing the hafting elements. Informal tools are any flake or core that exhibits wear in the form of one or more edge unit with crushing, or flake detachment from use. Cores comprise any material that has been reduced by flake removal to the point that its original configuration has been lost. Decortication flakes represent the initial removal of flakes from a core that have a portion of the original cortex of the stone on them.

Primary flakes are the intial flakes removed during the manufacture of a formed tool and/or a core that has had the cortex removed. Thinning flakes comprise those flakes that result from the shaping of formal tools (i.e., bifaces, projectile points). Pressure flakes are the result the same process of shaping or re-shaping of formal tools through the force of pressure rather than percussion. Lastly shatter and debris repesents the bi-product of core reduction and any tool manufacture that lacks further modifcation. All the raw data for the chipped stone artifacts excavated from the 20 units and the trench are presented in Appendix B. A summary of the chipped stone artifacts is presented below.

Table 20: Chipped Stone Summary for SCl-65

	Provenienced	Non Provenienced	Total
P. Points	6	4	10
Bifaces	17	11	28
F. Tools	14	12	26
Cores	42	5	47
Decortc.	59	15	74
Primary	387	123	510
Thinning	595	117	712
Pressure	30	3	33
Shatter	218	96	314
TOTAL	1368	386	1754

Key: P. Points=Projectile Points, F. Tools=Flake Tools, Decortc.=Decortication.

The largest class of chipped stone materials are the thinning flakes which represent 40% of the assemblage. This is followed in descending order by the primary flakes 29%, shatter debris 18%, decortication flakes 4%, cores 3%, flake tools 1.6%, bifaces 1.4%, and lastly projectile points 0.5% of the assemblage.

Except for the pressure flakes which are next to impossible to find on the surface, the differences between the two tables above in terms of relative proportions for each class are minimal. This being the case it can be safely assumed that the proportions of the different classes of chipped stone are a fairly accurate representation of the deposit at the site. These proportions have several implications for tool making activities at the site. The three largest classes of chipped stone at the Saratoga site are thinning flakes, followed by primary flakes, and shatter. The relatively high number of thinning and primary flakes is reflective of a good deal of tool maintenance and manufacture. Although the number of shatter debris is high relative to the assemblage, it is rather low compared to the thinning flakes which indicates that not much in the form of initial tool production occured on the site. Further support for this assumption comes from relatively low numbers of cores and decortication flakes. If a lot of initial core reduction was occurring at the site the numbers of cores, decortication flakes and shatter would be proportionally higher. Conversely, thinning, primary, and pressure flakes--the more refined products of tool manufacture--would be signifcantly lower. This is not the case at the Saratoga site.

The 47 cores from SCl-65, are generally fragments, and/or exhausted with a several larger exceptions. These two extremes can be viewed in Figure 21, artifact W9-1172 is a large red Franciscan chert core, while W9-631 is a exhausted green Franciscan chert core. The dominant material is Franciscan chert with over half of the cores made of red or green Franciscan Formation chert. Other materials represented include four Monterey Banded Chert cores, and single examples of basalt, quartzite, ryholite, and opalized agate. As is expected, the decortication flakes are principally made up of Franciscan chert.

Flake tools are the next largest class of chipped stone item, following decortication flakes, cores, and pressure flakes. These 26 implements take a variety of forms including core tool scrapers, choppers and re-touched primary flakes used as knifes and scrapers. Two of the smaller core tools are illustrated in Figure 21 (W9-223, and 1022). These tools for the most part are casual in nature with a couple of exceptions found in the core tool scrapers. One exceptional scraper/chopping implement (not illustrated) made of Monterey Banded Chert, was found on the surface by Frank Dutro Jr. The wide array of flake tools are certainly the most casual in nature, made predominantly of Francsican chert.

The bifaces are the next largest group of chipped stone tools with 28 specimens. Five are margin fragments, three are ends, and the remainder are midsections. Seventeen of the bifaces are made of obsidian while 11 are of made Monterey chert.

The absence of Franciscan chert bifaces is an interesting aspect of the biface assemblage. Franciscan chert is the most abundant local lithic material and most of the cores are made of the local chert. Yet all of the bifaces are made of Monterey chert and obsidian. Furthermore all were fragments or "exhausted" specimens. The ratio of exhausted Franciscan chert tools to debitage is very low at the site, indicating that they were discarded elsewhere. It is likely they were left behind at sites near where other lithic materials were available (Gramly 1980).

Monterey chert is found exclusively along the coast and the obsidian comes mostly from Napa with smaller amounts coming from Annadale and eastern Sierra sources. Therefore it seems certain that the obsidian was obtained via trade, whereas the Monterey chert may have been obtained by mobile bands moving back and forth from the bayshore to the Pacific. The presence of exotic lithics and the absence of exhausted chipped stone artifacts made of local materials suggests that the inhabitants were less then a settled population.

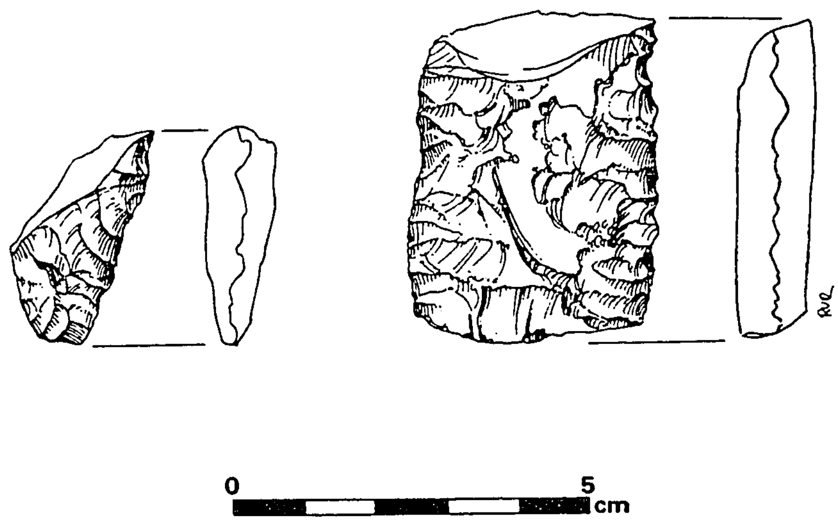
The chipped stone artifacts from the Saratoga site excluding the lack of pressure flakes (which is probably an artifact of the methods employed at the site), indicates that flaked stone activities included the production, maintenance, and replacement of tools, resulting in the disgarding of the old broken or worn items.

Projectile Points

Ten projectile points, eight of chert and two of obsidian, were recovered from the Saratoga site. As with the shell beads and ornaments this low number certainly represents a fraction of the points that must have been at the site, but were lost when the site was bulldozed. More than these nine were found at the site during the excavation including a group of small obsidian points that were placed inside a baby food jar that some how "disappeared" after work on the site was completed (Chester King personal communication). One of these missing points is illustrated in Figure 24 (cat. # W9-3). If it were not for a photograph taken by Bert Gerow, who visited the site, no record of this point would exist.

The obsidian point was one of five obsidian bifaces that were collected off the surface of the site by Frank Dutro Jr. This point (item A) and the largest of the obsidian biface fragments found by Dutro (item B) are depicted in Figure 22. Item A is the only specimen of the Dutro collection which may be tentatively typed. This single surviving obsidian point is fragmentary, with only the base and a small portion of the mid-section remaining. The specimen measures 30.1 mm long, 10.5 mm wide, 10 mm thick, and weighs 2.7 grams. The source of the obsidian was visually identified as Bodie Hills, with a hydration reading of 4.1 microns.

Fig. 23 Obsidian Projectile Point and Biface from SCl-65



A discussion of the results for all the obsidian from the site is presented in the section titled Chronological Data. The morphological attributes of note on this point are the long tapering stem and the absence of a clearly defined shoulder. These are characteristics that distinguish the Ano Nuevo Long-Stemmed point as defined by Jones and Hylkema (1988). A number of these points have been found in the San Francisco Bay Area including: 13 recovered by Gerow (1968) at SMA-77, the University Village site; one from CCo-295 (Ellis Landing) recovered by Nelson (1910), and two found by Uhle (1907) at Ala-309 the Emmeryville shell mound (Jones and Hylkema 1988). However, as the name implies the bulk of these points have been found on the coast at sites on Ano Nuevo point, as well as a number of other sites in Monterey and Santa Cruz counties. Specimen

W9-3, the missing point that was fortuitously captured on film by Bert Gerow appears to belong to the Ano Nuevo type. The drawing of this point seen in Figure 23 is a best effort representation based upon a blown up version of Gerow's photograph. The size of this point is approximate with no actual measurements to go by. The provenience of this point is given as 0-6" level of unit five. Apparent from the photo is that the point was made of a yellow grey Monterey chert. The base is missing therefore making this specimen difficult to type. The general form is that of a contracting stem with weak shoulders.

The temporal framework for contracting stem points is anchored by a radiocarbon date of 2950 +/- 350 B.P. derived from a direct association of these points with a grave lot from a burial unearthed at the University Village site. Jones and Hylkema (1988) citing data from several coastal sites declare, that Ano Nuevo stemmed points are not uncommon in components dated between 4,000 and 2,800 years before present, but are also prevalent in components dated between 2,800 and 1,000 years ago. Accordingly this point seems to be diagnostic of the time period between 4,000 and 1,000 B.P.

The seven chert points (Figure. 24) can be divided into two groups. The most numerous group with a total of five examples (cat #'s W9-10, 19, 192, 838, and W9-1303) of large to medium sized side-notched points. This small collection

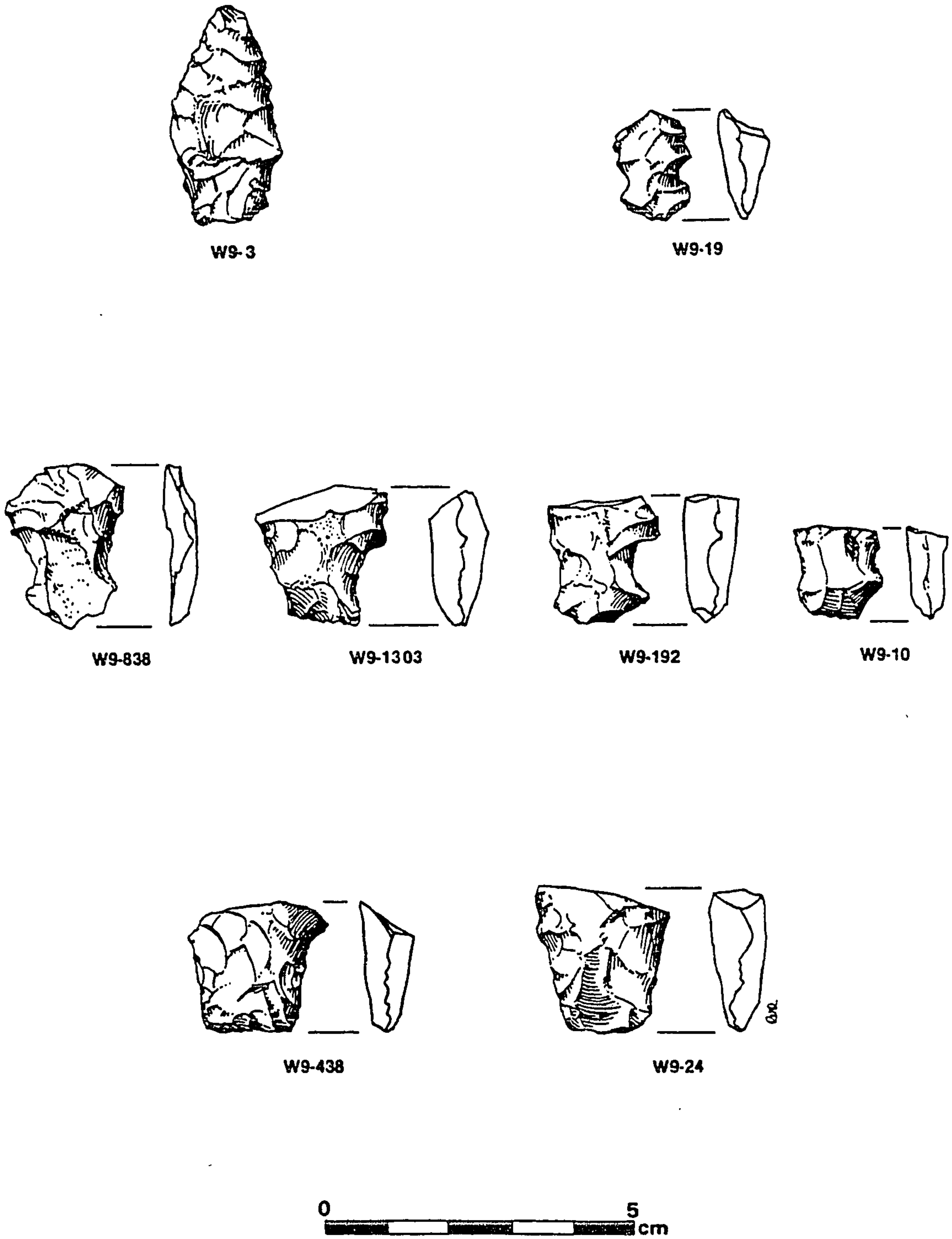


Figure 24. Projectile Points from SCl-65.

of points have attributes similar to those found with the Stanford Man II burial found on the Stanford campus. This burial found in a gravel bed in the bank of San Francisquito Creek. This burial--which contained three large side-notched Monterey chert projectile points--produced bone collagen dates of 4450 +/- 270 and 4400 +/- 125 years B.P. (Gerow 1974a). The salient morphological chacteristics of these points are their U U shaped side-notches, relatively large blades, and expanding stem with convex bases. Points of this type have been recorded at SCr-7, the Sandhill Bluff site (Hylkema 1991), and SCl-178,the Blood Alley site (Hildebrandt 1983). None of the five Saratoga points are complete rendering a full analysis impossible. The results are presented below in Table 21.

Table 21 Measurements of Side-notched Points from SCl-65

Cat. #	Prov.	MW	MT	PSA	DSA	BW	WT
W9-10	U 8 6-12	I	7.8	117/120	220/I	10.7	1.5
W9-19	U 3 6-12	I	8.5	140/135	215/200	8.4	1.2
W9-192	None	I	8.7	132/112	200/I	13.8	3.2
W9-838	U 13 6-12	19.8	5.1	127/120	220/212	13.6	2.2
W9-1303	U 2 6-12	I	9.1	119/I	192/I	I	3.7

Key: Prov.= provenience, U 3 6-12= the unit number and depth, MW= maximum width, MT= maximum thickness, PSA= proximal shoulder angle in degrees, DSA= distal shoulder angle in degrees, BW= basal width, WT=weight, I=incomplete specimen. Note maximum length, lenght/width ratio, and maximum width position were excluded due to the fragmentary nature of the projectile points. All measurments are in millimeters and grams.

All five of these points are made from Monterey chert. Specimen W9-10 was made of thermally affected Monterey chert, which is detectable by the white color the chert takes on when exposed to heat. Specimens W9-10 and 19 are considerably smaller than the other three projectile points and could be considered a different and/or later type. However, they still have the same general characteritics which implies the same hafting technique was being employed on these points perhaps, well after this method of hafting was established.

The second group of points (Figure 24 Cat #'s W9-24 and 438), fall into the Rossi Square Stem type as defined by Jones and Hylkema (1988). As with the Ano Nuevo points the Rossi Square Stems have strong coastal affinities. The type site for this point is MNT-387 (the Rossi site), situated in the town of Monterey. The Rossi site, as well as the nearby MNT-391 produced 10 of these large points. They have also been identified to the north in the Santa Cruz Mountains at SCr-9 and SCr-20, to the south along the Big Sur coastline, and in the San Francisco Bay Area at SMa-160 (the Hiller Mound), the Castro Mound (SCl-1), and the West Berkeley Mound (Ala-307), (Jones and Hylkema 1988). Another isolate specimen made of siltstone was observed by the author in the town of San Carlos found along San Carlos creek. The morphological traits of these points are large size:

> ...with long, thick, often excurvate blades and short stems that range from square to slighty expanding. Bases are generally flat with a sharp angle between the and the edge of the stem, although some have slighty rounded convex bases (Jones and Hylkema 1988:177).

The temporal placement of these points is framed by a group of radiocarbon dates taken from MNT-391, SCr-9, SCr-20, SCr-132, and SMa-125. The earliest of these dates comes from MNT-391, where five Rossi Square Stemmed points were recovered from grave lots of two burials that yielded dates of 3270 +/- 90, and 3620 +/-90 years B.P. (Jones and Hylkema 1988). At SCr-9 in the Santa Cruz Mountains four dates in excess of 2500 years B.P. were recorded from lowest levels of the site where two Rossi points were recovered. Further evidence of a time frame of 4000 to 2000 B.P. for the Rossi points comes from the West Berkeley site, where a number of these points were found in and below levels of the site that were dated between 3500 and 3860 years B. P. As noted by Jones And Hylekma (1988), this point type may have persisted beyond 2000 years B.P. based on questionable associations of Rossi points with dates as late as 500 to 600 years B.P. All of these dates are from sites that have yet to be published and critical data on the validity of the associations of the dates to the points has yet to be evaluated. Table 22 presents the measurements of the two Rossi Square Stemmed points from the Saratoga site.

Table 22 Measurements of Rossi Square Stemmed Projectile Points from SCl-65

Cat #	Prov.	MW	MT	PSA	DSA	BW	WT
W9-24	U 8 24-30	I	8.5	I I	75/79	14.7	5.1
W9-438	None	I	8.9	80/77	205/I	15.5	3.5

Key: Prov.=provenience, U 8 24-30= the number of the unit and the depth, MW= maximum width, MT= maximum thickness, PSA= proximal shoulder angle, DSA= distal shoulder angle BW= basal width, WT= weight, I= Incomplete specimen. All measurements are in millimeters and grams.

Specimen W9-24 is made from a light green Franciscan chert, while specimen W9-934 is made of Monterey chert.

Shell Beads and Eccentric Artifacts

Only two shell beads and one ornament were recovered from the Saratoga site. This trio of shell artifacts is certainly a small remnant of a much larger population of shell beads that once existed at the site. The combined factors of bulldozing the site along with the poor perservation evidenced by the absence of faunal remains has undoubedtly reduced the number of shell artifacts that were once part of the cultural debris of the site.

The two beads are Olivella biplicata (Figure 25) were identified as the C-2 type (split drilled variable shelved) according to Bennyhoff's bead typology (Bennyhoff and Hughes 1987). Bennyhoff views this bead type as diagnostic of the Early Middle period of San Francisco Bay Area prehistory or circa 2000 years B.P. Both of these beads were found on the surface after the site had been bulldozed thus nothing can be said about their relative position in the stratigraphy of the site. The single ornament found at the site was recovered from unit 19 in the 18"-24" level of the site. As stated earlier this unit was somehow left off the site map rendering all the data from it without provenience. The oranment is made of Haliotis shell of an unknown subspecies due to the deterioration of the epidermis layer of the specimen. The ornament is a double biconically drilled "button" (CA4j type) with temporal affiliations to the Early period of Bay Area prehistory according to Bennyhoff.

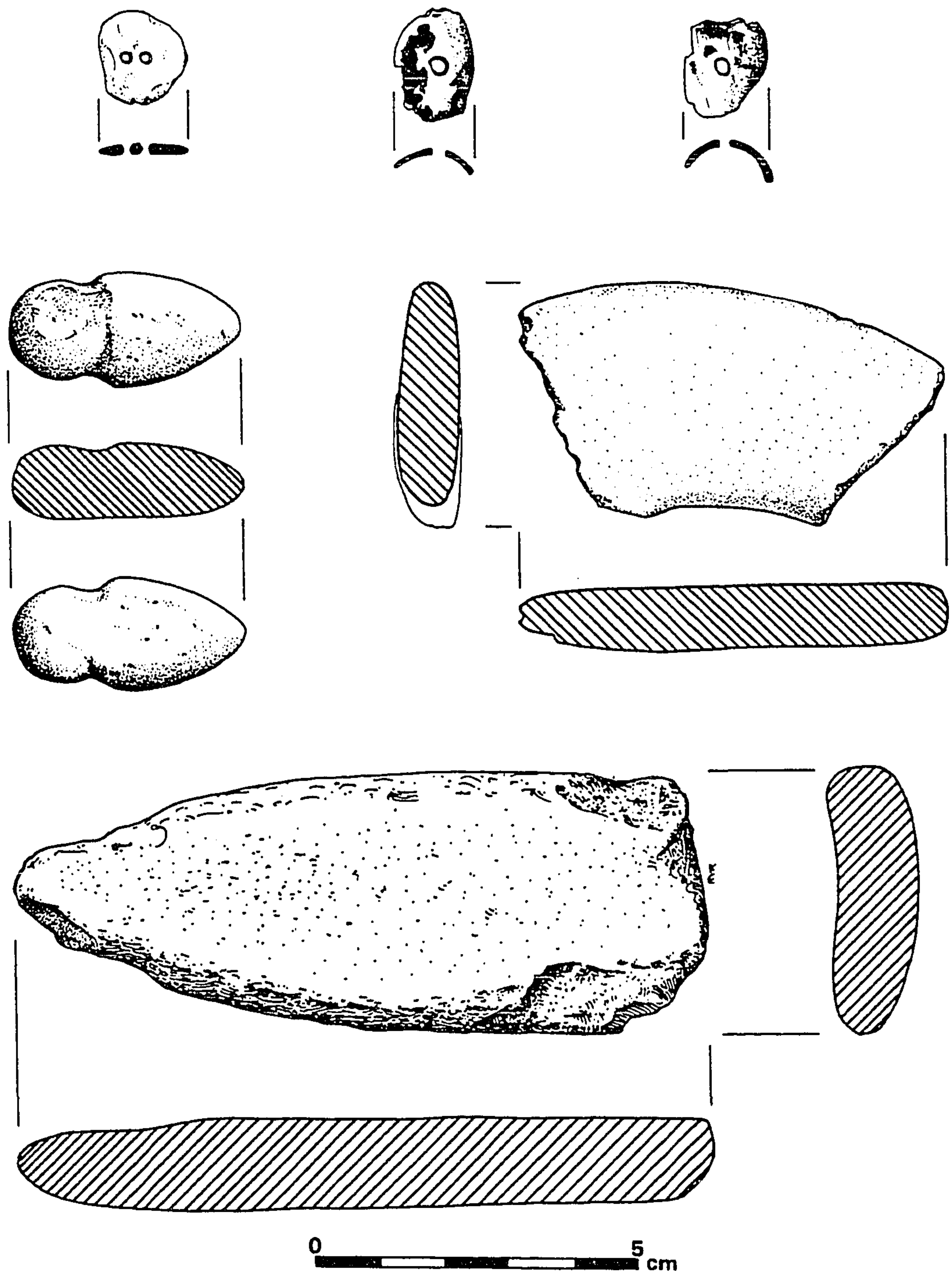


Figure 25. Shell Beads and Eccentric Artifacts from SCl-65.

The Early period covers approximately the time period between 4000 and 2000 years B.P.

Table 23 presents the basic measurements of these shell beads and ornament.

Table 23: <u>Shell Bead and Ornament Measurements</u>

Cat #	Length	Width	Wt.	Perforation Size
W9-269	15	13	0.5	.2
W9-351	17	12	0.4	.2
W9-713	14	14	0.3	.1

(Note: all measurements are in millimeters, weights and grams.)

<u>Eccentric Artifacts</u>

In addition to the scant number of shell beads and ornaments retrieved from the Saratoga site an equally small, but nonetheless intriguing group of artifacts, were also recovered. As with the shell beads these artifacts suggest a relative time frame for the occupation of the site. Two of the three artifacts that form this group--although found a considerable distance apart--represent important elements of a single tool. The first specimen appears to be what is known as a boatstone (Figure 25 cat # 536). Heizer and Elsasser (1953) offered the following accurate description of boatstones:

> . . . The special characteristics of this type of object are: a flat bottom or board longitudinal groove on the under surface; an upper convex surface; a groove over each end of the convex or upper side... (1953:26).

These curiously shaped stone objects are believed to be the counter weights to atlatls or the throwing stick; the principal weapon prior to the advent of the bow and arrow. Affixed to the bottom of the proximal end of the atlatl they served to offset the weight of the foreshaft of the weapon thus giving it greater balance. Examples of these rare artifacts have been reported in California. Heizer and Elsasser (1953) found several in the Sierra Nevada, and Riddle (1960a) cites two fragmentary specimens from CA-Las-7 (the Karlo site).

The boatstone from Saratoga is broken on one end and does not particularly resemble those found in the publications mentioned above. Yet, despite its specific appearance, it closely matches the special characteristics ascribed for boatstones. It has a broad shallow longitudinal groove on the bottom while the top is convex. The end that is complete has been abraded to form a dull point with slight grooves on its side. The specimen is made of gneiss and is 10.6 cm long, has a maximum width and thickness of 4.1 cm and 1.4 cm, and weighs 107.4 grams. The boatstone was recorded as being found in the sidewall of the extension of cutbank unit F, but no depth was given. Unit F contained Burial 4 and although its association to the burial is unclear it may have been a grave offering.

The appearance and duration of use of boatstones is not well documented in the archaeological literature. Few have been found in datable contexts. Heizer and Elsasser (1953) could only guess at their age by citing the fact that none have been found in late period sites, thus leading them to state that they are "an artifact type with an antiquity of several millenia" (1953: 28). Riddell (1960) suggests that boatstones may have represented a single tradition based on the strong similarities he found between the various boatstones of central California and the Sierra Nevada.

The second unique artifact (Figure. 25 cat # 1261) is an engaging spur an equally important element in the use of an atlatal. These artifacts were "lashed or otherwise fastened to spearthrowers to serve as spurs for the engaement of the butts of dart shafts" (Riddell and McGeein 1969: 474). They were made of bone, stone, and even shell and have been found in many regions of California. The main morophological characteristic of these artifacts is a groove, or platform, for lashing the spur to the throwing stick. The shaft of the spear fits over the spur securing it in place. Riddell and McGeein (1969) set forth a brief typology based on a number of specimens housed at the Lowie Museum of Anthropology, University of California, Berkeley, and those collected by private parties. Using this typology the Saratoga specimen falls into Type 1, or "Snakehead" type, so named for its broad head. This type according to Riddell and McGeein (1969) are almost exclusively made of stone. Examples of this type have been found in the San Joaquin Valley, the Sierra Nevada, and two from the previously mentioned Karlo site in Lassen County. The Saratoga specimen is made of sandstone, is 3.5 cm long, a maximum width of 1.7 cm, a maximum thickness of 1.1 cm, and weighs 9.7 grams. The dorsal side has been polished to create a flat surface, while the ventral side is convex with a groove on the distal end. This well formed artifact was found in unit 3 in approximately the 18"-24" level of the unit. This location places it as part of the grave fill over Burial 1. This fill included some of the first stones that formed the cairn over the grave. Due to its small size the spur can only be considered as loosely assocaited with the burial, because of the possibilty that it may have migrated down or was transported by rodent activity to the level of the cairn. Although the spur and the boatstone were not found together their co-occurence may be of some signifcance as recognized by Riddell and McGeein who state that "the Type 1 spur and the boatstone in its several forms seem to have a close relationship" (1969: 478).

The final exotic artifact from the Saratoga site appears to be a remnant of a stone ornament or ring (Figure 25 cat # W9-900). The fragment is ovoid in shape and highly polished especially on the interior of the perforation. It is made of sandstone, has a maximum thickness of of .4 cm and a reconstructed diameter of approximately 9.5 cm. This unusual artifact bears a certain likeness with a stone object found by Nelson at the Ellis Landing site in Richmond (1910:427), with the exception that it has a small peforation on the outer edge, and that its diameter (7.7) is smaller than that of the Saratoga specimen. A much closer match is reported by Riddell (1960: Fig. 21 H) at the Karlo site. The diameter of the Karlo specimen is given as 9.6 cm, but it is considerably thicker at 3 cm. Riddell calls this object a discoidal or "doughnut stone" a term found quite frequently in the literature on milling stone sites of southern California. It also has been suggested that doughnut stones were weights for digging sticks, or as tools for straighting arrows. Neither of these functions seems to apply to the Saratoga specimen due to its overall thinness. The Saratoga specimen was found in unit 11 in the 6"-12" level.

Chronological Data

The purpose of this section is to provide a temporal framework for the data presented above in order to place it into discrete archaeological components. Despite the amount of destruction the site suffered from the grading for the construction project, a fair picture of the chronology of SCl-65 may be drawn. The principal means of pulling the chronology of the site together were radiometric dates, obsidian hydration readings, and cross dating with temporally sensitive artifacts to other well dated archaeological sites in the region. The last two means are considered only relative time markers due to the inherit problems with obsidian hydration, as the work of Tremaine (1989) has pointed out, as well as the wide temporal overlapping of many "diagnostic" artifacts. These problems not withstanding, certain general conclusions on the duration of the occupation of the site can be made. Certainly a great deal of chronological data was lost when the site was bulldozed and many temporally signifcant relationships with the assemblage were jumbled. Furthermore, as stated earlier, the lot had been previously occupied by a church and a mill which took an unknown toll on the upper layers of the site.

Radiometric Data

Two radiometeric dates were generated from bone collagen taken from two of the four burials found at the Saratoga site. These dates are presented in Table 24 along with six other important dates from the general San Francisco Bay Area.

Table 24: Selected 14C dates from the San Francisco Bay Region

Site	matl.	Lab#	AGE B.P.	Ref.
CA-SMA-77	shell	UCR-0961	3460+/-360	Breschini (1986)
CA-ALA-307	charc.	M-0127B	3700+/-300	Breschini (1986)
Stanford M	bone c.	UCLA-1425	4400+/-270	Gerow (1974)
Sunnyv. M	charc.	I-06977	4460+/-95	Gerow (1981)
Bart skelt	O. clay	W-2463	4900+/-250	Breschini (1986)
CA-MRN-17	bone	UGA-4592	5575+/-220	Breschini (1986)
CA-SCl-65	bone c.	WS-3635	5995+/-150	Fitzgerald (1991)
CA-SCl-65	bone c.	WS-3636	6450+/-160	Fitzgerald (1991)

Key: matl.= material charc.=charcoal; Stanford M= Stanford Man II burial; Sunnyv. M= Sunnyvale Man burial, bone c.= bone collagen Bart skelt= Bart skelton; O. clay= Organic clay; UCR= University of California Riverside; M= University of Michigan; UCLA= University of California Los Angles; I= Teleydne Isotopes; W= U.S. Geological Survey; UGA=University of Georgia; WS= Washington State;

As can be seen from this table, the dates from the Saratoga site are of great antiquity and actually represent the two earliest dated humans in the greater San Francisco Bay Region. These radiocarbon assays are derived from the bone collagen of Burials 1 and 2. Burial 1 was dated to 5995 +/- 150 B.P. while burial number two at 6450 +/- 160. These dates predate the previously oldest human remains (the Bart skeleton), so named because it was discovered during the construction of the Bay Area Rapid Transit system, by roughly 10 and 15 centuries repectively. Although many sites in the region have produced older dates, most were genereated from charcoal samples often lacking clear associations with human occupation. Because there is no question about association on the dates from the burials, the Saratoga site is unique in the study of Bay Area prehistory. The implications of these dates are further explored in the final chapter. The lab report of the results of the radiocarbon assays is included in Appendix C.

<u>Obsidian Hydration Data</u>

A total of 73 obsidian specimens from the Saratoga site were submitted for hydration. The bulk of these specimens were excavated from the site with a handful coming from the private collection of Frank Dutro Jr. who had picked them up as a youth from the surface of the site. These were generously lent to the author for hydration analysis. Of the 73 specimens submitted for hydration 56 had readable rims. The 17 (23%) unreadable specimens were attributed to ten having diffuse hydration, two with no visible band, three with variable width band, and two made of chert. The obsidian hydration results are presented in Appendix C. Sourcing was done visually by Tom Origer, with selected specimens subjected to x-ray fluorescene. These specimens are also identified in Appendix C, and represent those that could not be visually sourced. The majority of the readings were taken from flakes. Hydration readings were taken on only 17 biface fragments with no complete points analyzed. The most complete obsidian specimen is the point base illustrated in Figure 23. The 56 specimens were sourced as follows: 44 (78%) were of Napa obsidian, four (7%) of Annadel, six (11%) of Bodie Hills, and two (5%) of Casa Diablo. The dominant obsidian source is Napa Glass Mountain (Figure 26). The sample of 44 specimens produced a mean of 4.11 microns and a standard deviation 1.14 microns. Hydration readings for Annadel, Bodie Hills, and Casa Diablo obsidian are presented in Figure 27. Results of the Annadel, Bodie Hills and Casa Diablo, are of limited utility due to their small number and the lack of established hydration rate for the Bodie Hills (Table 26). Hydration rates, tentative as they are, exist for Napa, Annadel and Casa Diablo obsidian. For the geographically close Napa and Annadale sources the hydration rates have been given rates by Origer (1987), and for the distant Eastern Sierra source of Casa Diablo by Hall (1984).

Figure 26. Napa Obsidian Hydration Results from CA-SCl-65.

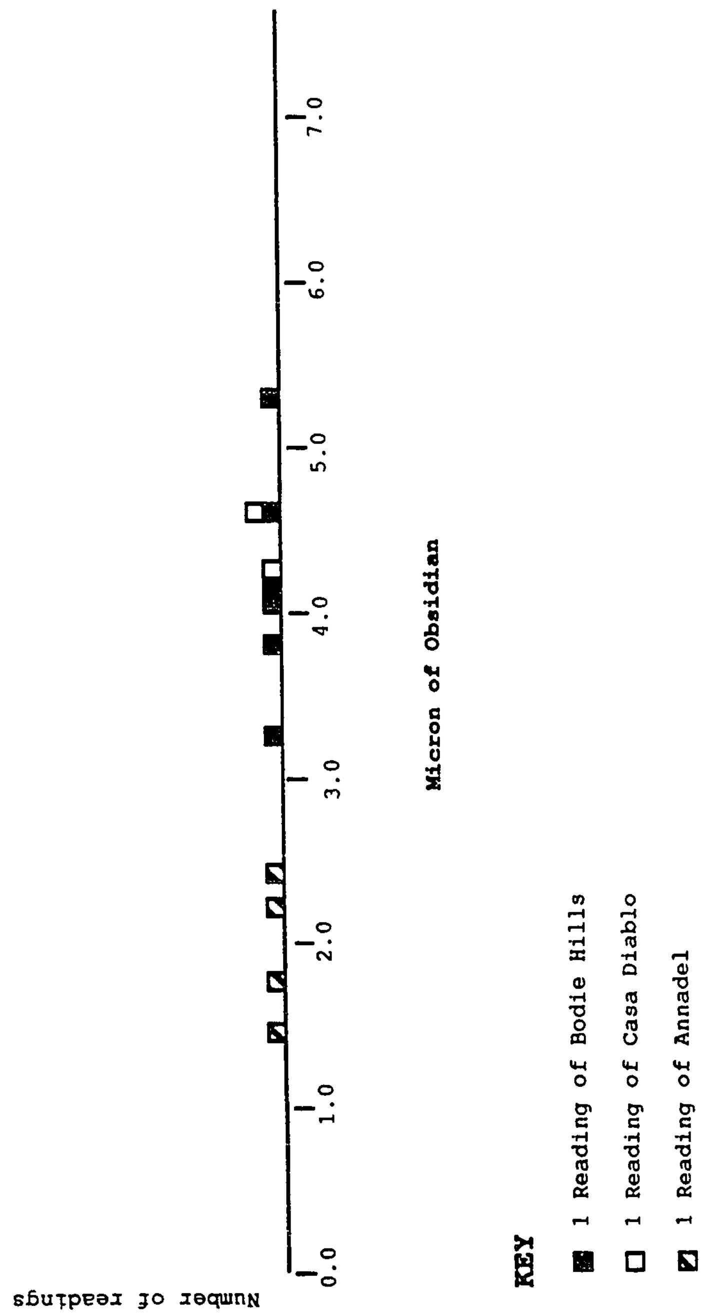


Figure 27. Annadel, Bodie Hills and Casa Diablo Obsidian Hydration Results from CA-SCl-65.

As can be seen in Figure 26 there is considerable range in the readings from 1.5 microns to 7.2 microns. The majority however, (31 or 73%) fall between 3.0 microns and 5.0 microns. This clustering of rim values of Napa obsidian represents the peak of obsidian use at the site. Translated to years before present these values span a period roughly between 1500 and 4000 years. The statistically less signifcant seven rim values beyond 5.0 microns range approximately from 7900 to 5000 years B.P. The four rim measurements less than 3.0 microns translate to approximately 400 to 1000 years B.P. The four Annadel specimens of 1.5, 1.9, 2.3 and 2.5 seemingly bolster the few late Napa readings falling between 400 to 1000 years when translated to years B.P. The two Casa Diablo specimens of 4.3 and 4.6 microns are placed about 2000 years B.P. utilizing Hall's (1984) formula. Although research on a hydration rate for Bodie Hills obsidian has progressed, no realible rate exists. The Bodie Hill hydration readings are 3.3, 3.9, 4.1, 4.2, 4.6, and 5.3 with a mean of 4.2 microns and a standard deviation of 0.67 microns. In summary, based on the tenuous ratios of microns to calender years before present, the obsidian hydration data from SCl-65 seems to indicate a peak of activity on the site between approximately 1500 and 4000 years before present.

Burials and Features

A total of four human burials were uncovered during the excavation of SCl-65. Three of these burials were located in a single unit (unit 3) and the fourth in exposure F (see Figure 5). All four of these burials were poorly preserved, highly fragmented, and found beneath cairns. The burial records are rather sketchy, with no clear record of Burial 3 and no record for the cairn over Burial 2. This loss of data is magnified due to the great antiquity assigned to Burials 1 and 2. A series of photos and a few rather poorly executed drawings are the only existing records for these four interments. Fortunately, nearly all the stones that constituted the cairns over Burials 1 and 4 were saved, allowing at minimum a close examination of the cairns themselves.

Burial 1 was intially thought to be a feature (feature 7) made up of a lose configuration of groundstone tools and thermally affected rock. The top of this feature was recorded as beginning at 19 1/2" below the surface. By the time the first level of the cairn had been removed the first few bones appeared. It was at this point that the burial was recognized as such. A re-drawing combining the two sketches made for the feature and then the burial is presented in Figure 28.

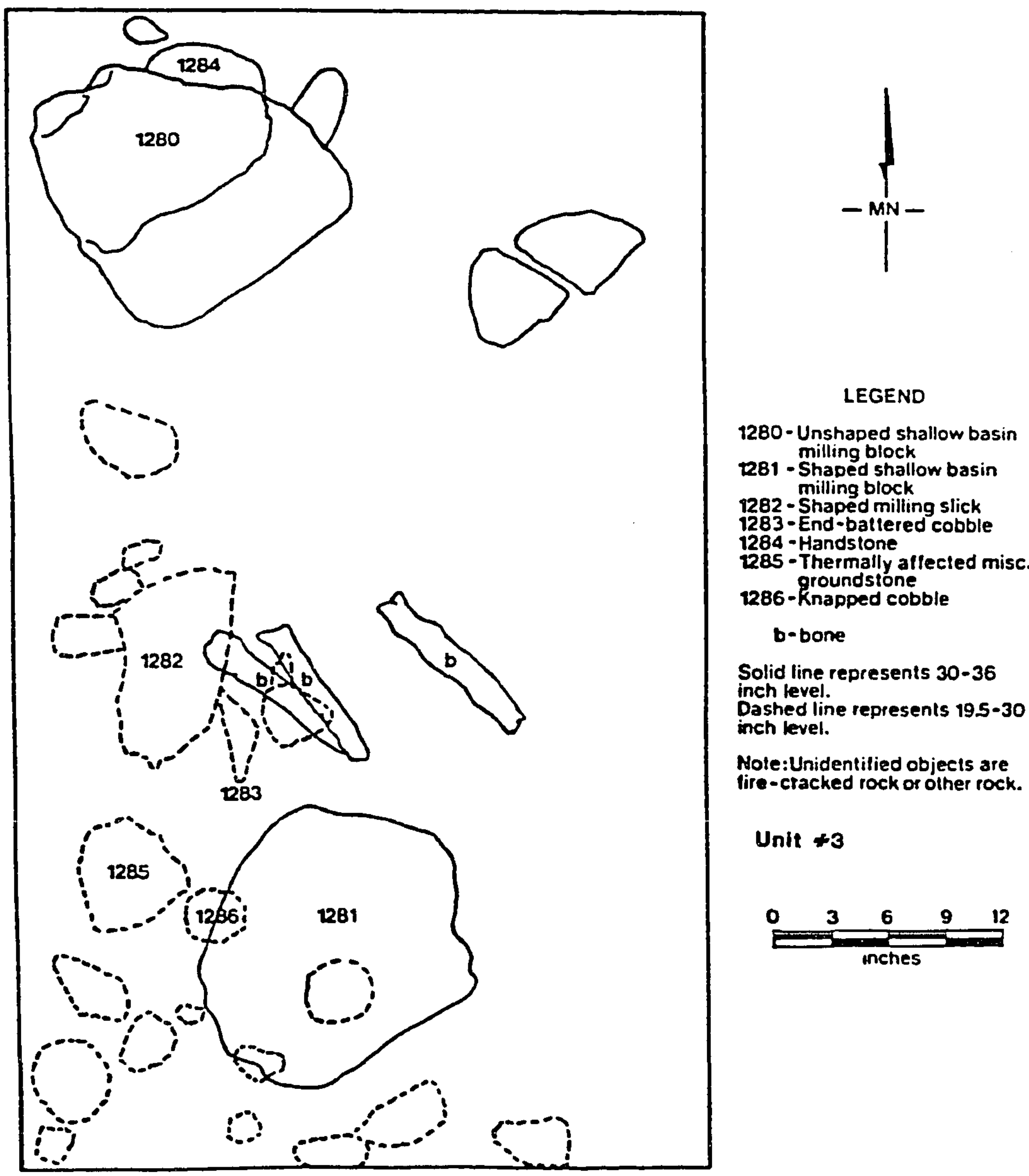
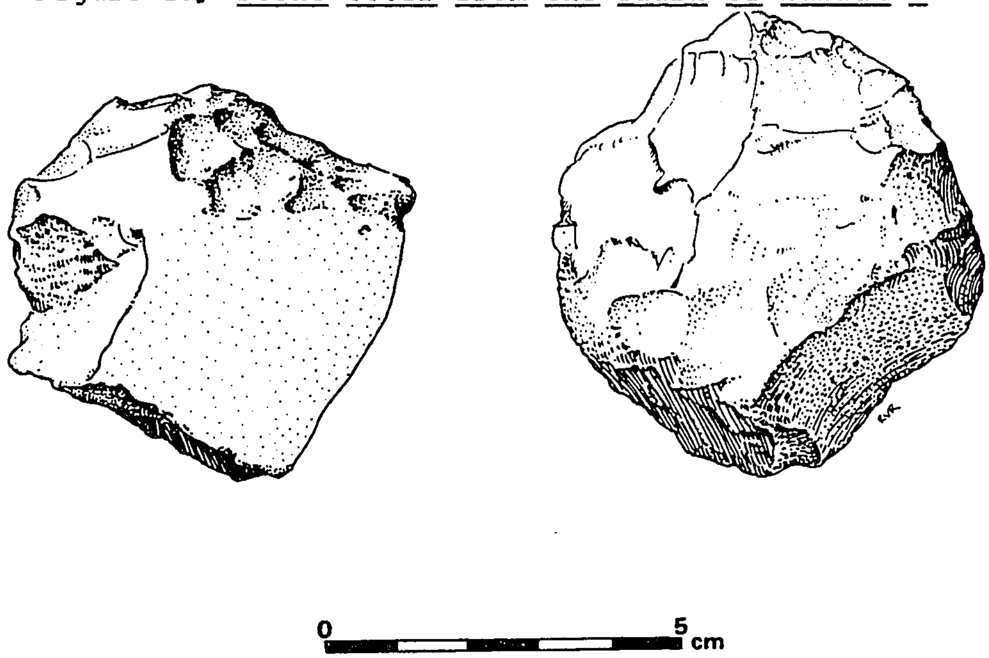


Figure 28. Burial 1 with associated rock cairn.

As can be seen from this illustration very little of the burial remained. An analysis and inventory of the bones recovered revealed that this burial was probably an adult based on the size of the long bones. Although not completely apparent in Figure 28, portions of both femurs, tibia, and fibula were found. No elements of the cranium, or other thick bone were recovered. There is a field note suggesting that the burial was flexed but it certainly seems improbable that any burial posture could have been determined. As Figure 28 indicates a number of milling tools were part of the cairn. Two of these artifacts are illustrated in Figures 6 and 7 (W9-1284 and 1281). Despite the fact that each of these artifacts have been typed as shaped, both are exceedingly simple crude tools with only a bare minimal amount of shaping. Indeed the assemblage of ground tools from the cairn are some of the crudest of the entire assembalge. Two additional artifacts that were either part of the cairn or were interred directly with the burial are illustrated in Figure 29. Specimen W9-1286 is a simple battered piece of sandstone while W9-1268 is a more formally made sandstone scraper. The shaped milling block seen in Figure 10 was found with its grinding surface face up, while the unshaped milling block (W9-1280) was found grinding surface face down.

Figure 29. Stone tools from the cairn of Burial 1



A light stain of red ochre was found on the grinding surface of this tool, the only such evidence found on any tool from the Saratoga site. The ochre stain and the inverted milling block suggest that the cranium of the burial may have been covered with this tool, with the ochre sprinkled around as a grave offering. Two of the three milling tools appear to have been grave offering as well, while only the fragmented specimen (W9-1282) was found in the level that served as the outer layer of the cairn. Many of the rocks of this layer of the cairn were simple fire-cracked rock along with a smaller number of miscellaneous fragmented pecked stones.

According to a very brief note and simple sketch Burial 2 was found in the very next level below Burial 1 along the south sidewall. The recorded depths of this burial are 37 to 41" below datum. According to eyewitness accounts this burial also had a cairn and a "metate placed over its head." Regretably there is no recorded evidence of this cairn or "metate" that the author could find. Instead, all that could be found were several black and white photos and one drawing of the bones completely exposed. Using blown-up versions of photos a fairly accurate drawing of the burial is presented in Figure 30. The analysis of this burial found a good deal more elements still intact compared to Burial 1. Again, this burial was judged to be an adult based on the size of the long bones. Four fragments of parital bone were recovered, along with fragments of the inominate, the left humerus, left and right ulna, left radius, left fibula, and fragments of at least one femur and tibia. The original sketch shows that more bone was present than can be seen in the photos. The drawing also indicates a great deal more articulation of the elements than is evident in the photos. However, considering the age of this burial, it is quite possible that much of it simply disintegrated as it was exposed to the air and sunlight, accounting for the discrepancies

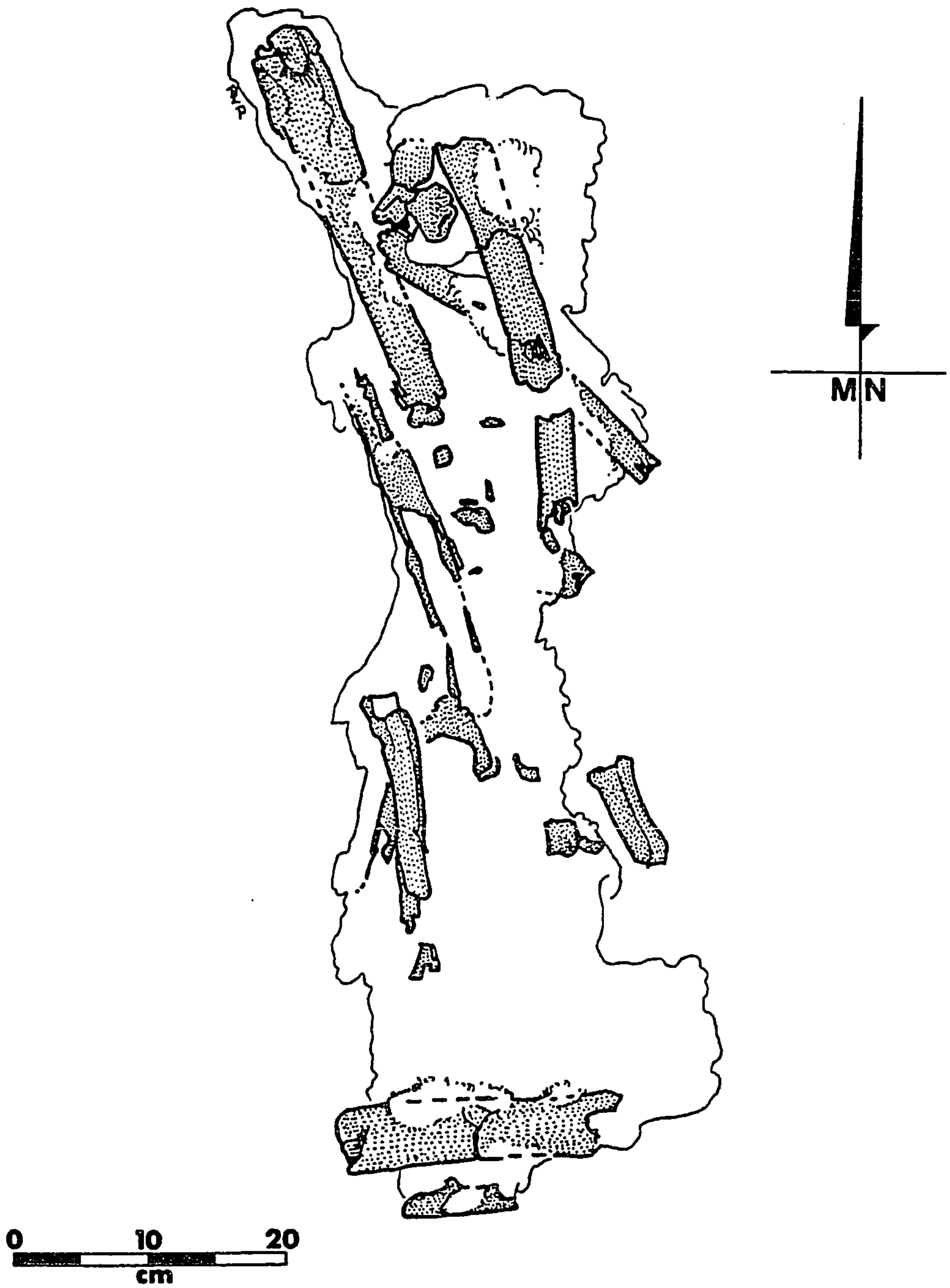


Figure 30. Burial 2.

between the photo and the drawing. It is nearly impossible to determine exactly the burial posture from the photos, but from the rough skecth the burial appears to be semi-flexed. It has been suggested to the author by Dr. William Wallace that this burial looks like a reburial, a common trait of milling cultures of Southern California.

Burial 3 was found in the north-half of Unit 3 at an unrecorded depth. This burial, according to excavation notes and first hand accounts, was left in situ but was at least partially vandalized. Burial 3 was found to have a cairn of "metates and rocks" over it but had two of the "metates" stolen from it one night. Presumably what was left of this burial was backfilled over and still exits. No drawing or photos could be found for this burial, although several of the people who worked the site claim they saw this burial and its associated cairn.

The final burial was found about 75 feet to the northwest of from unit three in the cutbank exposure unit F. This fact indicates that perhaps either (1) a large cemetery existed at the site, (2) the site has two distinctive cemeteries, or (3) there is no concentrated burial area and burials were widely dispersed over the site. Chester King believes that two distinctive cemeteries do exist at the site which would represent two different occupations. Burial 4 and its associated cairn is illustrated in

Figure 31, which represents a re-drawing of two profile sketches of the first and second exposures of the cairn and the burial. The solid line (see Figure 31) represents the outline of the exposure unit which was approximatley five feet long and 2 feet wide. The cairn apparently extended into the north sidewall of exposure F which was expanded in order to fully expose the cairn. The depths given for the cairn are 17" below the surface at the top and 26" at its lowest point. According to the brief notes written on the sketches the "lowest bone" was found at 29" below the surface. These same notes state that the "cairn covered the whole body" and that two metates were pulled out that would have been covering the burial but were removed when the exposure unit was excavated. Furthermore a good pit outline was visible due to the dark fill soil contrasted against the yellowish rocky sterile soil. A photo taken of the sidewall of this unit clearly backs up this note. The cairn itself was within this pit. Notes written on the second drawing indicate that a large mortar covered the skull which had been split in two. Fragments of the cranium can be seen in Figure 31, the largest of which lays just to the right of artifact W9-517. Other bones indicated on the drawing are all either fragments of femur or other unidentified long bone.

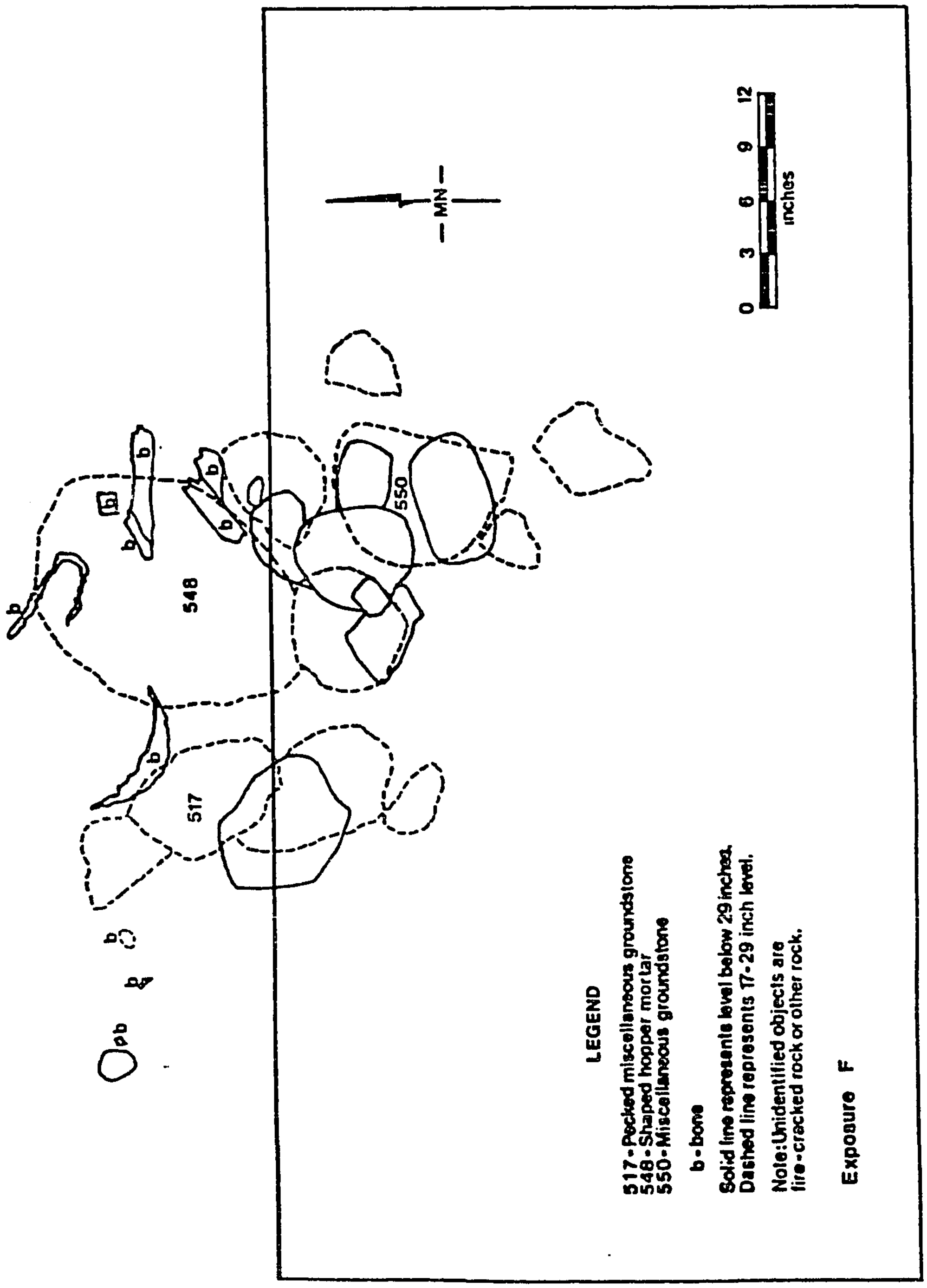


Figure 31. Burial 4 with associated rock cairn.

No burial posture was given for this burial. Unfortunately, the remains of this burial were lost or misplaced over the years since the excavation thus precluding the possibilty of doing an inventory of the skeleton. The cairn materials, however, were not lost and were given a close analysis for this study. One of the more prominent artifacts is depicted in Figure 31. In contrast to Burial 2 this artifact that covered the skull of burial four is a shaped hopper mortar (cat# W9-548). A complete list of the artifacts found in association with this cairn and burial four is presented in Table 25.

Table 25: Associated artifacts of Burial 4

	Cat#	Description
1.	W9-518	Large unfinished pestle blank
2.	W9-519	Shaped Unifacial Unipitted Stone, * Fig. 19
3.	W9-520	Shaped Bifacial Handstone
4.	W9-536	Boatstone * Fig.26 (Extension of Exposure F)
5.	W9-537	Quartz Core
6.	W9-538	Cobble Bifacial Bipitted Stone
7.	W9-539	Shallow Unifacial Millingslab
8.	W9-540	Cobble Bifacial Handstone
9.	W9-541	Cobble Unifacial Handstone
10.	W9-548	Shaped Hopper Mortar

Key: * = artifact is illustrated in Figure.

Besides these artifacts ten other miscellaneous ground and pecked stones were part of the cairn. As can be deduced from the table above, there is a general uniformity of the types of artifacts found in the cairns of Burials 1 and 2 with a couple of notable exceptions. The most glaring of these are the inclusion of the unfinished pestle blank, the pitted stones, and the shaped hopper mortar. The various possible meanings of the differences between the makeup of the two burial cairns will be addressed in the final chapter.

Features

Of all the data gathered on SCl-65 none is more muddled than that on the features excavated. The notes are very poor and often contradictory. Sketches of some of the features were made and not of others; this also applies to the small group of photos taken of the features. A very salient point about the nature of the features was made by Chester King, who observed in retrospect that many were formed through the re-depostion of previously distrubed artifacts. This seems particularly true in regards to several unearthed within the first 12 inches of the site. In many cases historic materials such as ceramic pipe, glass, and metal, were found mixed in with the rock features. In lieu of this fact, a close examination of only the features below the 12" level is made here. A total of 11 feature numbers were assigned of which records exist for Features 1, 2, 4, 5, 6, 7, 8, 9, 10, and 11. Table 26 presents the locations and depths of these recorded features.

Table 28: Recorded Features of SCl-65

Feature #	Unit #	Depth
1	6	0-14"
2	4	6-12"
4	9	6-18"
5	2	20-25 3/4"
6	10	12-18"
7	3	19 1/2 -30" *
8	13	6-12"
9	15	6-12"
10	13	12-18"
11 (4?)	16-17	12-18"
?	16-17	?

Key: * = Burial cairn of Buiral one, ? = unknown unit and depth.

With perhaps only one exception each of these features took the form of a lens of whole and fragmented groundstone, tools, thermally affected rock, chipped stone debitage and miscellaneous pecked and ground stone in varying densities.

Feature 4, was the most extensive feature recorded at the site. Some confusion exits in the records on this feature as can be seen from the table above. Whether Feature 4 was exclusively located in unit nine, or was also located in Units 16 and 17 remains unclear. This confusion extends to Feature 11, which was either a separate entity, or just the extension of Feature 4. Given that all three units adjoined each other on the western end of Trench A, it seems likely that there was one continuous feature that was assigned two feature numbers. There were two fairly detailed drawings made of this feature and a series of photos taken. A review of the contents of this feature in units 9, 16, and 17, from the 12-18" level reveals that there were four handstone fragments, one whole handstone, two chert cores, two hammerstones, one chert cordical flake, one basalt core tool, and two miscellaneous groundstone fragments. In addition to these artifacts 39 pieces of thermally affected rock weighing 8.1 kilos were pulled from this feature.

Feature 5 located in unit two was encountered at 20" below datum. According to the notes this feature consisited of a small clump of thermally affected rock in association with a marked soil change, charcoal, and flecks of red ochre. Seven pieces of thermally affected rock, that weighed 1.4, kilos were extracted from this feature.

Feature 6 located in unit ten was found at the 12" below datum. This feature was a rather sparse affair compared to Feature 4. The only artifacts recovered were four sandstone cobble cores. Handstones were recorded as well but were found not to be artifacts. Only four thermally affected rocks that weighed .267 grams were collected from this mini feature.

Feature 10 was the third level of Unit 13 (12-18") and was the continuation of Feature 8 that was the 6-12" level directly above Feature 10. Because these features were seemingly a single continous event, the artifacts from both levels are included in this discussion. Two hammerstones, one anvil stone, one complete handstone, one shaped cobble mortar, one unifacial milling slab, four miscelllaneous groundstone fragments, and one of the rare projectile points (see Figure 24, cat# W9-838) were all recovered from this single feature. Eighteen thermally affected rocks weighing 3.6 kilos were also found in this feature.

The remaning three features (1, 2, and 9) all recorded within the first 12" or so of the site follow the same pattern as the features disscussed above. In other words, each was comprised of a number of fragmented and whole groundstone and cobble tools, clustered together in small aggregates. General references in the notes point out that these aggregates were found in many areas of the site.

Chapter VII

CONCLUSIONS

Component Definitions

Despite the high level of disturbance that occurred at SCl-65 it is still possible to assign temporally discrete components. Based on the chronological data from the preceeding chapter, Table 27 presents the three components found at the site.

Table 27: Components of SCl-65

	Depth	Hydration M.	Stand D.	C-14 B.P.
Component 1	0-6"	2.07	0.45	-
Component 2	6-18"	4.05	0.58	-
Component 3	18-42"	6.01	0.69	5995 +/-150 6450 +/-160

Key: Hydration M.= Obsidian hydration mean, Stand D.= Standard Deviation, C-14 B. P.= radio carbon date in years before present.

The assemblages for each of these components are presented in Tables 28 and Tables 29. Table 28, presents a breakdown of the major classes of artifacts found within each component, while Table 29, details the types of debitage found in each of three components. Following these two tables a discussion on the particulars of each component are presented.

Table 28: <u>Tool Assemblages for Components of SCl-65</u>

Components	1.	2.	3.	Total
P. Points	0	4	1	5
Bifaces	5	10	2	17
Flake tools	2	7	7	16
Handstones	4	20	6	30
Milling S.	1	5	3	9
Mortars	0	7	2	9
Pestles	0	2	1	3
Pitted St.	2	7	6	15
Stone Balls	0	1	0	1
Anvil St.	1	2	0	3
Total	15	65	28	108

Key: P. Points= Projectile Points, Milling S.=Milling Slabs
Pitted St.= Pitted Stones,

Table 29: <u>Debitage from Components of SCl-65</u>

Components	1.	2.	3.	Total
Decort. flk	13	23	20	56
Primary flk	72	236	78	386
Thinning flk	109	321	157	587
Pressure flk	2	21	10	33
Shatter	45	128	49	222
Total	241	729	314	1284

Key: Decort. flk = Decortication flakes,

As can be seen in Table 4 a large portion of the groundstone tools lack provience therefore not allowing a full comparison of these tools in the three components. Due to this problem some of these data are best regarded as general trends found at the site. The first component at the Saratoga site is best example of this problem.

As stated earlier, the site had suffered considerable disturbance from a sawmill, a church, and construction of the housing complex. The exact location of the first two developments is unknown, so their impact is unclear. The last impact certainly was the *coup de grace*, hopelessly mixing and mashing any remaining late period artifacts from the site. Nervertheless, there is a smattering of evidence from the site that indicates that there was a late component. Evidence of some activity comes in the form of a few obsidian hydration rim values, which includes the only sample of Annadel obsidian found at the site. The rim values for the Annadel obsidian are as follows 1.5, 1.8, 2.3, and 2.5. Annadel obsidian, according to Origer (1987), hydrates faster than Napa obsidian, its geographically close neighbor. These four rim values roughly span 400 to 1150 years before present. There are also four Napa rim values of 1.5, 1.9, 2.5, and 2.6, which when translated to years run approximately from 350 to 1000 years before present. These eight rim values thus bracket a time period that spans approximately 350 to 1200 years before present. This period covers the transition of the middle to late prehistoric periods, to just prior to Euorpean contact. Besides these rim values there is circumstantial evidence of a late period component based upon the memory of Chester King. He recalled seeing a baby food jar full of very small projectile points recovered from the site after it was bulldozed, that later disappeared. If indeed this jar of diminutive projectile points did exist they would be diagnostic of a late period occupation. Groundstone artifacts found in this level were rather sparse with handstones being the most numerous with four specimens. However, without further data all that can be said is that its highly probable that a late component did exist at the site before it was disturbed.

Following Component 1 at SCl-65 there is a melange of data that points to a steady increase of activity on the site. In general the quantity of all cultural materials increases. Due to the lack of datable materials no radio carbon dates were generated for Component 2. Thus segregating this mass of data into a temporal component was accomplished by cross dating with diagnostic artifacts and obsidian hydration readings. In as much as this method of constructing components is reliable in the absence of absolute dates, the following components were defined.

The large cluster of Napa obsidian hydration reading indicated in Figure 26, together with the relative frequency increase of all types of tools and debitage is evidence that the site was used as a more permanent residential base.

Obsidian sourcing data for this component indicates that non-California sources were in use suggesting that the occupants of the site were invovled in the Trans-Sierran obsidian trade network. These two sources were Bodie Hills and Casa Diablo. Various hydration rates have been postulated by a variety of archaeologists for Casa Diablo obsidian. The rate as mentioned above for this thesis is Hall's (1984). As of yet no rate has been worked out for Bodie Hills, but it is thought to be similar to Casa Diablo. Research in obsidian hydration rates have however indicated that the Eastern Sierran sources hydrate faster than Napa or Annadel obsidian. Therefore relatively thick rim values found on Eastern Sierran sources represent less time than equivalent rim values found on Napa obsidian. Thus the two rim values of 4.3 and 4.6 on Casa Diablo obsidian only roughly translate to 1900 and 2200 years before present. The rim values for the Bodie Hills glass are as follows: 3.9, 4.1, 4.2, 4.6, 4.6, and 5.3 (See Table 26). Combining the Napa, and Eastern Sierra obsidian readings, and then translating those into to years before present suggests a time period of 4000-1500 B.P. for Component 2. The 4000-1500 B.P. time frame is in line with many other dates of sites in the San Francisco Bay Area. During this 2500 year span there is solid evidence in the archaeological record of increased occupation throughout the San Francisco Bay Region.

In concert with these events, there is a marked increase in chipped stone and groundstone artifacts deposited at the Saratoga site. There is a relatively greater increase of formal and informal tools, as well as an increase in cores, primary flakes, and thinning flakes, all indicators of greater tool manufacture at the site. In all this component contains 56% of the total provenienced chipped stone assemblage from the site. Coinciding with the increase of chipped stone artifacts there is also an increase in groundstone tools in Component 2. A total of 34 groundstone tools dominated by 20 handstones were recovered from this level along with the highest portion of mortars (seven). Two pestles and one of the four stone balls were also recovered from this component.

The majority of the diagnostic artifacts are found in Component 2. Four of the five provenienced projectile points are from Component 2. As stated earlier these four points along with a fifth point depicted in Figure 23 (cat # W9-1303, 838, 192, 19, and 10), resemble the three large projectile points found with the Stanford Man II burial. The dating of the burial is 4400 +/- 270 B.P., which places it near the time range of Componet 2. The Stanford Man points are all made of Monterey chert, and match fairly closely with three of the points of the same material from SCl-65 (Figure 24, specimens 1303, 838, and 192). Although all share the same basic morphological traits of the Stanford Man II points numbers 838 and 1303 appear to be dart points while 19 and 10 seem to be arrow tips. The smaller projectile points with this form seem to be a logical carryover of this particular lithic technology. Albeit a tenous relationship, the similarilites of the Stanford Man II burial projectile points to those of the Saratoga site, leads this author to belive that there is a generic connection between the Component 2 at SCl-65 and the Stanford Man II burial.

By circa 3700 B.P. before the first occupants of the West Berkeley mound appear, and by 3400 the "Early Bay" culture as defined by Gerow (1968) is present on the mid-peninsula. Component 2, at SCl-65 appears to have begun before and was contemporaneous with the occupation of Gerow's "Early Bay" culture at the University Village site. A projectile point made of Bodie Hills obsidian found on the surface by Frank Dutro (illustrated in Figure 23), has the characteristics of an Ano Nuevo contracting stem point. This point type has a wide distribution on the coast and elsewhere in sites along the bayshore (Jones and Hylkema 1988). Moreover, this point type was found in direct association with a burial from the University Village site with a date of 2950 +/- 350 years before present. Overall though the lack of other shared or similar diagnostic artifacts makes it difficult to tie this component at the Saratoga site to Gerow's indigenous "Early Bay" culture.

Finally, there are the two Olivella (C-2 type) shell beads (Figure 25) both found on the surface of the site. According to Bennyhoff and Hughes (1987) this bead type dates to circa 2000 years B.P. or the Early Middle period of San Francisco Bay Area prehistory.

The time frame for Component 2 begins sometime just prior to Gerow's "Early Bay" and Fredrickson's (1974) "Berkeley Pattern" as represented on the bayshore at ALA-307 and continues through to near the end of the "middle period" in Bay Area prehistory. A great deal of debate surrounds the timing of the transitions from "early to middle to late" in the Bay Area. Unfortunately the disturbance at SCl-65 precludes defining the timing and nature of these transitions. This is especially regretful due to the presence of a pre-early componet at the site.

Component 3 at the Saratoga site is represented by Burials 1 and 2, that were radiocarbon dated to 5995 +/-150 and 6450 +/-160 respectively, and their associated cairns consisting of crude milling tools and fire cracked rock. Due to the unique relationship of this component to San Francisco Bay Area prehistory a new moniker or phase name has been given. Henceforth, the Component 3 at SCl-65 is titled the Saratoga Creek Phase, named after the creek that flows just north of the site. The horizontal extent of the Saratoga Creek Phase is unknown. Burials 1 and 2 were found approximately from the 20 inch to 40 inch level of Unit 3. Unit three was located on the south side of the site, yet units in the general vicinity failed to produce little else in the form of this component. Assuming that these burials were placed in pits as well as covered with cairns, as burial four appears to have been, then the soils directly above burial one and two could be considered part of Component 3. Only ten units and two sections of the trench were found to contain cultural materials below the 24 inch level of the site, and only five units and one section of the trench had cultural materials below the 30 inch level. Outside of the artifacts found as part of the cairns covering the burials, only five groundstone artifacts were recovered from below the 18 inch level. All the other artifacts found below the 18 inch level were of chipped stone. As Table 31 indicates, only about 20% of the chipped stone assemblage was recovered from below the 18 inch level. More striking, however, is the lack of flake tools, bifaces, and projectile points. The single projectile point typed as a Rossi Square Stem was found in the 24 to 30 inch level of unit eight. Based on dates derived from other sites this point is belived to be 2500 to 3000 years younger than Saratoga Creek component. There are two possible explanations for this: (1) the point is intrusive and does not belong to the Saratoga Creek component, (2) this point type extends further back in time than previously thought. Another artifact that seems to be out of place is the Haliotis ornament that was found in the 18-24 inch level of unit 19. In all probability this double biconically drilled shell "button" dates to the Early Period (circa 3,000 B.P.) and is intrusive to the component. Excluding or including Burials 3 and 4 into the Saratoga Creek component is a difficult task, due to the absence of conclusive evidence either way. Burial 3 was found in the same unit as burials 1 and 2, but never had a depth recorded for it. As stated in the section on the burials, a cairn of "metates and rocks" was reported to have covered this burial but no drawing or photos were taken of it. Regretably this cairn was also quickly backfilled because of vandals who stole some of the artifacts one evening. Burial 4 is just as problematical. Much better recorded than Burial 3 it was found some 75 feet away from the first three burials in the cutbank of a trench dug by the developers. The recorded depth of this burial was 17 to 26 inches, or slightly above the recorded depth of burial one. It was also covered with a cairn of "metates," yet as stated earlier these metates turned out to be a shaped hopper mortar and a large unfinshed pestle blank, pitted stones, as well as handstones and an assortment of miscellaneous groundstone. The presence of a hopper mortar and pestle blank are an intriguing contrast to the tools found with Burial 1. Presumbably based on differences in the makeup of the cairns and distinctions observed between the vertical and horizontal placement of the burials, Chester King belives that two temporally separate cemeteries exist at the site. An alternate explanation for the differences found between the burial cairns is that there existed considerable variability in the composition of the cairns constructed for the dead, and that no single cairn represents the whole pattern. A third possibility is that the differences between the cairns represent two entirely different groups of inhabitants that shared a similar burial mode, if not a different subsistence regime. In the absence of an absolute date for Burial 4 there is no clear resolution to the observed differences found between the burial cairns at SCl-65. Also in absence of any field notes, soil profiles, or other geological data on the stratigraphy of the site, the presence of the Saratoga Creek component is confined to Burials 1 and 2, with the strong possibility that a much larger deposit of this component exists somewhere on the site, presumbably in the form of additional burial carins.

Besides the two radio carbon dates there are seven obsidian hydration readings which, although representing a small percentage of the obsidian readings from the site, they nevertheless hint at an early occupation at the Saratoga site. These seven readings are 7.2, 6.7, 5.9, 5.8, 5.8, 5.4, and 5.3 microns, all of Napa obsidian. In addition to these obsidian hydration rim values there are two diagnostic artifacts that seemingly belong to the Saratoga Creek component. These are the aforementioned, boatstone and atlatal engaging spur. The spur was found in the 18-24" level of Unit 3, while the boatstone was located in the sidewall of unit extension F with no recorded depth. These two artifacts represent part of a small assemblage of similar tools found in California thought to be used for thousands of years before the introduction of the bow and arrow.

In review it can be stated that the site was first occupied sometime before 6450 years B.P. and that with the exception of an apparent hiatus between circa 6000 and 4000 years ago, the site was in use up to about 1200 B.P. Table 30, summarizes the components at SCl-65.

Table 30: Chronology of Components at SCl-65

Component	Dates (years B.P.)
1	350(?) - 1200
2	4000 - 2500
3 (Saratoga Creek)	6450-5900

Milling stone Components of SCl-178 and SCr-177

With the foregoing definitions of SCl-65 fleshed out and with the firm establishment of a milling stone complex at the site, it is now time to review the previously published or unpublished data from SCl-178, and SCr-177, for data concerning the milling stone complex in the San Francisco Bay region. The first of these to be reviewed is SCl-178.

SCl-178, or the Blood Alley site as its also called, has scant but intransigent data reflecting an archaic milling economy. Utilizing data based upon geological strata, projectile points, and radiocarbon dates, Hildebrandt (1983) established four temporal components at

SCl-178. Component I, the first and oldest of the four, "was estimated to roughly date from 8000 B.C. to 2500 B.C." (Hildebrandt 1983:8-128). Hildebrandt identified a pre-mortar and pestle complex assembalge that was located deep within the complex alluvial deposit at SCl-178. A small number of widely dispersed artifacts were found within five excavation units at depths ranging from 420-550 centimeters below the surface. The tools found in this level included six handstones, three cores, one notched stone, one grooved stone, one cobble tool, and several utilized flakes and flake tools (Hildebrandt In press). Unfortunately the dating for this small assemblage is somewhat in doubt. Three dates were obtained from charcoal samples collected from near the stratum containing the assemblage. These dates therefore are not directly associated with the assembalge and may not accurately express their true age. These dates are presented in Table 31.

Table 31: Some radiocarbon dates of Component I at SCl-178

Date (years B.P.)	Depth (in centimeters)
8550 +/- 300	330
9250 +/- 1000	350
10010 +/- 500	510

These dates are of great antiquity, with the youngest two thousand years older than the oldest burial from the Saratoga Creek Component of SCl-65. If these dates are accurate, or moreover accurately date the milling tool assemblage, it would place the start of milling focused economies in the Bay Area at about the same time if not earlier then those of southern California. It is in this light that the loose association of the dates to the milling tools becomes more critical. Yet, as stated by Hildebrandt, these artifacts fall well within the time frame established for the floourshing of the milling stone cultures:

> . . .by virtue of lying stratigraphically below an assemblage that includes mortars and pestles and a point type found at the Stanford Man II site (Hildebrandt In press).

What remains at issue is the exact timing of when this pattern took root at the site.

SCr-177, or the Scotts Valley site, is a complex site with a multitude of radiocarbon dates spanning over 10,000 years of prehistory. No less then 28 dates over 5,000 years old have been extracted from the Scotts Valley site. In an as yet unpublished report (Cartier, et al. 1987) Cartier has identified two main cultural patterns "depending on criteria between three and seven cultural episodes" (Cartier et al.1987), at SCr-177. The two main patterns are named the Ano Nuevo and the Scotts Valley. According to Cartier the Ano Nuveo Pattern is a Paleo-Indian component, with two phases that date from 11,500 to 13,500 years before present. This pattern, and its two phases, are clearly beyond the scope of this thesis and will not be addressed here. More pertinent to this study is the Scotts Valley Pattern. This pattern according to Cartier dates between circa 10,650 and 7,000 years before present and "corresponds to the 'proto-archaic' and 'archaic' stages as widely recognized in American archaeology" (Cartier et al. 1987: 169). The first phase of this pattern is named the Umunhum phase which "has been radiocarbon dated to about 8500 to 9500 years ago" (Cartier et al. 1987: 169). Cartier views this phase as:

> . . .as a period of transition or adjustment in human adapatations. . . (that) is marked by the first appearance of groundstone milling equipment including handstones and millingstones (1987:175).

Much of the basis for this statement is derived from the discovery of a small cairn of three millingslabs uncovered in the 60-80 centimeter level of area AA during the 1987 salvage excavations. A radiocarbon assay on charcoal gathered out of wetscreens from the 100-110 centimeter level directly beneath the cairn yielded a date of 10,850 +/- 180. Initially the relatively close association of this date to the millingslabs was touted as proof of milling cultures being in place by no later then 10,000 years ago. If this was the case, the Scotts Valley site would be one of the earliest examples of milling stone cultures in the state. A reassessment of the particulars of the excavation of the three slab cairn has raised some questions on the prudence of assuming that the slabs are 10,000 years old. Specifically, the manner in which slabs were left, with one "resting on edge end up" (Cartier et al.1987:63). This position is indicative of a burial cairn placed over the dead, much in the same fashion that the burials from the Saratoga site were covered. If these slabs represent what is left of a burial cairn it can be assumed that it was placed in a pit, thus being intrusive into the earlier cultural strata. Besides being used as grave offering or markers, small cairns of milling tools were often buried in caches for safe keeping and later use. It is interesting to note that no other milling tools were found in the 60-80 centimeter level of area AA, but that milling equipment was found in the 40-60 centimeter level directly above the slabs. Nevertheless, the presence of three well-formed millingslabs deep within the Scotts Valley site is intriguing as evidence of early milling activity.

In the ensuing Scotts Valley Phase of the Scotts Valley Pattern, Cartier cites further evidence of milling activities. A cluster of six radiocarbon assays, all on charcoal ranging from circa 7300-5970 years before present, represent the peak of habitation for this phase. Cartier regards the Scotts Valley Phase to be "temporally equivalent and technologically related to various Early Milling stone cultures known elsewhere in California" (1987:176). Yet elsewhere in the same report Cartier mitigates that statement with the following:

> . . . The 1987 excavations did produce some groundstone artifacts including milling tools (manos and metates). This did not, however occur in a frequency that could be compared to a typical 'milling stone horizon' site in Southern California (1987:62).

A review of the data compiled for the 1987 excavations on all areas of the site (AA, BB, CC, and D) reveals that only a total of 16 handstones, 7 millingslabs, 5 anvil stones, and 15 hammerstones, were recovered. These 43 artifacts represent the grand total of a very large area of excavation and cover every pattern and phase described for the site. This is in stark contrast to the results of the 1983 salvage excavation which produced a relatively large number of groudstone artifacts, including 50 handstones, 13 millingslabs, 21 assorted groundstone fragments, and 30 pecked and battered cobble tools (Cartier 1984, 1985).

It is in the next phase (the Sand Hill Phase) that Cartier finds a decrease in the frequency of groundstone tools from the Scotts Valley Phase. The time frame given for this phase is 5500-4500 years B. P., based once more on radiocarbon assays on charcoal gathered out of cultural bearing strata. Seed grinding is still practiced during this phase, but according to Cartier it is on the decline.

To date there has been no report or publication produced that attempts to integrate the two groups of data generated from the 1983 and 1987 salvage excavations. Furthermore the delineation of the patterns and phases at the Scotts Valley site fails to include the number of milling tools per pattern or phase, but rather lists the data by the area excavated. Re-organization of the data into one account will be necessary before the best picture of the long prehistory of SCl-177 is drawn. In the meantime it seems safe to assume that there is a milling stone component at the site that reflects plant and/or grass seed exploitation that gradually increased over time. The dating, although not the best in terms of association, indicates that milling stone adaptations began conservatively speaking 7,000 years ago and continued at minimum for the next 2500 years.

<u>Intersite Comparisons</u>

Having reviewed the data for SCl-178 and SCr-177, it is now appropriate to recapitulate the dating of the various components that contain milling assemblages. Table 32, presents these components for all three sites.

Table 32: Milling stone Components of SCl-65, SCl-178, and SCr-177 .

Site	Phase	Dates (B.P.)
SCl-65	Saratoga Creek	6450 - 6000
SCl-178	Component I	10,000 - 4500
SCr-177	Scotts Valley Phase	7000 - 5900
	SandHill Bluff Phase	5500 - 4500

The above table illustrates that there is considerable overlapping between all three sites in terms of the age of their respective millingstone patterns. The most firm date of the three sites is the Saratoga Creek Component, because of the direct association of the millingstone cairns with the radiocarbon dates on the human bone. The other milling components are bracketed in a more approximate fashion, due to the nature of the dating. In the opinion of the author the 10,000 year-old date is too old by 2500 years or so, but that the 4500 year old cutoff date for the transition to another economic mode is not unreasonable.

A recent excavation in the southern Santa Clara Valley near Morgan Hill, has produced further evidence of a milling assemblage dating to circa 5,000 years before present. This latest data is in an as of yet unpublished report on the archaeological data recovery of site SCl-671 (Leventhal no date). This site dug by Ohlone Family Consulting Services under the direction of Alan Leventhal has found at 160 - 200 centimeters below the surface a millingstone assemblage that has been dated with two charcoal samples to 4980 +/- 160, and 5395 +/- 200 (Leventhal no date). There are no figures or data on the size or nature of the assemblage yet the milling tools have been found stratigraphically below a midden containing mortars and pestles that has been dated to 2350 +/- 80 before present.

Emerging from the data from SCl-65, SCl-178, SCr-177, and now perhaps SCl-671, is a portion of the archaeological record of the southern San Francisco Bay Region that has long been hypothesized to exist, but was illusive due to the lack of sites that contained verifiable archaic milling stone assemblages. The effect of the emergence of a milling stone complex for the Bay Aare has two direct implications for the prehistory of the San francisco Bay Region. First, it proves that the Bay Area has an archaeological record coeval with nearly anywhere in the state. Furthermore early dated milling stone patterns as evidenced above effectively place Bay Area and central Califronia archaeology into alignment with the basic tenet on the nature of subsistence practices during the early archaic period. Second, models of prehistoric cultural evolution in the Bay Area now have to be reconstructed to take into account the presence of an archaic population that is divorced from any of the prevailing ideas of population movements emanating from the central valley. Archaic milling stone cultures in the Bay Area prove that Gerow's Early Bay culture was in fact a relatively late event that may have been spawned from an "in situ" archaic culture. Based on linguistical data Whistler, (1977, 1980) has proposed that an "undocumented early Millingstone group that spoke languages of the Hokan stock occupied Cental California at approximately 5000 B.C." (Hildebrandt 1983:1-21). Regardless of their linguistical affiliation, a milling stone pattern was in place by at least 6500 years ago, if not a thousand years earlier.

Interregional Comparisons

With the establishment of a milling stone pattern for the San Francisco Bay region, the next step is to compare it with the milling stone cultures of southern California. A full blown comparison is not possible due to the paucity of data on the milling stone pattern in the Bay Area. However, a cursory comparison is feasible. The most obvious comparison is the age of the Saratoga Creek Phase and that of several of the "classic" milling stone sites of southern California. For example the Encinitas Tradition, as defined by Warren (1968), dates between 7500-5000 years before present. The Scotts Valley Phase at SCr-177 falls almost exactly into this time frame.

Component I at SCl-178 is more difficult to place, yet it appears to roughly fall between 8000 and 4500 years before present. Beyond temporal considerations, similarities also exist between certain aspects of the material culture of the two milling stone patterns. For example the presence and general abundance of milling tools, hammer stones and other cobble tools along with low frequencies of bifaces and projectile points is a basic trait that is shared between the south coast and the Saratoga and Blood Alley sites. On a more specific level deep, well-formed milling slabs and loaf shaped bifacially worn handstones at SCl-65 and SCr-177, bear strong resemblances to those of the south coast. More diagnostic are the four stone balls found at Saratoga a trait also found in Oak Grove sites along the Santa Barbara coast. Another diagnostic trait of the south coast milling cultures is the presence of rock aggregates made of fragmented milling tools and thermally affected rock. Although the recording of the features at SCl-65 was very poor, there were several features which bore a resemblance to these somewhat mysterious archaeological manifestations. Probably the most intriguing shared diagnostic trait found between the two patterns is that of the burial carins. Burial cairns comprised of broken or "killed" groundstone is a distinctly south coast millingstone culture trait. The presence of four such cairns, and possibly another at Scotts Valley is perhaps the strongest connection between the milling cultures of the regions.

Summary

The term "Milling Stone Horizon" has been deftly ignored throughout this thesis for the reason that the term, as defined by Willey and Phillips, (1958) means:

> . . . a primarily spatial continuity represented by cultural traits and assemblages whose nature and mode of occurrence permit the assumption of a broad and rapid spread (1958:33).

The key objections for using the term "horizon" for milling stone sites, is: (1) the tendency to obscure real differences which exist in the archaeological record, and (2) the notion that the spread of milling technology was rapid and uniform across time and space. It seems highly unlikely that milling adaptations commenced at one particular point in prehistory, which is to imply that a single culture or tradition was responsible for its wide geographic distribution. The cultural connotations inferred in the usage of such terms as "horizon" and "tradition" are largely responsible for de-emphasizing the regional differences between the various expressions of the milling stone pattern. By ignoring these differences, the singular cultural tradition theory on the orgins of the milling stone pattern is encouraged. Basgall and True

(1985) offer a concise foil to the cultural historical view in a general overview of the status of the milling stone concept:

> . . . it is imperative that we explicitly outline those aspects of the archaeological record which are being integrated by the rubric 'Milling Stone'. . . If the Milling Stone concept is meant to integrate archaeological data in terms of shared economic or adaptational attributes,then any assemblage with high proportions of millingstones,manos, core-cobble implements, crude hammers, and relatively low frequencies of refined bifacial tools is Milling Stone, regardless of age (1985:3.53).

Noting that there are considerable differences between the various assemblages of the milling stone pattern, Basgall and True (1985) state that most of the variability can be explained:

> . . . under the assumption that almost any population residing in these regions, with access to the same technologies, would have dealt with their environments in a generally similar fashion (and) . . . would possess functionally similar artifact assemblages. . . (3:54).

It is in this light that the variability of milling stone patterns is best examined. However, a caveat should be included regarding the often strong similarities found in millingstone sites. It is not sagacious to ignore that specific socio/technological specialized traits are held in common amongst the assemblages of the milling stone pattern. Culturally determined matters, such as burial mode or grave goods, cannot be strictly attributed to subsitence practices or independent invention. It is possible, if not likely, that historical connections did exist between the milling stone manifestations of the south coast and the Bay Area. The appearance of culturally new or distinctive behavior once introduced to a region may be sustained long after the orgins of that behavior have disappeared. In other words, shared cultural traits between regions need not be synchronous in nature, because their maintenance or longevity is dependent upon any number of culturally determined factors. Mindful of these ruminations, it is possible that the similarities between the milling stone patterns of the south coast and the bay area are rooted deep in the early stages of the archaic period.

The final objective of this thesis is to determine if any shift in economic mode from a milling-focused subsistence to an intensive acorn economy can be detected at any of the three sites.

The 1987 excavations at the Scotts Valley site produced no mortars or pestles. A few pestles and mortar fragments were recovered from the 1983 excavation, but as yet have not been placed within the chronological framework constructed for the site. In the Sandhill Bluff Phase dated to 5500-4500 years ago, Cartier notes the presence of pitted stones along with a general decrease in groundstone milling tools. Cartier (1987) interprets these data as a decline in the milling of grass seeds and the possible introduction of acorn processing, based on the assumption that the pitted stones may have functioned as acorn anvils. This interpretation is tenuous at best, but the dating of this phase does coincide with other data for the introduction of intensive acorn processing.

At SCl-178, and the previously mentioned nearby site of SCl-163, Hildebrandt found some concrete evidence of the initiation of intensive acorn processing. Charting the relative frequencies of milling equipment versus the mortar and pestle complex, from the earliest component to the latest, Hildebrandt (c.f. Elsasser 1986) found a jump in the number of mortars and pestles starting at 4500 B.P. Prior to 4500 B.P., in Component I of SCl-178, not one mortar or pestle was found. Milling tools are still in use after 4500 B.P., but suddenly there are more mortars and pestles from the two sites than there are handstones and millingslabs. The only drawback to this analysis is that the actual number of artifacts involved is rather small, leaving some doubt whether these patterns have applicability to the region as a whole.

Although the data from SCl-65 are beset with problems due to the disturbance and poor recording, they nevertheless indicate that a swing from milling technologies to intensive acorn use occurred. Firstly, no mortars or pestles were retrieved from the site until the 6-12 inch level of the deposit. One pestle blank, one hopper mortar and pitted stones were found in the cairn over burial 4 but as mentioned previously the temporal placement is problematic. In Component 2 two pestles and seven mortars were found along with 3 pitted stones. Component 2 is roughly dated between 4000 - 2500 B.P. It is apparent that a shift from the milling stone pattern had already occurred by this point, but due to the lack of provenienced groundstone artifacts, a more fine-grained determination of when the shift occurred is not possible. However, there are some observations that can be made about the assemblage as a whole. The amount of wear and degree of care in manufacturing, exhibited across the nine classes of groundstone tools, ranged from extremely casual to finely-pecked and polished artifacts. This is especially true in regards to the differences seen between the tools found over the burials and most of the mortars and pestles. In terms of frequencies, the 62 mortars and 39 pestles consitute 24.8 % of the assemblage while the 63 millingslabs and 86 handstones consitute 36.5 % of the assembalage. The dominance of the milling tools may indicate that, although a transition from milling to balanophagy did occur, it perhaps happened at a slower rate than elsewhere in the region.

In summation, the available archaeological data from SCl-65, SCl-178, and SCr-177, indicates that each possessed, during either the early or middle archaic, milling stone patterns that stressed the processing of vegetal resources as a primary focus in the adaptive strategies of the inhabitants. Futhermore, the shift from milling technologies to an acorn intensive economic mode occured following a developmental sequence that probably included decreased mobility due to growing population pressures. There were, undoubtedly, a number of other factors affecting this shift that remain unknown. Future research should focus on why and when this shift from milling stone to balanophagy occurred.

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Appendix A

Stone Balls

CAT #	PROV	FORM	MATL	W/F	L/W	T/P	MAX LGTH	MAX WDTH	THCK	WT	FEAT ASC
W9-143	none	sh/rnd	gr	W	ES	pl/pk/b	9.1	8.9	9	947	NO
W9-183	none	sh/rnd	ss	W	ES	pl/pk#	5.7	5.3	5.3	116	NO
W9-444	Bldg-7	sh/rnd	ss	W	ES	pk/s/b^	8.6	9.1	9.1	864	NO
W9-1209	U4 12-18	sh/rnd	ss	W	ES*	pk/b/grv	4.7	4.8	4.7	107	NO

Key: to abbreviations used for groundstone tables.

Cat # = catalouge number, prov = provenience, Bldg-7 = Building number, Grag. = garage area of construction site, pool = pool area of construction site, rc = recreation area of building site, Exp 4 = Exposure unit in cut bank, TA2 = Trench section, U4 12-18 = unit and depth in inches, Matl = material, W/F = whole or fragmentary, Max lgth = maximum lenght, Max wdth =maximum width, Thck = thickness, WT = weight in grams and/or kilograms, Feat Asc = Feature Association, A Sur Cv = Area surronding concavity, b = battering, b/bv = battering and bevelling bub = bulbous, cobl =cobble, conv = convex, c/ovl = cobble with oval shape, cd = center depression, c/rnd = cobble with round shape, c/irr = cobble with irregular form, cyl = cylindrical, ES = every side, L/W =location of wear, med = medium, N/A = non-applicable, T/P = type and pattern of wear, shape of pecking, depth/p = depth of pecking, L/W/P =length and width of pecking, unsh = unshaped, sh = shaped, ed = end, f = face, F/PD =faces with pits, #/ PD = number of pits per face, sd = side, SH/F = shape of face, sh/rnd = shape round, T/W type of wear,pl = polish, pk =pecking, ovl = oval, irr = irregular pk = pecking, pl =polish, b = battering F10 = feature number, N/P/W = number of places with wear, n/v = non visible, P/W = patterns of wear, Loc = localized, rand = random, sl/con + slightly convex st and s = striations, dol = dolomite, gyw = greywhacke, gr = granite, qtz = quartz, rhy = rhyolite, rim = thickness of rim, ss = sandstone, unsh/hop = unshaped hopper mortar, #FC = number of faces, * = thermally affected, ^ and # = special shape or form,

ANVIL STONES

CAT #	PROV	FORM	MATL	W/F	T/W	SHAPE/P	DEPTH/P	L/W/P	MAX LGTH	MAX WDTH	THCK	WT	FEAT ASC
W9-26	none	unsh/irr	ss	F	pk	irr	0	22x19	30	25.3	7.1	9.6	NO
W9-40	none	unsh/irr	ss	F	pk	irr	0	10x8	26.9	17.5	6.8	4.6	NO
W9-292	Bldg-9 S	unsh/ovl	ss	F	pk	cir	0	?	11.5	11.3	6.2	1.11	NO
W9-325	Bldg-9	unsh/irr	ss	W	pk/pl	cir	0	2.4x2	34.3	26.5	8.4	10.4	NO
W9-383	none	unsh/irr	ss	W	pk	irr	0	9x5	31.1	28	13	12.2	NO
W9-385	Bldg-1 NE	unsh/irr	ss	W	pk	irr	0.6	16x9	40.5	31	12.8	19	NO
W9-843	U14 0-6	unsh/irr	ss	W	pk	irr	0	3x2	33	25	21.5	22.8	NO
W9-844	U13 12-18	unsh/irr	ss	W	pk	cir	1.1	3.5x3.4	18.5	13	10.5	2.8	F10
W9-1160	U6 12-18	unsh/irr	ss	F	pk	irr	0	18x12.5	24.6	22.3	11.9	8.6	NO

MISC PECKED STONE

CAT #	PROV	FORM	MATL	W/F	N/P/W	P/W	MAX LGTH	MAX WDTH	THCK	WT	FEAT ASC
W9-139	none	unsh/irr	ss	F	1	Loc	6.2	8.2	4.1	348	NO
W9-186	rc a	unsh/irr	ryh?	F	1	Loc	7.9	5.9	3.3	186	NO
W9-232	pool	unsh/irr	ss	F	3	rand	8.2	6.7	4.5	400	NO
W9-322	Bldg-9 S	unsh/irr	ss	W	1	Loc	14.1	11.8	7.2	1855	NO
W9-388	Bldg-1	unsh/ovl	ss	F	1	Loc	27	21.6	9.5	6000	NO
W9-396	Bldg-1	unsh/cir	ss	F	1	Loc	10.2	8.3	6.1	842	NO
W9-464	Bldg-8 S	unsh/ovl	qtz	W	1	Loc	12.4	11.1	4.4	929	NO
W9-522	Exp.F	unsh/irr	ss	F	1	Loc	5.8	4.6	3.9	121	B4
W9-523	Exp.F	unsh/irr	ss	F	1	Loc	5	8.2	5.4	313	B4
W9-553	U20 0-6	unsh/irr	ss	F	3	rand	4.7	7	3.4	160	NO
W9-989	U10 6-12	unsh/irr	qtz	F	1	Loc	5.6	4.2	3.2	136	NO
W9-1204	U4 6-12	unsh/irr	ss	F	1	rand	8.2	6.9	7.8	387	NO
W9-1266	U3 18-24	unsh/irr	ss	F	3	rand	4.3	7.8	4.7	312	NO
W9-1410	none	unsh/irr	ryh?	F	1	rand	7.3	6.1	3	262	NO
W9-1419	none	unsh/ovl	ryh?	W	5	r/loc	13.4	7.8	5.3	836	NO

HAMMER STONES

CAT #	PROV	FORM	MATL	W/F	N/P/W	L/W	T/W	MAX LGHT	MAX WDTH	THCK	WT	FEAT ASC
W9-55	none	c/ovl	qtz	W	3	f/end	b/pk	10.4	7.6	5.5	632	NO
W9-60	none	c/irr	ss	F	1	end	b/pk	6.6	8.8	5.2	403	NO
W9-62	none	c/ovl	ss	F	2	sides	b/pk	8.4	8	4.3	378	NO
W9-63	none	c/ovl	ss	W	4	sd/ed	b	7.5	5.5	3.1	201	NO
W9-64	none	c/ovl	ss	F	1	end*	b	10.8	7.5	6.1	660	NO
W9-66	none	c/irr	ss	F	1	end	b	4.3	5.1	3.6	119	NO
W9-68	none	c/ovl	ss	W	3	f/ends	b/pk	6.7	6	4.7	256	NO
W9-71	none	c/ovl	ss	W	1	sd/ed	b/pk	9.1	4.9	3.2	250	NO
W9-74	none	c/ovl	ryh?	W	3	f/ends	b	8.6	6.2	3.7	271	NO
W9-233	pool	c/rnd	ss	W	1	end	b	9.6	9	6.3	743	NO
W9-294	Bldg-9 S	c/rnd	gr?	W	4	f/sd/ed	b/pk	7	5.7	5	365	NO
W9-340	Bldg-1	c/irr	ss	W	1	end	b	11.9	8	7.3	1160	NO
W9-359	Grag. S	c/ovl	qtz	W	4	f/ends	b	7.7	5.1	4.9	231	NO
W9-373	none	c/irr	gr?	W	1	ends	b	7.6	7.7	5.2	425	NO
W9-392	Bldg-1	c/irr	ss	W	2	ends*	sp/b	13.7	9.3	7	1169	NO
W9-393	Bldg-1	c/ovl	ss	W	2	faces	b	12.7	11.3	8.2	1506	NO
W9-411	Bldg-2	c/ovl	ss	W	1	end	b	11.7	8.4	5.1	684	NO
W9-453	Bldg-8 S	c/ovl	ss	W	4	f/end	b	7.5	4.9	5.4	329	NO
W9-456	Bldg-8 S	c/irr	ss	F	1	end	b	6.4	5.2	3.7	184	NO
W9-534	Exp.F	c/rnd	ss	W	2	ends	b	6.2	5.6	4.7	198	NO
W9-743	U17 12-18	c/irr	gyw	F	1	end	b	4.4	6.9	3.3	162	F?
W9-840	U13 6-12	c/irr	ss	W	1	end	b	13.3	10.1	6.7	1200	F8
W9-845	U13 12-18	sh/irr	ss	W	3	f/sd/ed	b	15	12.6	6.5	1650	F10
W9-864	U12 0-6	c/irr	ss	F	1	end*	b	6	6.6	4	293	NO
W9-978	U10 6-12	c/irr	ss	F	1	end	b	6.2	8	3.4	237	NO
W9-979	U10 6-12	c/irr	dol?	W	4	f/sd	b	5.5	5.3	4.3	235	NO
W9-1078	U9? 6-12	c/ovl	ss	W	2	ends	b	9.8	6.1	3.9	313	F4?
W9-1150	U6 6-12	c/ovl	ss	W	1	f/end	b/pl	7.7	6	3.6	250	NO
W9-1239	U3 6-12	c/irr	ss	F	2	f/sd	b/pk	7.9	5.6	4.5	239	NO
W9-1314	U2 24-30	c/irr	ss	W	1	end	b	14.1	9	5.4	1230	NO
W9-1404	none	c/irr	ryh	F	2	sd/ed	b	7.3	8.9	6.6	589	NO
W9-1408	none	c/irr	ss	F	1	face	b/pk/pl	8.9	8.7	5	426	NO

PITTED STONES

CAT #	PROV	FORM	MATL	W/F	SH/F	F/PD	#/PD	OTH/W	MAX LGHT	MAX WDTH	THCK	WT	FEAT ASC
W9-65	none	sh/ovl	ss	W	conv*	2	2	b/bv	9.9	6.2	4.6	395	NO
W9-67	none	c/rnd	ss	W	N/A	1	1	N/A	7.3	6.8	4.5	281	NO
W9-72	none	c/ovl	ss	W	N/A	2	4	b	9.4	6	4.5	370	NO
W9-202	rc 8-24	c/ovl	ss	W	N/A	1	1	N/A	12.9	10.9	6.3	1131	NO
W9-236	pool	c/ovl	ss	W	N/A	2	2	b	8.6	6.2	4.6	344	NO
W9-205	rc 8-24	c/irr	ss	W	N/A	2	1	pk/b	8.3	5	4.7	305	NO
W9-240	pool	c/ovl	ss	W	conv	2	2	pl/s	10.1	5.8	4.7	338	NO
W9-242	pool	c/ovl	ss	F	N/A	2	2	N/A	8.5	7.3	5	348	NO
W9-295	Bldg-9 S	c/ovl	ss?	W	N/A	2	2	b	9.1	6.6	5.1	374	NO
W9-296	Bldg-9 S	c/ovl	ss	W	N/A	2	3	N/A	6.7	5.1	3.3	145	NO
W9-332	Bldg-1	c/ovl	ss	W	N/A	2	2	N/A	6.7	5.9	3.6	219	NO
W9-335	Bldg-1	c/ovl	ss	W	N/A	2	2	pk	7.6	6.4	4.6	258	NO
W9-339	Bldg-1	c/ovl	ss	W	flat	1	1	pl	12.2	10	7.1	1611	NO
W9-379	none	c/ovl	ss	F	N/A	2	2	pk	7	5.3	4.5	224	NO
W9-394	Bldg-1	sh/ovl	ss	F	conv	2	2	bv/pk	6.2	6.4	4.6	298	NO
W9-461	Bldg-8	c/ovl	ss	W	conv?	1	1	pl/pk/s	7.6	7.2	4.1	306	NO
W9-519	Exp. F	sh/rnd	ss	W	flat	1	1	bv/b/s	7.3	6.5	3.9	243	B4
W9-535	Exp.F	c/irr	ss	F	conv	2	2	pl/s	6.5	5.8	4.5	248	B4?
W9-538	Exp.F	c/rnd	ss	W	conv	2	2	N/A	6.9	6.4	2.8	167	B4
W9-689	U19 24-30	c/ovl	ss	F	N/A	2	2	pk	4.7	7.7	2.6	117	NO
W9-690	U19 24-30	c/irr	ss	F	N/A!	1	1	N/A	8.5	4.4	5	247	NO
W9-716	U17 0-6	c/irr	ss	F	conv	2	2	bv/s	7.6	7.3	4.4	232	NO
W9-717	U17 0-6	c/irr	ss	F	N/A	1	2	N/A	4.2	5.6	3.8	118	NO
W9-807	U13 12-18	sh/irr	ss	F	conv	1	1	bv/pk	5	7	3.9	200	NO
W9-943	U10 6-12	sh/ovl	ss	W	N/A!	2	2	pl*	4	5.2	4	159	NO
W9-980	U10 6-12	c/ovl	ss	W	flat	2	2	b/pl/s	8.7	6.2	2.6	182	NO
W9-982	U10 6-12	c/irr	ss	W	conv	1	1	pl	7.2	6.6	2.1	165	NO
W9-1006	U10 18-24	c/rnd	ss	W	conv	1	1	pl	7.2	6.8	3.6	227	NO
W9-1158	U6 12-18	sh/irr	ss	F	conv	1	1	pl/pk/s	8.3	6.8	4.2	305	F1
W9-1174	U6 14-18	c/ovl	ss	F	conv	1	1	pl/pk/s	9.4	5.2	3.8	249	NO
W9-1355	TA2 12-18	c/ovl	ss	W	N/A	2	2	b	7.3	5.8	3.9	207	NO

PESTLES

CAT #	PROV	FORM	MATL	W/F	SH/COBL	SIZE	ENDS SHAPE	DIST/W	PROX/W	MAX LENGT	MAX WIDTH	THCK	WT	FEAT ASC
W9-13	TAS 6-12	N/A	ss	F	N/A	N/A	N/A	N/A	N/A	4.6	N/A	N/A	45	NO
W9-20	none	N/A	ss	F	sh	N/A	conv	N/A	pk	7	4.4	6	302	NO
W9-69	none	con	ss	W	sh	med	sl/conv	N/A	pk/sp	16.7	5.5	6.2	924	NO
W9-145	pool	cyl	ss	F	sh	long	N/A	irr	N/A	21.1	N/A	8.7	2600	NO
W9-146	pool	cyl	gyw	W	sh	med	flat	pl/sp	N/A	17.9	7.6	5.7	1150	NO
W9-155	pool	cyl	ss	W	sh	long	N/A	pk	pk	21.9	5.1	6.9	2200	NO
W9-157	pool	N/A	ss	F	N/A	short	conv	pk	N/A	9.4	4.9	4.9	503	NO
W9-173	none	bub	ss	W	cobl	med	sl/conv	pk	N/A	13	5.2	4.4	650	NO
W9-174	none	bub	ss?	W	cobl	med	irr	pk	N/A	18.1	9	4.9	1168	NO
W9-175	none	N/A	ss	W	sh	short	N/A	N/A	N/A	8.8	N/A	8.1	520	NO
W9-176	none	bub	ss	W	sh	med	sl/conv	pk	pk	16.5	6	6.8	876	NO
W9-177	none	bub	ss	W	sh	med	sl/conv?	b/pk	pk	19	5.9	5.3	1177	NO
W9-178	Bldg-8	cyl	?	W	cobl	long	conv	pk	N/A	21.1	7.5	8.9	2200	NO
W9-188	rc a	N/A	gyw	F	cobl	med	conv	pk	N/A	13.1	5.4	5.3	498	NO
W9-215	rc 8-24	cyl	ss	W	sh	med	conv?	b/pk	N/A	14.8	6.5	6.5	1006	NO
W9-216	rc a SW	?	ss	W	sh	med	conv	N/A	pk	17.3	5	7	1214	NO
W9-217	rc a SW	con	ss	W	sh	med	sl/conv	pl/pk	N/A	13.4	6	6.6	898	NO
W9-218	rc a SW	cyl	ss	W	sh	long	conv	pl/pk	N/A	23.1	5.2	7	2200	NO
W9-220	rc a SW	cyl	?	W	cobl	long	sl/conv?	b/pk	N/A	24.3	5.8	7	2200	NO
W9-241	pool	N/A	ss	F	sh	short	conv	N/A	pl	6.4	4.3	5.2	197	NO
W9-272	rc a	bub	ss	W	cobl	med	sl/conv	b/pk	pk	17.5	7.8	7.1	1364	NO
W9-297	Bldg-9 S	con	ss	W	cobl	short	sl/conv*	pk	pk	12.4	6.6	7.6	901	NO
W9-298	Bldg-9 S	con	ss	W	sh	long	conv	pk	N/A	20.9	6.2	6.7	1325	NO
W9-314	Bldg-9	cyl	ss	W	cobl	med	sl/conv	b	N/A	19.1	6.6	9.4	1498	NO
W9-326	Bldg-9 S	cyl	gyw	F	sh	long@	conv	pl/pk	N/A	36.8	4.2	5.5	1661	NO
W9-333	Bldg-1	N/A	ss	F	sh@	short	N/A	N/A	N/A	7.1	N/A	5.1	274	NO
W9-334	Bldg-1	N/A	ss	F	sh@	short	N/A	N/A	N/A	5.5	N/A	4.9	179	NO
W9-343	Bldg-1	cyl	ss	W	sh	med	sl/conv	pl/pk	N/A	19.1	5.4	5.7	1166	NO
W9-354	Grag.	cyl	gyw	F	cobl	short	conv	b/pk	N/A	10.7	4.3	3	297	NO
W9-355	Grag.	N/A	ss	F	cobl	short	conv	pl/pk	N/A	7.6	4.1	5.3	369	NO
W9-415	Bldg-1 SW	cyl	ss	F	sh	med	conv	N/A	pl	14.4	5.7	7.5	1230	NO
W9-422	Bldg-2-3	con	ss	W	sh	med	conv	b/pk	N/A	16.9	5.9	5.5	937	NO
W9-445	Bldg-7	cyl	ss	W	sh	med	conv	pl/pk	pk	16.6	5.8	6.7	1720	NO
W9-447	Bldg-7	cyl	gr	W	sh	long	conv	sp/pk	sp/pk	20.2	5.9	5.9	1287	NO
W9-475	Bldg-8	con	gyw	W	sh	med	sl/conv	pl	st/pl	17.1	6.8	6.8	1201	NO
W9-476	Bldg-8	N/A	ss	F	cobl	short	conv	pk	N/A	10.4	4.1	7.4	554	NO
W9-518	Exp.F	cyl	ss	F	sh	long	conv	b/pk	N/A	29.3	5.5	8.4	4600	B4?
W9-558	U20 6-12	bub	ss	F	cobl	short	flat	pl/pk	N/A	11.3	8.5	8.5	1460	NO
W9-1406	none	cyl	gyw	W	sh	short	conv	sp/pk	N/A	11.5	4.7	6.3	483	NO

HANDSTONES

CAT #	PROV	FORM	MATL	W/F	FACE SHAPE	#FC	WEAR	STR	SIDES	ENDS	MAX LGTH	MAX WDTH	THCK	WT	FEAT ASC
W9-2	U3 0-6	c/irr	ss	F	conv	1	pl	pal	irr	irr/b	6	7.1	4.3	283	NO
W9-9	U4 12-18	c/irr	ss	F	conv/flt	2	p/bv/cd	nv	irr	irr	4.5	8.9	5.2	321	NO
W9-21	none	c/irr	ryh	F	conv	3	p/bv/cd	nv	irr/pl	irr/b	7.5	5.2	5.3	362	NO
W9-59	none	c/irr	ss	F	conv	1	pl/bv	nv	irr	irr/pk	9.8	5.1	5.7	466	NO
W9-61	none	s/ovl	ss	W	flt/con*	2	p/bv/cd	pal	irr/pk	irr/pk/b	13	8.1	5.2	974	NO
W9-73	none	c/ovl	ss	W	conv	2	cd	ang	irr/pk	irr/b	8.6	7.2	4.7	413	NO
W9-159	pool	c/irr	ss	F	conv	1	pl	nv	irr	n/w	8.7	7.3	5.8	475	NO
W9-160	pool	c/irr	ss	F	conv	2	pl/pk	nv	irr/pk	n/w	8.3	5.2	4.6	294	NO
W9-166	none	c/ovl	ss	W	flat	2	p/cd/pk	pa/a	pk	n/w	12	10.7	6.2	1.1	NO
W9-167	none	s/ovl	ss	W	flat	2	p/bv/pk	ang	i/pl/pk	irr/pk	12	10.3	4.5	837	NO
W9-169	none	c/ovl	ss	W	flat	1	pl/bv	nv	irr/pk	irr/b	10.3	8.7	5.9	698	NO
W9-170	none	c/irr	ss	F	flat	1	pl	ang	irr/pk	n/w	5.5	9	5.3	375	NO
W9-172	none	c/ovl	ss	W	flat	1	bv/pk	nv	irr	irr/pk	11.3	8.5	6.1	784	NO
W9-184	none	c/irr	ss	F	conv	1	pl/bv	ang	irr/pk	irr	8.1	5.1	4.3	217	NO
W9-203	rc a sw	s/rnd	ss	F	flat	1	p/bv/pk	ang	irr/pk	sq/b/pk	9.9	9.7	6.9	608	NO
W9-204	rc a sw	c/irr	ss	F	conv	1	pl	pal	irr	irr/b	11.2	9.1	7.8	940	NO
W9-206	rc a sw	c/ovl	qtz	W	flt/conv	3	pl	nv	irr/pl	irr	11.8	9	6.2	1.5	NO
W9-207	rc a sw	c/ovl	qtz	W	conv	2	cd/pk	pal	i/pl/pk	irr/b	11.2	8.4	5.3	806	NO^
W9-208	rc a sw	s/rnd	gr?	W	flat	1	pl	pel	irr	rnd/pl	9.9	9.7	5.5	904	NO
W9-210	rc 8-24	c/ovl	ss	W	flat	1	p/bv/pk	nv	irr/pk	irr	13.7	12.1	5.1	1.4	NO
W9-221	rc a	s/irr	ss	F	flat	1	p/bv/pk	pel	irr/pk	irr	12.2	10.7	6.1	1.2	NO
W9-222	rc a	c/ovl	ss?	W	flt/con*	1	p/bv/pk	nv	irr/pk	rnd	11.1	10.1	7	1.2	NO
W9-234	pool	s/ovl	ss	W	flat	2	p/bv/pk	pel	flt/pk	sq/pk	11.2	8.5	4.8	778	NO
W9-235	pool	c/ovl	ryh	W	conv	2	pl/pk	ag/nv	irr/pk	irr	12.2	8.6	7.1	1.59	NO
W9-237	pool	s/irr	ss	F	flt/conv	2	pl/pk	nv	irr/pk	sq/pk	5.3	8.7	6.6	357	NO
W9-238	pool	s/ovl	ss	W	flat	2	pl/bv	pel	irr/pk	irr/pk	11.9	10	7.9	1.11	NO
W9-239	pool	s/ovl	ss	W	flat*	2	pl/bv	pa/nv	irr/pk	irr/pk	9.9	9.1	4.2	584	NO
W9-274	Bldg-1SW	c/ovl	ss	W	conv	1	pl/pk	nv	irr	irr/pk	15.0	9.4	6.7	1.4	NO
W9-276	Bldg-1SE	s/ovl	ss	W	conv	2	pl/pk	pel	irr/pk	irr	9.9	8.5	5.3	593	NO
W9-293	Bldg-9S	c/irr	ss	F	conv	1	pl/cd	nv	irr	irr	6.8	6	3.6	240	NO
W9-313	Bldg-9	c/irr	ss	F	conv	1	pl	nv	irr	irr	4.6	4.3	4.9	125	NO
W9-315	Bldg-9	s/ovl	ss	F	flt/conv	2	pl/bv	nv	pl/pk	irr/pk	7.6	7.7	5	500	NO
W9-336	Bldg-1	s/ovl	ss	W	conv	1	pl/bv	nv	irr/pk	irr/pk/b	10.9	9.7	7.6	895	NO
W9-338	Bldg-1	c/irr	ss	F	conv	2	pl/pk	pel	irr/pk	irr/pk	8.1	8.5	4.6	398	NO
W9-341	Bldg-1	c/irr	ss	W	flat	1	pl/bv	nv	irr	irr	10.6	10.2	8.7	1.2	NO
W9-356	Grag.	c/irr	ss	F	flat	1	pl	ang	irr	irr	7.2	11.1	5.9	559	NO
W9-357	Grag.	c/irr	ss	F	flat	1	pl	nv	irr	irr	9	7.2	3.6	329	NO
W9-371	Bldg-1N	c/irr	ss	F	conv	1	pl*	pal	irr	irr/b	9.3	8.9	7.6	792	NO
W9-374	none	s/ovl	ss	F	conv	2	p/bv/pk	pe/nv	i/pl/pk	rnd/pk	6.3	8.3	5.4	460	NO
W9-397	Bldg-1	c/ovl	ss	W	flat	1	pl*	pel	irr	irr/pk/b	14.7	10	8.5	1.2	NO
W9-401	none	c/irr	ss	F	flat	1	pl*	pal	irr	irr	9	11.5	7.1	844	NO
W9-404	Bldg-2	c/irr	ss	F	flt/conv	2	pl	pel	irr	irr	9.2	7.7	4.9	501	NO
W9-416	Bldg-1SW	c/irr	ss	W	flat	2	pl/bv*	pa/nv	irr	irr/pk	9	7.4	6.1	487	NO
W9-417	Bldg-1SW	c/ovl	gr?	W	conv	1	pl	pel	irr	irr	12.1	9.3	7.8	1.3	NO
W9-419	Bldg-1SW	c/ovl	qtz	W	flat	1	pl	nv	irr/pk	irr/pk/b	9.9	9.3	6.1	789	NO
W9-423	Bldg-2-3	c/ovl	ss	W	conv	2	pl/bv	nv	irr/pk	rnd/pk/b	8.3	6.4	4.3	342	NO

HANDSTONES (cont)

W9-428	Bldg-3NE	c/irr	ss	F	flat	2	pl/bv	nv	irr	irr	8.3	6.0	5.1	371	NO
W9-450	Bldg-8	c/ovl	ss	W	conv	1	pl/bv	nv	irr	irr/pk/b	12.3	8.2	4.2	530	NO
W9-451	Bldg-8	s/irr	ss	F	flat	2	pl/bv	ang	irr/pk	irr	6.2	6.5	3.5	170	NO
W9-468	Bldg-8	s/ovl	ss	F	conv	2	p/bvcd@*	pe/nv	i/pl/pk	rnd/pk	6.2	8.5	6.2	476	NO
W9-474	Bldg-8	s/ovl	gr?	W	flt/con*	2	p/bv/pk	nv	irr/pk	irr/b	12	7.7	4.2	698	NO
W9-485	Bldg-8	c/irr	ss	F	flt/conv	2	p/bvcd@	nv	irr	irr/b	8.0	8.2	4.5	462	NO
W9-502	Exp.C	c/irr	ss	F	conv	1	pl	nv	irr	irr	5.6	6.5	4.3	205	NO
W9-505	Exp.E	s/ovl	ss	F	flt/con*	2	pl/cd	nv	i/pl/pk	irr/pk	9.5	8.1	4.7	607	NO
W9-520	Exp.F	s/ovl	ss	F	conv	2	pl/bv	pa/ag	irr/pk	sq/pk/b	7.1	9.3	6.5	723	B4
W9-528	Exp.F	c/irr	ss	F	flat	1	p/bv/pk	nv	irr	N/A	7.6	3.3	5.6	230	NO
W9-530	Exp.F	c/irr	ss	F	conv	1	pl	nv	irr	irr	7.4	5.8	6.5	497	NO
W9-531	Exp.F	s/irr	ss	F	flat	2	p/bv/pk	nv	irr	sq/pk/b	5.3	8.5	4.3	365	NO
W9-540	Exp.F	c/rnd	ss	W	conv	2	pl	nv	irr	rnd	6.1	5.1	5.2	200	B4
W9-541	Exp.F	c/irr	ss	W	conv	1	pl/bv	nv	irr/pk	irr/b	7.3	6.0	4.4	241	B4
W9-742	U17 12-18	c/irr	ss	F	flat	1	pl/bv	ang	i/pl/ft	irr	5.6	6.9	5.9	214	F?
W9-744	U17 6-12	c/ovl	ss	W	flat	2	pl	pal	irr/pk	irr/pk	11.7	10.3	6	1.16	F?
W9-750	U16 12-18	c/ovl	ss	F	flat	1	pl/bv	pel	irr/pk	irr/b	8.9	8.8	4.1	503	F?
W9-800	U14 18-24	s/irr	ss	F	conv	2	p/bv/pk	nv	irr/pk	irr/pk	5.7	5.6	5.2	310	NO
W9-805	U13 12-18	c/irr	ss	F	conv	i	pl/pk	nv	irr	N/A	5.8	5.7	3.7	199	NO
W9-809	U13 12-18	c/irr	ss	F	conv	1	pl	pel	irr	irr	7.6	5.3	3.3	196	NO
W9-847	U13 12-18	c/irr	ss	W	flat	1	pl/bv	pal	irr/pk	b	13.1	9.5	6.2	939	F10
W9-853	U12 6-12	c/irr	ss	W	conv	1	pl	pal	irr	irr/pk	5.7	4.8	4.8	172	F?
W9-901	U11 10-T	c/irr	ss	W	flat	1	p/bv/pk	pel	irr	irr/pk	13.3	12.2	5.3	1.2	NO
W9-930	U10 0-6	c/irr	ss	F	flat	2	pl/pk	pel	irr/pk	N/A	4.8	8.8	4.2	265	NO
W9-972	U10 0-6	c/ovl	ss	W	conv	1	pl/bv*	pel	irr	irr	8.3	8.3	6.4	570	NO
W9-973	U10 6-12	c/irr	ss	F	flt/conv	2	pl/pk*	pa/nv	N/A	irr	7.1	5.2	5.7	261	NO
W9-974	U10 6-12	c/irr	ss	F	flat	1	p/bv/pk	nv	N/A	N/A	5.7	4.3	3.3	120	NO
W9-988	U10 12-18	c/irr	gr	F	conv	1	pl	nv	irr/pk	irr/pk	4	9.3	7.3	345	NO
W9-1075	U9 6-12	c/irr	ss	W	conv	2	pl/cd*	pa/nv	irr	irr	7.6	7.7	4.1	335	NO
W9-1076	U9 6-12	s/ovl	ss	F	N/A	1	bv	nv	irr/pk	sq/pk	7.7	7.7	3	201	F4
W9-1077	U9 12-18	c/ovl	ss	F	flt	1	pl/bv	pel	ft/pk/s	irr/pk	6.1	7.2	4	190	F?
W9-1081	U9 12-18	c/irr	ss	F	conv	1	pl	nv	irr	irr	3.5	5.6	4.4	142	F4
W9-1090	U9 12-18	c/ovl	ss	W	conv	1	pl	nv	irr	irr	6.9	5.7	3	151	NO
W9-1153	U9 0-6	c/irr	ss	F	flat	1	pl	ang	irr	irr	11.4	9.1	4.9	749	NO
W9-1191	U5 12-18	s/irr	ss	F	conv	2	pl/pk	pal	irr/pk	irr/pk/b	10.8	5.8	5.6	509	NO
W9-1207	U4 12-18	c/irr	ss	F	conv	1	pl/pk	nv	irr/pk	irr	7.6	6.8	4.4	334	NO
W9-1284	U3 30-36	s/rnd	ss	W	conv	1	p/bv/pk	nv	irr	irr/pk/b	8.3	7.5	5.6	423	B1
W9-1394	TA5 12-18	s/ovl	ss	F	flt	2	p/bv/pk*	pa/nv	irr	irr/pk	12	7.9	5.4	729	NO
W9-1395	TA5 12-18	s/irr	ss	W	conv	2	p/bv/pk	ang/i	irr/pk	irr/b	10.3	7.8	6.6	811	NO
W9-1418	none	c/ovl	ss	W	conv	1	pl	nv	irr	irr	7.6	6.6	3.4	181	NO

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CAT #	PROV	FORM	MATL	W/F	CONCAVITY SHAPE	DEPTH	RIM	WEAR A	SUR CV	BASE	MAX LGTH	MAX WDTH	THCK	WT	FEAT ASC
W9-6	U3 6-12	unsh/hop	ss	F	rnd	1	0	pl/pk	N/A	irr	25.7	18.6	11	8.6	NO
W9-22	U4 6-12	sh/cob	ss	F	ovl	7	2.5	pk	pl	flt	20	17.4	15	6	F2
W9-25	U6 6-12	sh/cob	ss	W	rnd	5.4	1	pl/pk	pk	cur	16.2	15.2	13.2	4.2	F1
W9-46	none	unsh/hop	ss	W	rnd	0.5	0	pl/pk	pl	cur	30	26.5	15.8	11.6	NO
W9-47	none	unsh/cob	ss	F	ovl	2.3	0	pk*	N/A	ovl	21.6	13.5	12.2	5	NO
W9-49	none	unsh/hop	ss	W	irr	0.1	0	pk	N/A	flt	24	22.9	8.3	5.8	NO
W9-51	none	unsh/cob	ss	F	irr	0	0	pl	N/A	flt	11	7.5	7.5	0.7	NO
W9-70	none	unsh/cob	ss	F	irr	0	0	pl	N/A	cur	12.5	11.7	6.1	1.31	NO
W9-144	none	sh/cob	ss	F	ovl	5.5	3.4	pl	N/A.	cur	19	17	10	3	NO
W9-149	pool	unsh/hop	ss	F	rnd	0.7	0	pk	pk	cur	24.7	24	10	6.5	NO
W9-152	rc a	sh/cob	ss	F	ovl	1.6	0	pl/pk	N/A	cur	28.5	19.6	8.3	5.6	NO
W9-185	rc a	unsh/cob	ss	F	irr	5.1	0	pk	N/A	cur	20.2	7.7	13.8	??	NO
W9-190	rc a	sh/cob	ss	F	irr	5.5	0	pl/pk	pk/sp	flt	24.5	19.5	9	5.4	NO
W9-197	rc 8-24	unsh/cob	ss	W	irr	4	0	pl	N/A	cur	20.5	16.6	6.5	3	NO
W9-213	rc 8-24S	unsh/cob	ss	F	irr	1.5	0	pl/pk	N/A	cur	11.6	10	5	0.5	NO
W9-214	rc 8-24S	sh/cob	tuffa	F	irr	1.1	0	pl	N/A	cur	16.9	11.7	7.9	??	NO
W9-227	rec a SW	sh/cob	ss	F	irr	4	0	pl	pk	cur	15.2	9.5	8.2	1.2	NO
W9-275	Bldg-1SE	unsh/cob	ss	F	irr	0.4	0	pl	N/A	flt	14.1	12.5	7	0.9	NO
W9-283	Bldg-1SE	sh/cob	cong	W	ovl	7	5.5	pl/pk	pk?	flt	27.2	20.5	14.7	10.4	NO
W9-284	Bldg-1SE	sh/cob	ss	F	irr	10.8	6.5	pk	pk	cur	14.5	13	17.5	7.2	NO
W9-285	rc a	unsh/hop	ss	F	ovl	1.9	0	pk	N/A	flt	22.8	16	10	5.4	NO
W9-286	Bldg-1SE	unsh/hop	ss	F	irr	4.4	0	pk^	pk	cur	28.3	9.9	14.6	7.2	NO
W9-288	rc 0-12N	sh/bowl	ss	F	irr	17	2.3	pl/pk	pk	cur	28.9	18.9	9	13.2	NO
W9-289	rc 0-12N	sh/bowl	ryh	F	rnd	16.5	15.2	pl/pk	pl/pk	cur	25.9	25.6	5	8.8	NO
W9-290	rc 0-12N	unsh/cob	ss	W	ovl	8.5	0	pl/pk	N/A	flt	31.2	26	12.9	9	NO
W9-316	Bldg-9	sh/hop	ss	W	ovl	1.2	0	pk	N/A	cur	27.9	24.4	11.2	8.8	NO
W9-320	Bldg-9	unsh/hop	ss	W	rnd	0.5	0	pk	N/A	cur	25.5	23.3	9.5	7.2	NO
W9-321	Bldg-9	sh/hop	ss	W	ovl	2	0	pl/pk*	N/A	irr	30	18.7	7.3	9.8	NO
W9-331	Bldg 8/9	unsh/hop	ss	W	ovl	0.4	0	pk	pk	cur	32	26.2	12.5	11.2	NO
W9-337	Bldg-1	unsh/cob	ss	W	ovl	0.6	0	pk^	N/A	irr	13.5	10.6	7	1.3	NO
W9-345	Bldg-1W	unsh/hop	ss	W	rnd	1.5	0	pk/pl^	pk	flt	29	21	10.5	10	NO
W9-346	Bldg-1W	unsh/hop	ss	F	ovl	??	0	pk	N/A	cur	27.7	23	13.2	8.8	NO
W9-347	Bldg-1W	unsh/hop	ss	W	ovl	1.9	0	pl	pk	cur	27.9	22	11.9	9	NO
W9-349	Bldg-1W	unsh/hop	ss	W	irr	0.6	0	pk	N/A	flt	27.8	24.4	8.2	8.6	NO
W9-350	Bldg-1W	sh/hop	ss	F	irr	1.6	0	pl/pk	pk	cur	31.9	27.7	11.5	10.6	NO
W9-364	Bldg-1SE	sh/cob	ss	F	irr	2.4	0	pl/pk	N/A	cur	20.5	11	11	3	NO
W9-367	Bldg-1SW	unsh/cob	ss	F	irr	3.5	0	pk	pk	flt	24.4	15.6	11.3	4.8	NO
W9-375/6	none	unsh/cob	ss	F	irr	1.6	0	pk	pk	irr	15	9.2	9.6	0.9	NO
W9-378	none	sh/cob?	ss	F	N/A	0	2	N/A	pk	N/A	6.5	5.3	3.2	1.16	NO
W9-384	Bldg-1SE	unsh/hop	ss	W	ovl	0.9	0	pk	pk	flt	26.5	22	15.5	12.4	NO
W9-391	BLdg-1	unsh/hop	ss	W	irr	0	0	pl	N/A	irr	16.5	14.6	8.7	3	NO
W9-398	Bldg-1	sh/hop	ss	W	rnd	1.3	0	pl/pk	N/A	cur	34.5	28	14.8	15.4	NO
W9-402	Bldg-1/2	sh/hop	ss	W	rnd	0.5	0	pl/pk	pl/pk^	cur	18.5	17.9	6.7	3.8	NO
W9-413	Bldg-1SW	unsh/hop	ss	W	ovl	1.7	0	pl/pk	pl	cur	31	14.5	12	12	NO
W9-414	Bldg-1SW	unsh/cob	ss	F	ovl	4	0	pk	pk	flt	22.2	17.3	11	4	NO

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W9-420	Bldg-1SW	unsh/hop	ss	W	rnd	0.7	0	pk	N/A	cur	26.5	22.5	11	7.4	NO
W9-442	Bldg-7	sh/cob	ss	F	irr	5.4	7	pl/pk	pl	cur	25.6	15.5	11.6	5.4	NO
W9467/70	Bldg-SW	unsh/hop	ss	F	ovl	2.1	0	pk	pk	flt	26.9	24.5	7	5.2	NO
W9-471	Bldg-8SW	unsh/cob	ss	F	irr	1.7	0	pk	pk	cur	12.6	10.1	9	0.8	NO
W9-477	Bldg-8	sh/cob	ss	F	irr	3.5	0	pk	N/A	irr	14.6	10.2	12.1	2.2	NO
W9-482	Bldg-8	unsh/cob	ss	W	ovl	0.4	0	pk	pk	flt	23.5	16.2	9.5	4	NO
W9-484	Bldg-8	unsh/hop	ss	W	rnd	0.8	0	pl/pk	N/A	cur	27.6	24.2	13	11.2	NO
W9-487	Bldg-8	unsh/hop	ss	F	ovl	0.5	0	pk*	N/A	irr	23.5	16.4	13	6	NO
W9-489	Bldg-8	unsh/hop	ss	F	ovl	1.2	0	pk	N/A	cur	32.6	28	14	12	NO
W9-526	Exp.F	unsh/hop	ss	F	ovl	0.5	0	pl	pk	flt	31	25.2	13.4	11	NO
W9-548	Exp.F	sh/hop?	ss	W	ovl	1.5	0	pl/pk	pk	flt	33	24.6	16	14	B4
W9-691	U19 24-30	unsh/cob	ss	F	ovl	1.2	0	pk	N/A	irr	11.2	7.9	6.5	0.6	F?
W9-836	U13-6-12	sh/cob	ss	F	irr	1.2	0	pk	pl/pk	irr	20.5	13	11.5	3.6	F8

MILLING SLICKS OR SLABS

		SH/			TYPE	# OF	MAX	MAX			BASIN			FEAT
CAT #	PROV	UNSH	MATL	W/F	WEAR	FACE	LGTH	WDTH	THCK	WT	SHAPE	DEPTH	L/W	ASC
W9-23	TA2 0-6	unsh	ss	F	pk	1	16.5	14.0	12.0	4.6	irr	1.0	9.5x6.2	NO
W9-42	none	unsh	ss	F	pol	1	31.8	31.0	16.5	16.2	irr	1.4	24x12	NO
W9-44	none	unsh	ss	F	pol	1	17.5	10.9	8.6	2.2	irr	1.5	7x6.5	NO
W9-45	none	sh	ss	W	pol/pk	1	34.8	25.9	9.3	12.4	irr	1.2	29.2x22	NO
W9-39	none	unsh	ss	W	pk	1	48.5	35.0	17.0	35.6	ovl	0.5	42x26	NO
W9-41	none	unsh	ss	W	pol	1	28.0	27.0	14.0	13.6	ovl	0.8	10.3x8	NO
W9-48	none	sh	ss	W	pol	2	39.9	32.0	19.4	28.6	ovl	0.0	33x20#	NO
W9-150	pool	sh	ss	W	pk	1	43.3	27.0	14.6	21.4	irr	1.0	35x23.9	NO
W9-200	rc 8-24	sh	ss	F	pol/pk	2	36.5	23.0	13.5	14.8	ovl/irr	0.5/1	12x10.5#	NO
W9-230	rc 8-24	sh	ss	W	pol/pk	1	27.0	25.6	13.6	8.2	irr	0.9	10x7	NO
W9-226	rc sw	unsh	ss	F	s/pl/pk	1	26.5	11.0	8.0	3.4	irr	2.0	16.5x8.3	NO
W9-270	Bldg-2	unsh	ss	F	s/pl/pk	1	33.9	25.2	11.7	13.2	cir/irr	2.8	18.5x12.9	NO
W9-287	rc a	unsh	ss	F	pol	1	32.5	23.6	13.0	11.2	irr	1.0	15x10.5	NO
W9-317	Bldg-9	unsh	ss	W	pol/pk	1	25.5	21.0	15.2	9.6	ovl	1.0	18x12	NO
W9-387	Oak-Ar	sh	ss	F	pol/pk	1	26.7	17.3	12.1	6.4	irr	1.6	14x8	NO
W9-409	Bldg-2	unsh	ss	F	pol/pk	1	31.9	16.0	10.0	4.8	irr	1.2	14x12.5	NO
W9-481	Bldg-8	sh	ss	W	pol/pk	2	47.2	29.0	16.1	24.6	shaped	2.0	?x12.5	NO
W9-140	none	sh	ss	F	pol/pk	2	20.0	13.5	14.5	6.2	irr	0.3	14x10	NO
W9-142	none	unsh	ss	W	pol/pk	1	42.1	25.6	15.0	20.6	irr/ang	0.0	17.5x16.5	NO
W9-151	pool8-24	unsh	ss	W	pol/pk	1	27.9	21.5	11.0	9.4	irr	0.0	17x10	NO
W9-156	pool	unsh	ss	F	s/pl/pk	1	10.1	8.5	4.0	0.4	irr	0.0	8.5x6.5	NO
W9-187	rc a	sh	ss	F	s/pl/pk	2	21.4	16.5	7.5	2.6	irr	0.0	12x6#	NO
W9-196	rc 8-24	unsh	ss	F	pol	1	29.2	19.4	12.4	8.2	irr	0.0	18x11	NO
W9-199	none	sh	ss	W	pol/pk	2	40.3	27.0	8.5	13.2	ovl	0.6	20x11#	NO
W9-201	rc a sw	unsh	ss	W	pol	1	43.0	23.5	12.0	14.2	irr	0.0	14x12	NO
W9-209	rc 8-24	sh	ss	F	pol/pk	2	10.0	9.1	6.6	0.7	irr	0.0	6.5x5.2#	NO
W9-225	rc a	unsh	ss	F	pol/pk	2	21.6	17.6	11.0	4.6	irr/ang	0.6	14.5x12.5	NO
W9-228	rc 8-24	unsh	ss	W	s/pol	1	22.0	19.5	6.5	3.8	irr	0.0	12.5x13	NO
W9-229	rc 8-24	unsh	ss	W	pol/pk	1	24.0	23.0	11.5	8.2	irr	0.8	16x10	NO
W9-291	Bldg-9 S	sh	ss	F	s/pl/pk	2	18.2	14.1	10.0	4.2	irr	0.0	14x6.5	NO
W9-319	Bldg-9 S	unsh	ss	W	pol/pk	2	35.5	33.0	14.5	16.2	irr	0.0	25x15#	NO
W9-330	Bldg 8/9	unsh	ss	F	pol/pk	2	38.0	23.0	9.0	8.6	irr	0.0	26x19#	NO
W9-363	Bldg-1 S	unsh	ss	F	pol	1	29.0	26.5	14.5	10.8	irr	0.0	8x6	NO
W9-365	Bldg-1 S	unsh	ss	W	pol/pk	1	33.2	25.9	9.0	9.6	irr	0.0	10x7	NO
W9-368	Bldg-1 S	unsh	ss	F	pol/pk	1	21.2	18.5	8.3	3.2	irr	0.5	10x5	NO
W9-369	Bldg-1 S	unsh	ss	W	s/pol	2	22.8	16.8	9.2	4.8	ovl/irr	0.2	8.5x7.5#	NO
W9-370	Bldg-1 N	unsh	ss	F	pol	1	35.2	24.3	10.3	10.0	ovl/irr	0.0	9.5x9.2	NO
W9-382	none	unsh	ss	F	pk	1	21.0	14.0	7.0	4.4	irr	0.0	14.5x14	NO
W9-389	Bldg-1	sh	ss	W	pol/pk	1	29.5	21.8	10.3	9.0	cir	0.9	7.5x5.5	NO
W9-390	Bldg-1	unsh	ss	F	pol/pk	1	21.6	15.3	6.3	13.4	irr	0.0	13x11	NO
W9-399	Bldg-1	unsh	ss	W	s/pl/pk	2	43.0	27.8	8.5	12.2	ang	0.0	18x10	NO
W9-400	none	sh	ss	W	pol/pk	2	31.0	26.0	10.0	12.0	cir	0.0	18x15	NO

MILLING BLOCKS AND SLABS (cont)

W9-424	Bldg-3 S	unsh	ss	F	s/pol	1	9.5	8.1	6.1	0.7	irr	0.0	8.2x5.5	NO
W9-425	Bldg-3 S	unsh	ss	F	pol/pk	2	18.6	11.9	9.3	2.2	irr	0.0	11x8#	NO
W9-426	Bldg-3	unsh	ss	W	pol/pk	1	33.0	28.0	13.4	12.8	irr	0.0	18x7	NO
W9-427	Bldg-3 N	unsh	ss	W	pol	1	35.0	33.0	13.5	24.2	irr	0.1	16x9	NO
W9-441	Bldg-7	sh	ss	W	pol/pk	1	28.1	20.5	10.0	7.4	irr	0.8	11x9	NO
W9-446	Bldg-7	unsh	ss	W	pol/pk	2	35.5	22.0	14.0	10.4	irr	0.0	28x17#	NO
W9-483	Bldg-8	unsh	ss	W	pol/pk	2	19.5	18.4	10.6	6.0	irr	0.7	17x12#	NO
W9-486	Bldg-8	unsh	ss	W	pol	1	35.0	22.0	13.5	12.8	irr	0.1	15x14	NO
W9-498	Exp.D	unsh	ss	W	pol	1	23.5	21.1	8.6	5.2	irr	0.0	8.5x7.5	NO
W9-504	Exp.E	unsh	ss	W	s/pl/pk	1	25.1	21.2	10.0	6.0	irr	0.5	15x11	NO
W9-532	Exp.F	unsh	ss	F	spl/pk	1	28.0	27.0	11.6	10.2	ang	0.5	13x8	NO
W9-533	Exp.F	unsh	ss	F	pol	1	19.4	16.2	10.2	2.6	irr	0.8	11x6	NO
W9-539	Exp.F	unsh	ss	W	pol/pk	1	23.3	17.0	9.2	3.6	irr	0.8	11x4	NO
W9-812	U13 12-18	unsh	ss	F	pol/pk	2	9.5	8.0	7.5	0.5	irr	0.0	7x6.5#	NO
W9-837	U13 6-12	unsh	ss	F	pol/pk	1	18.6	10.5	10.7	3.0	irr/ang	0.0	9.5x9	F8
W9-1208	U4 12-18	sh	ss	F	pol/pk	1	15.9	8.4	7.4	1.2	irr	0.0	9x5	NO
W9-1282	U3-19-30	sh	ss	W	pol/pk	1	18.9	19.0	10.0	5.6	irr	0.5	18x18	B1
W9-984	U10 6-12	unsh	ss	F	pol/pk	1	23.7	16.9	11.1	5.6	irr/ang	1.1	13x7.9	NO
W9-1280	U3 12-18	sh	ss	W	s/pol	1	32.0	25.2	16.4	22.2	irr	0.9	14x8	B1
W9-1281	U3 30-36	sh	ss	W	pol/pk	1	35.3	30.5	15.8	17.8	irr	1.0	12x6.8	F7
W9-1356	TA2 24-30	sh	ss	W	s/pl/pk	1	33.5	16.8	12.8	7.2	irr	1.5	25x9	NO

MISC GROUNDSTONE

W9-43	none	unsh	ss	F	pol	1	18.2	12.3	13.6	3.8	irr/ang	0.0	6x5.2	NO
W9-52	none	sh	ss	F	pk	2	9.8	8.5	3.1	0.3	irr	n/a	8.4x8.9	NO
W9-57	none	unsh	ss	F	pol	1	13.0	11.0	7.3	1.6	irr	0.0	4.9x3.3	NO
W9-137	none	unsh	ss	F	pol	1	12.6	11.6	11.3	1.9	irr	0.0	7x7.2	NO
W9-147	none	unsh	ss	F	pk	1	22.6	17.9	12.0	6.8	irr	0.2	10x7	NO
W9-168	none	unsh	ss	F	pol	1	9.3	5.6	4.5	0.3	irr	0.0	???	NO
W9-189	rc a	unsh	ss	F	pol	1	20.5	18.0	9.7	5.2	irr	0.5	8x7.5	NO
W9-198	rc 8-24	unsh	ss	F	pol/pk	1	17.5	8.6	7.7	1.5	irr	0.5	11x5.6	NO
W9-271	rc a	unsh	ss	F	pol	1	22.7	18.6	12.8	9.0	irr	0.0	8x6	NO
W9-281	Bldg-1 S	unsh	ss	F	s/pl/pk	1	22.5	12.6	10.3	4.4	irr	0.0	12x6	NO
W9-282	Bldg-1 S	sh	ss	F	pol/pk	1	34.5	24.0	10.5	10.8	irr	0.7	17x5	NO
W9-344	Bldg-1 W	unsh	ss	W	pk	1	41.6	26.5	12.0	17.4	irr	0.0	38x17	NO
W9-358	Grag.	unsh	ss	F	pk	2	13.5	11.5	6.0	1.3	irr	0.0	10x8*	NO
W9-366	Bldg-1 S	sh	ss	F	pol/pk	2	17.6	11.5	8.7	2.8	irr	0.0	7x4	NO
W9-386	none	unsh	ss	F	pol/pk	1	32.0	20.4	13.2	9.4	irr	1.0	10.2x9.1	NO
W9-395	Bldg-1	unsh	ss	F	pol	1	12.0	10.7	9.5	1.2	irr	0.0	6x4.5	NO
W9-412	Bldg-2	unsh	ss	F	pol	1	25.5	16.0	9.2	3.6	irr	0.0	13x9	NO
W9-478	Bldg-8	unsh	ss	F	pol	1	10.3	10.2	6.1	0.9	irr	0.0	8x8.1	NO
W9-488	Bldg-8	unsh	ss	F	s/pol	2	17.1	15.1	6.1	2.4	irr	0.0	8x6	NO
W9-516	Exp.F	unsh	ss	W	pol	1	19.7	11.3	9.0	2.4	irr	0.0	9x5	B4
W9-517	Exp.F	unsh	ss	F	s/pk	1	18.6	13.0	11.0	2.2	irr	0.0	14x6	B4
W9-525	Exp.4	unsh	ss	F	pk	1	21.6	13.5	10.6	4.2	irr	0.0	8x6.5	B4?
W9-529	Exp.F	unsh	ss	F	s/pol	1	14.5	10.0	6.5	1.0	irr	0.0	6x5.5	NO
W9-542	Exp.F	unsh	ss	F	pol	1	8.0	7.2	6.0	0.2	irr	0.0	6x5	B4
W9-549	Exp.F	unsh	ss	F	pk	2	11.6	9.2	9.6	0.9	irr	0.0	N/A	B4
W9-550	Exp.F	unsh	ss	F	gv	1	19.5	16.8	13.0	4.4	N/A	0.0	N/A	B4
W9-552	U20 0-6	unsh	ss	F	pk	2	6.3	7.8	6.8	0.4	irr	0.0	N/A	NO
W9-600	U19 36-42	unsh	ss	F	s/pol	2	6.9	6.2	6.5	0/3	irr	0.0	N/A	NO
W9-688	U19 24-30	unsh	ss	F	s/pol	1	10.4	7.2	4.2	0.3	N/A	0.0	10.1x7.2	F?
W9-751	U16 6-12	unsh	ss	F	pol	1	11.0	9.0	5.5	0.4	irr	0.0	7.5x6	F?
W9-761	U15 0-6	unsh	ss	F	pk	1	12.8	5.0	3.5	0.3	N/A	0.0	12.3x3.9	NO
W9-842	U13 6-12	unsh	ss	F	pol	1	12.5	13.0	6.1	0.6	irr	0.0	8x5.5	F8
W9-849	U13 12-18	unsh	ss	F	pol	1	15.0	10.5	8.0	1.8	irr	0.0	6x5.5	F10
W9-841	U13 6-12	unsh	ss	F	pol/pk	1	13.2	10.5	6.2	0.9	irr	0.0	7x4.5	F8
W9-848	U13 12-18	unsh	ss	F	pol/pk	1	10.5	7.2	4.3	0.4	irr	0.0	8.5x4.5	F10
W9-915	U11 12-18	unsh	ss	F	pol	1	12.5	9.5	9.5	1.4	irr	0.0	5x3.4	NO
W9-916	U11 12-18	unsh	ss	F	b	0	8.3	5.9	3.3	0.2	N/A	0.0	N/A	NO
W9-917	U11 12-18	unsh	ss	F	pol	0	8.8	5.2	2.2	0.1	N/A	0.0	N/A	NO
W9-1053	U9 0-6	unsh	ss	F	pol/pk	1	17.7	8.9	7.6	1.2	irr	0.0	11x6	NO
W9-1084	U9 12-18	unsh	ss	F	pol/pk	1	13.6	11.2	8.1	1.1	irr	0.0	4x3.5	F?
W9-1088	U9 12-18	unsh	ss	F	pol	1	7.6	7.0	6.8	0.5	irr	0.0	6x3.5	F?
W9-1152	U6 12	unsh	ss	F	pol	1	14.5	8.1	5.7	0.9	irr	0.0	7x3.8	F1
W9-1203	U4 6-12	unsh	gyw	F	pk/pol	1	9.1	4.8	3.9	0.3	N/A	0.0	N/A	NO
W9-1213	U4 16	unsh	ss	F	pol/pk	1	16.7	13.0	7.9	3.0	irr	0.4	5x6.5	NO
W9-1279	U3 12-18	unsh	ss	F	pol	1	28.0	21.2	8.0	8.0	irr	0.3	7.5x5.8	F7
W9-1285	U3 19-30	unsh	ss	F	pk	1	12.0	12.5	11.0	2.8	irr	0.0	7.8x6.5	F7
W9-1287	U3 19-30	unsh	gyw	W	pk	1	13.1	6.1	6.6	0.8	irr	0.0	3.8x2.1	F7
W9-1318	U2 36-42	sh	ss	W	pk	2	17.0	11.0	12.0	2.6	N/A	0.0	17x11	NO

Appendix B

Table 1
SCI-65 Chipped Stone Summary
Unit 1, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	0	0	3	1	0	0	0	0	0	4
	wt.	0	0	8.2	1	0	0	0	0	0	9.2
6-12	#	0	1	1	0	0	0	0	0	0	2
	wt.	0	0.8	1.1	0	0	0	0	0	0	1.9
12-18	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
18-24	#	0	1	0	0	0	0	0	0	0	1
	wt.	0	0.9	0	0	0	0	0	0	0	0.9
24-30	#	0	2	1	1	0	0	0	0	0	4
	wt.	0	7.7	1.1	0.4	0	0	0	0	0	9.2
30-36	#	0	1	0	2	0	2	0	0	0	5
	wt.	0	1.7	0	1.2	0	0.7	0	0	0	3.6
36-42	#	0	0	0	4	0	1	0	0	0	5
	wt.	0	0	0	2.2	0	0.3	0	0	0	2.5
Total #		0	5	5	8	0	3	0	0	0	21
Total wt.		0	11.1	10.4	4.8	0	1	0	0	0	27.3

KEY

1= Cores
2= Decortication Flakes
3= Primary Flakes*
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

#= Number of Pieces
* small primary flakes

wt.= Weight in Grams

Table 2
SCI-65 Chipped Stone Summary
Unit 2, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	0	1	4	5	1	4	1	0	0	16
	wt.	0	3.7	4.9	4.7	0.2	5.3	2.1	0	0	20.9
6-12	#	1	0	8	15	2*	4	0	0	1	31
	wt.	15.3	0	43.7	15	0.2	8.4	0	0	1.8	84.4
12-18	#	0	0	6	3	0	6	0	0	0	15
	wt.	0	0	39	0.8	0	7	0	0	0	46.8
18-24	#	0	2	4	8	3+	2	0	0	0	19
	wt.	0	2.1	14.8	4.4	0.5	2.7	0	0	0	24.5
24-30	#	0	0	3	6	0	1	0	1 o	0	11
	wt.	0	0	6.3	9.4	0	2.3	0	0.4	0	18.4
30-36	#	1	0	0	2	0	1	0	0	0	4
	wt.	173	0	0	4.7	0	3.9	0	0	0	181.6
36-42	#	0	1	0	2	0	0	0	0	0	3
	wt.	0	6.6	0	2.8	0	0	0	0	0	9.4
Total #		2	4	25	41	5	18	1	1	1	99
Total wt.		188.3	12.4	108.7	41.8	0.9	29.6	2.1	0.4	1.8	386

KEY
1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

#= Number of Pieces
* obsidian
+ obsidian midsection
o 2 are obsidian

wt.= Weight in Grams

Table 3
SCI-65 Chipped Stone Summary
Unit 3, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	1	2	2	3	0	1	0	0	0	9
	wt.	34.2	1.4	6.5	2	0	1.9	0	0	0	46
6-12	#	0	1	9	17	0	5	1	1	1	35
	wt.	0	13.6	68.6	17.5	0	44.2	658	4.1	1.2	807.2
12-18	#	2	1	8	13*	0	1	0	0	0	25
	wt.	371	3.2	24.1	11	0	6.2	0	0	0	415.5
18-24	#	0	2	5	14*	0	6	1	0	0	28
	wt.	0	2.8	13.3	5.3	0	7.2	3.9	0	0	32.5
24-30	#	0	0	4	2	0	2	0	0	0	8
	wt.	0	0	8.8	1	0	0.8	0	0	0	10.6
30-36	#	0	1	3	18 o	0	3	2	0	0	27
	wt.	0	1	8.4	6.3	0	2.8	103.2	0	0	121.7
36-42	#	0	0	5	5	1	3	0	0	0	14
	wt.	0	0	24.4	1.7	0.1	2	0	0	0	28.2
Total #		3	7	36	72	1	21	4	1	1	146
Total wt.		405.2	22	154.1	44.8	0.1	65.1	765.1	4.1	1.2	1461.7

KEY
1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

#= Number of Pieces
* one is obsidian
+ exhausted core
o 4 are obsidian

wt.= Weight in Grams

Table 4
SCI-65 Chipped Stone Summary
Unit 4, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	0	1	5	7*	0	5	0	0	0	18
	wt.	0	7.4	7.7	5.4	0	5.2	0	0	0	25.7
6-12	#	2	0	0	0	0	0	0	0	0	2
	wt.	368	0	0	0	0	0	0	0	0	368
12-18	#	1	1	3	8	0	1	0	0	0	14
	wt.	173	9.6	15	7.5	0	173	0	0	0	378.1
18-24	#	0	3	1	5+	0	1	0	0	0	10
	wt.	0	376.5	3.2	2.3	0	1	0	0	0	383
24-30	#	0	1	3	3	0	0	0	0	0	7
	wt.	0	0.6	13	1.7	0	0	0	0	0	15.3
30-36	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
36-42	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
Total #		3	6	12	23	0	7	0	0	0	51
Total wt.		541	394.1	38.9	16.9	0	179.2	0	0	0	1170.1

KEY
1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6=Shatter Debris
7= Informal Tools
8=Biface/Pt. Blanks
9=Projectile Point

#= Number of Pieces
* 2 of these are obsidian
+ 1 of these is obsidian

wt.= Weight in Grams

Table 5
SCI-65 Chipped Stone Summary
Unit 5, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	0	1	9	9*	0	1	0	1	0	21
	wt.	0	0.5	34.7	4.5	0	2.1	0	0	0	41.8
6-12	#	0	0	1	4	0	1	1	0	0	7
	wt.	0	0	1.2	3.9	0	0.6	2.3	0	0	8
12-18	#	1	0	2	0	0	0	0	0	0	3
	wt.	166	0	6.7	0	0	0	0	0	0	172.7
18-24	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
24-30	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
30-36	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
36-42	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
Total #		1	1	12	13	0	2	1	1	0	31
Total wt.		166	0.5	42.6	8.4	0	2.7	2.3	0	0	222.5

KEY
1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

#= Number of Pieces

wt.= Weight in Grams

* one is obsidian

Table 6
SCI-65 Chipped Stone Summary
Unit 6, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	0	1	6	11*	0	1	1	0	0	20
	wt.	0	2.5	21.6	7.5	0	0.7	250	0	0	282.3
6-12	#	0	0	7	16	0	3	1	0	0	27
	wt.	0	0	17.8	11.2	0	6.1	2.8	0	0	37.9
12-18	#	3	1	14*	7	0	8	0	1	1 o	35
	wt.	1079	2.1	44	6.4	0	15.2	0	0	1.8	1148.5
18-24	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
24-30	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
30-36	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
36-42	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
Total #		3	2	27	34	0	12	2	1	1	82
Total wt.		1079	4.6	83.4	25.1	0	22	252.8	0	1.8	1468.7

KEY

1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

#= Number of Pieces
wt.= Weight in Grams

* one is obsidian
o obsidan shatter probable pt. base frag.

Table 7
SCI-65 Chipped Stone Summary
Unit 7, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	0	1	2	6	0	1	0	0	0	10
	wt.	0	2.5	10.8	3.1	0	0.9	0	0	0	17.3
6-12	#	0	1	8	26	0	4	0	1 o	0	41
	wt.	0	4.8	22.2	13.4	0	15.2	0	1	0	56.6
12-18	#	0	0	6	12	1*	2	0	3	0	24
	wt.	0	0	19.4	19.1	0.1	0.7	0	0	0	39.3
18-24	#	0	0	3	8	0	0	0	0	0	11
	wt.	0	0	8.1	6.5	0	0	0	0	0	14.6
24-30	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
30-36	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
36-42	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
Total #		0	2	19	52	1	7	0	4	0	86
Total wt.		0	7.3	60.5	42.1	0.1	16.8	0	1	0	127.8

KEY

1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes

6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

#= Number of Pieces
* one is obsidian
o obsidian biface frag.

wt.= Weight in Grams

Table 8

SCI-65 Chipped Stone Summary

Unit 8, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	1	0	2	4	0	2 o	0	2	0	11
	wt.	11.2	0	6.4	2.7	0	0.1	0	0	0	20.4
6-12	#	0	0	0	3	0	1	0	0	1	5
	wt.	0	0	0	1.6	0	2.6	0	0	1.9	6.1
12-18	#	0	0	2	3	0	2	0	0	0	7
	wt.	0	0	4.8	3.5	0	9.8	0	0	0	18.1
18-24	#	0	0	0	2	0	0	0	0	0	2
	wt.	0	0	0	2	0	0	0	0	0	2
24-30	#	0	0	1	2	0	0	0	0	1	4
	wt.	0	0	7	1.4	0	0	0	0	5.3	13.7
30-36	#	0	0	1	4	0	0	0	0	0	5
	wt.	0	0	2.5	1.8	0	0	0	0	0	4.3
36-42	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
Total #		1	0	6	18	0	5	0	2	2	34
Total wt.		11.2	0	20.7	13	0	12.5	0	0	7.2	64.6

KEY

1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

#= Number of Pieces
o these are obsidian pt. shatter

wt.= Weight in Grams

Table 9
SCI-65 Chipped Stone Summary
Unit 9, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	0	1	7	15*	0	8	0	1	0	32
	wt.	0	3.3	21.9	5.8	0	13.9	0	0	0	44.9
6-12	#	0	2	5	6	3 o	5	0	2	0	23
	wt.	0	6.8	47	5.3	0.2	35.4	0	0	0	94.7
12-18	#	0	2	6	23+	1*	3	1	0	0	36
	wt.	0	196	59.2	9.3	0.1	5.8	566	0	0	836.4
18-24	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
24-30	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
30-36	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
36-42	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
Total #		0	5	18	44	4	16	1	3	0	91
Total wt.		0	206.1	128.1	20.4	0.3	55.1	566	0	0	976

KEY
1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

#= Number of Pieces
+ 4 obsidian
* one piece is obsidian
o two pieces are obsidian

wt.= Weight in Grams

Table 10
SCl-65 Chipped Stone Summary
Unit 10, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	0	0	0	0	0	2	0	0	0	2
	wt.	0	0	0	0	0	3.4	0	0	0	3.4
6-12	#	2	0	5	11 o	1	5	1	0	0	25
	wt.	407	0	10.8	5	0.1	14.7	72	0	0	509.6
12-18	#	3	0	3	6	2 o	2	0	0	0	16
	wt.	419	0	10	4.3	0.1	3	0	0	0	436.4
18-24	#	1	1+	0	0	0	1	1	0	0	4
	wt.	101	45	0	0	0	42	52	0	0	240
24-30	#	0	0	2	8 o	1 *	3	0	0	0	14
	wt.	0	0	4.5	4.3	0.1	1.3	0	0	0	10.2
30-36	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
36-42	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
Total #		6	1	10	25	4	13	2	0	0	61
Total wt.		927	45	25.3	13.6	0.3	64.4	124	0	0	1199.6

KEY
1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

#= Number of Pieces
o two fo these are obsidean
+ one of these are obsidean
* utilized cordical flake (tool)

wt.= Weight in Grams

Table 11
SCI-65 Chipped Stone Summary
Unit 11, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	1	2	0	14	1	6	0	0	0	24
	wt.	10.5	3.4	0	7.5	0.1	5.5	0	0	0	27
6-12	#	0	0	4	6	0	3	0	0	0	13
	wt.	0	0	7	2.2	0	6.5	0	0	0	15.7
12-18	#	0	1	2	9	0	1	0	0	0	13
	wt.	0	1.7	1.8	4	0	0.7	0	0	0	8.2
18-24	#	0	0	6	4	0	2	0	0	0	12
	wt.	0	0	10.5	3.8	0	3.8	0	0	0	18.1
24-30	#	0	0	1	2	0	0	0	0	0	3
	wt.	0	0	8.8	0.7	0	0	0	0	0	9.5
30-36	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
36-42	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
Total #		1	3	13	35	1	12	0	0	0	65
Total wt.		10.5	5.1	28.1	18.2	0.1	16.5	0	0	0	78.5

KEY
1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

#= Number of Pieces

wt.= Weight in Grams

Table 12

SCl-65 Chipped Stone Summary

Unit 12, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	0	1	3	4	0	3	0	0	0	11
	wt.	0	6	7.6	1.7	0	18.4	0	0	0	33.7
6-12	#	1	1	7	14	0	1	0	0	0	24
	wt.	192	5.2	20.6	5.7	0	1	0	0	0	224.5
12-18	#	0	0	0	1	0	1	0	0	0	2
	wt.	0	0	0	2.4	0	18.8	0	0	0	21.2
18-24	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
24-30	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
30-36	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
36-42	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
Total #		1	2	10	19	0	5	0	0	0	37
Total wt.		192	11.2	28.2	9.8	0	38.2	0	0	0	279.4

KEY

1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

#= Number of Pieces

wt.= Weight in Grams

Table 13

SCI-65 Chipped Stone Summary

Unit 13, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	0	0	5	9	0	3	0	0	0	17
	wt.	0	0	13.9	3	0	1.5	0	0	0	18.4
6-12	#	1	1	7	8	0	6	0	0	1	24
	wt.	48	7	5.9	6	0	4.2	0	0	2.2	73.3
12-18	#	0	0	8	14	0	4	0	0	0	26
	wt.	0	0	15.4	9.1	0	5.5	0	0	0	30
18-24	#	0	0	5	9	0	2	0	0	0	16
	wt.	0	0	7.4	4	0	7.9	0	0	0	19.3
24-30	#	0	0	3	6	0	0	0	0	0	9
	wt.	0	0	7.3	2.8	0	0	0	0	0	10.1
30-36	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
36-42	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
Total #		1	1	28	46	0	15	0	0	1	92
Total wt.		48	7	49.9	24.9	0	19.1	0	0	2.2	151.1

KEY

1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

#= Number of Pieces

wt.= Weight in Grams

Table 14
SCI-65 Chipped Stone Summary
Unit 14, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	1	1	5	1	0	4	0	1	0	13
	wt.	82.5	4.3	7.5	0.8	0	10.8	0	1.3	0	107.2
6-12	#	0	0	3	10	0	0	0	0	0	13
	wt.	0	0	19.9	4.8	0	0	0	0	0	24.7
12-18	#	1	0	5	4	0	0	0	0	0	10
	wt.	212	0	22.7	2.6	0	0.7	0	0	0	238
18-24	#	0	1	1	5	0	1	0	0	0	8
	wt.	0	2.5	2.2	2.4	0	5.2	0	0	0	12.3
24-30	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
30-36	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
36-42	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
Total #		2	2	14	20	0	5	0	1	0	44
Total wt.		294.5	6.8	52.3	10.6	0	16.7	0	1.3	0	382.2

KEY
1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

#= Number of Pieces

wt.= Weight in Grams

Table 15
SCI-65 Chipped Stone Summary
Unit 15, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	0	0	3	2	0	1	0	0	0	6
	wt.	0	0	6.1	1.1	0	2.2	0	0	0	9.4
6-12	#	0	0	6	1	0	3	0	1	0	11
	wt.	0	0	11.4	0.8	0	1.8	0	3.6	0	17.6
12-18	#	1	1	10	16	6	2	0	0	0	36
	wt.	25	31.3	51.7	11	3.3	2	0	0	0	124.3
18-24	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
24-30	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
30-36	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
36-42	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
Total #		1	1	19	19	6	6	0	1	0	53
Total wt.		25	31.3	69.2	12.9	3.3	6	0	3.6	0	151.3

KEY

1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

#= Number of Pieces

wt.= Weight in Grams

Table 16
SCI-65 Chipped Stone Summary
Unit 16, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	0	0	1	3	0	1	0	0	0	5
	wt.	0	0	3.3	1.5	0	4	0	0	0	8.8
6-12	#	0	0	3	1	1	1	0	0	0	6
	wt.	0	0	10.5	0.5	1	1	0	0	0	13
12-18	#	1	0	5	0	1	1	0	0	0	8
	wt.	266	0	46.3	0	0.1	1	0	0	0	313.4
18-24	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
24-30	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
30-36	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
36-42	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
Total #		1	0	9	4	2	3	0	0	0	19
Total wt.		266	0	60.1	2	1.1	6	0	0	0	335.2

KEY
1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

#= Number of Pieces

wt.= Weight in Grams

Table 17
SCI-65 Chipped Stone Summary
Unit 17, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	0	0	4	0	0	1	0	0	0	5
	wt.	0	0	9.9	0	0	1.1	0	0	0	11
6-12	#	0	1	9	5	0	4	0	0	0	19
	wt.	0	11.7	24.2	2.1	0	21.4	0	0	0	59.4
12-18	#	5	0	7	7*	0	1	1	0	0	21
	wt.	671	0	68.2	4.2	0	0.6	110	0	0	854
18-24	#	0	3	12	11	0	10	0	0	0	36
	wt.	0	3.8	26.8	8.1	0	9	0	0	0	47.7
24-30	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
30-36	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
36-42	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
Total #		5	4	32	23	0	16	1	0	0	81
Total wt.		671	15.5	129.1	14.4	0	32.1	110	0	0	972.1

KEY
1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

#= Number of Pieces
wt.= Weight in Grams

* one of these is obsidian

Table 18
SCI-65 Chipped Stone Summary
Unit 18, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	1	0	5	8	0	0	0	0	0	14
	wt.	28	0	10.5	1	0	0	0	0	0	39.5
6-12	#	0	0	5	7	0	4	0	0	0	16
	wt.	0	0	7	2.7	0	7.5	0	0	0	17.2
12-18	#	0	0	10	13	2	8	0	0	0	33
	wt.	0	0	31.1	2.4	0.2	24.4	0	0	0	58.1
18-24	#	0	0	5	11*	0	2	0	0	0	18
	wt.	0	0	31.4	4.5	0	2.2	0	0	0	38.1
24-30	#	1	0	4	6	0	3	0	1	0	15
	wt.	81	0	15.6	3.3	0	3.3	0	2.1	0	105.3
30-36	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
36-42	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
Total #		2	0	29	45	2	17	0	1	0	96
Total wt.		109	0	95.6	13.9	0.2	37.4	0	2.1	0	258.2

KEY
1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

#= Number of Pieces

wt.= Weight in Grams

* two of these are obsididan

Table 19
SCI-65 Chipped Stone Summary
Unit 19, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	0	0	0	1	0	2	0	0	0	3
	wt.	0	0	0	0.2	0	3.3	0	0	0	3.5
6-12	#	0	0	24	30	2	17	0	1	0	74
	wt.	0	0	44.4	12.6	0.1	30.6	0	1.7	0	89.4
12-18	#	0	0	7	4	0	2	0	0	0	13
	wt.	0	0	19.3	3.8	0	2	0	0	0	25.1
18-24	#	0	0	3	2	0	2	0	0	0	7
	wt.	0	0	4.7	0.6	0	2.7	0	0	0	8
24-30	#	0	3	10	26	1*	5	1	1	0	47
	wt.	0	3	27.2	15	0.1	10.3	8.9	1.3	0	65.8
30-36	#	0	0	8	15	0	2	1	0	0	26
	wt.	0	0	26	8.5	0	5.1	2	0	0	41.6
36-42	#	0	1	12	8	0	8	0	1	0	30
	wt.	0	0.7	27.5	4.8	0	12.8	0	9.7	0	55.5
Total #		0	4	64	86	3	38	2	3	0	200
Total wt.		0	3.7	149.1	45.5	0.2	66.8	10.9	12.7	0	288.9

KEY
1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

#= Number of Pieces

wt.= Weight in Grams

* obsididan

Table 20
SCI-65 Chipped Stone Summary
Unit 20, 1/4" Dry Screen

Depth		1	2	3	4	5	6	7	8	9	Total
0-6	#	0	1	6	3	0	0	0	0	0	10
	wt.	0	2.3	42.7	1.3	0	0	0	0	0	46.3
6-12	#	2	2	15	13	0	10	0	1	0	43
	wt.	581	469.4	62.1	9.7	0	18.6	0	9.4	0	1150.2
12-18	#	0	1	6	7	0	4	0	0	0	18
	wt.	0	5.2	11.9	5	0	5.6	0	0	0	27.7
18-24	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
24-30	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
30-36	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
36-42	#	0	0	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0	0	0
Total #		2	4	27	23	0	14	0	1	0	71
Total wt.		581	476.9	116.7	16	0	24.2	0	9.4	0	1224.2

KEY
1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

#= Number of Pieces

wt.= Weight in Grams

Table 21
SCI-65 Trench
Trench A1

Depth		1	2	3	4	5	6	7	Total
6-12	#	0	0	0	0	0	0	0	0
	wt.	0	0	0	0	0	0	0	0
12-18	#	0	0	0	0	1	0	0	1
	wt.	0	0	0	0	.1*	0	0	0
18-24	#	0	0	2	4	0	3	0	9
	wt.	0	0	9.5	4.8	0	3.1	0	17.4
Total #		0	0	2	4	1	3	0	10
Total wt.		0	0	9.5	4.8	0.1	3.1	0	17.4

KEY
1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

* obsidian

Table 22
SCI-65 Trench
Trench A2

Depth		1	2	3	4	5	6	7	Total
6-12	#	0	2	2	1	0	0	1	6
	wt.	0	7.8	9.7	1.3	0	0	4.4	23.2
18-24	#	0	0	1	0	0	0	0	1
	wt.	0	0	3.2	0	0	0	0	3.2
30-36		0	1	1	0	0	0	0	2
		0	40.8	3.9	0	0	0	0	44.7
Total #		0	3	4	1	0	0	1	9
Total wt.		0	48.6	16.8	1.3	0.1	0	4.4	71.1

KEY
1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

Table 23
SCI-65 Trench
Trench A3

Depth		1	2	3	4	5	6	7	Total
6-12	#	1	0	6	3	0	4	0	14
	wt.	16.7	0	36	1.7	0	3.1		57.5
Total #		1	0	6	3	0	4	0	14
Total wt.		16.7	0	36	1.7	0	3.1	0	57.5

KEY
1= Cores
2= Decortication Flakes
3= Primary Flakes
4= Thinning Flakes
5= Pressure Flakes
6= Shatter Debris
7= Informal Tools
8= Biface/Pt. Blanks
9= Projectile Point

Table 24
SCI-65 Trench
Trench A4

Depth		1	2	3	4	5	6	7	Total
6-12	#	4	0	8	2	0	5	0	19
	wt.	85	0	48.3	1.5	0	9.3	0	144.1
Total #		4	0	8	2	0	5	0	19
Total wt.		85	0	48.3	1.5	0	9.3	0	144.1

KEY
- 1= Cores
- 2= Decortication Flakes
- 3= Primary Flakes
- 4= Thinning Flakes
- 5= Pressure Flakes
- 6= Shatter Debris
- 7= Informal Tools
- 8= Biface/Pt. Blanks
- 9= Projectile Point

Table 25

SC1-65 Trench

Trench A5

Depth		1	2	3	4	5	6	7	Total
6-12	#	0	0	0	0	0	0	1	1
	wt.	0	0	0	0	0	0	52	52
W9-1373	#	0	0	0	0	3	0	0	3
(a & b)	wt.	0	0	0	0	0.3*	0	0	0.3
	#	1	3	11	7	1	1	0	24
	wt.	21	103.8	93.3	5.7	0.1	2.7	0	226.6
12-18	#	1	3	4	7	0	5	0	20
	wt.	30.6	1.6	15.7	3.8	0	9.1	0	60.8
18-24	#	0	0	1	5	0	3	0	9
	wt.	0	0	2.6	9.6	0	4.3*	0	16.5
24-30	#	0	0	0	2	0	0	0	2
	wt.	0	0	0	1	0	0	0	1
Total #		2	6	17	21	4	9	1	59
Total wt.		51.6	105.4	114.2	20.2	0.3	16.1	52	357.2

Key

1=Cores
2=Decortication Flakes
3=Primary Flakes
4=Thinning Flakes
5=Pressure Flakes
6=Shatter Debris
7=Informal Tools
8=Biface/Pt. Blanks
9=Projectile Point

* obsidian

Appendix C.

CA-SCL-65 | Submitted by: R. Fitzgerald - SJSU | January 1988

Lab#	Catalog#	Description	Provenience	Remarks	Readings	Mean	Source
01	W9-1306a	flake	Unit 2/6-12"	w	3.6 3.6 3.7 3.8 3.8 3.8	3.7	NV (v)
02	W9-1306b	flake	Unit 2/6-12"	none	3.5 3.5 3.5 3.6 3.6 3.8	3.6	NV (v)
03	W9-1309a	flake	Unit 2/18-24"	none	3.8 3.8 4.0 4.1 4.2 4.2	4.0	NV (v)
04	W9-1309b	flake	Unit 2/18-24"	none	5.7 5.7 5.7 5.8 5.8 5.9	5.8	NV? (v)
05	W9-1325	flake	Unit 2/24-30"	w		vw	NV (v)
06	W9-1229	flake	Unit 3/6-12"	none	3.4 3.4 3.5 3.5 3.5 3.5	3.5	NV (v)
07	W9-1253	flake	Unit 3/12-18"	none	5.3 5.3 5.3 5.4 5.5 5.6	5.4	NV (v)
08	W9-1255	flake	Unit 3/18-24"	none	5.7 5.7 5.8 6.0 6.0 6.0	5.9	A? (v)
09	W9-1270a	flake	Unit 3/30-36"	w		dh	NV (v)
10	W9-1270b	flake	Unit 3/30-36"	none	4.1 4.1 4.2 4.3 4.3 4.3	4.2	? (v)
11	W9-1270c	flake	Unit 3/30-36"	none	3.4 3.4 3.4 3.6 3.6 3.6	3.5	NV? (v)
12	W9-1270d	flake	Unit 3/30-36"	none	4.2 4.2 4.2 4.3 4.3 4.4	4.3	? (v)
13	W9-1276a	flake	Unit 3/36-42"	none	3.3 3.3 3.3 3.4 3.5 3.6	3.4	NV (v)
14	W9-1195a	flake	Unit 4/0-6"	none		nvb	? (v)
15	W9-1195b	flake	Unit 4/0-6"	w		vw	CD? (v)
16	W9-1206	flake	Unit 4/12-18"	none	4.0 4.1 4.1 4.2 4.2 4.2	4.1	NV? (v)
17	W9-1218	flake	Unit 4/18-24"	none	4.5 4.5 4.7 4.7 4.7 4.7	4.6	BH? (v)
18	W9-1184	biface frag	Unit 5/0-6"	none	4.6 4.7 4.7 4.7 4.7 4.8	4.7	NV (v)
19	W9-1138	flake	Unit 6/0-6"	none	1.8 1.9 1.9 2.0 2.0 2.0	1.9	NV (v)
20	W9-1170	flake	Unit 6/14-18"	none		dh	CD? (v)
21	W9-1171	biface frag	Unit 6/14-18"	none	5.6 5.7 5.7 5.8 5.8 5.9	5.8	NV (v)
22	W9-1117	biface frag	Unit 7/6-12"	none	3.3 3.3 3.3 3.3 3.4 3.4	3.3	? (v)
23	W9-1123a	biface frag	Unit 7/12-18"	none	3.6 3.6 3.7 3.7 3.8 3.8	3.7	NV? (v)
24	W9-1123b	biface frag	Unit 7/12-18"	w		vw	NV (v)
25	W9-1123c	biface frag	Unit 7/12-18"	none	2.5 2.5 2.6 2.6 2.7 2.7	2.6	NV? (v)
26	W9-1097	biface frag	Unit 8/0-6"	none	3.2 3.3 3.3 3.3 3.3 3.4	3.3	NV (v)
27	W9-1098	biface frag	Unit 8/0-6"	none	4.6 4.7 4.8 4.8 4.9 4.9	4.8	NV (v)
28	W9-1049	biface frag	Unit 9/0-6"	none	3.7 3.7 3.8 3.8 3.8 3.8	3.8	NV (v)
29	W9-1061a	biface frag	Unit 9/6-12"	none	3.0 3.0 3.0 3.0 3.1 3.2	3.1	NV (v)
30	W9-1062b	biface frag	Unit 9/6-12"	none	4.2 4.2 4.3 4.4 4.4 4.4	4.3	NV? (v)
31	W9-1089a	flake	Unit 9/12-18"	none	5.3 5.3 5.3 5.3 5.3 5.3	5.3	NV? (v)
32	W9-1089b	flake	Unit 9/12-18"	none	4.1 4.1 4.2 4.2 4.3 4.4	4.2	NV (v)
33	W9-1089c	flake	Unit 9/12-18"	w		dh	NV (v)
34	W9-1089d	flake	Unit 9/12-18"	none	2.4 2.4 2.5 2.5 2.5 2.6	2.5	A? (v)
35	W9-935	flake	Unit 10/0-6"	w		dh	NV (v)
36	W9-962	flake	Unit 10/6-12"	none	3.2 3.2 3.3 3.3 3.3 3.3	3.3	NV? (v)
37	W9-963	flake	Unit 10/6-12"	none	3.2 3.2 3.2 3.3 3.3 3.4	3.3	NV (v)
38	W9-999b	flake	Unit 10/12-18"	none	3.7 3.7 3.8 3.8 3.8 4.0	3.8	NV? (v)
39	W9-1000a	flake	Unit 10/12-18"	none	3.8 3.8 3.8 4.0 4.0 4.1	3.9	NV (v)

Lab Accession No.: 87-H555 | Technician: Thomas M. Origer

CA-SCL-65			Submitted by: R. Fitzgerald - SJSU			January 1988	
Lab#	Catalog#	Description	Provenience	Remarks	Readings	Mean	Source
40	W9-1039	flake	Unit 10/24-30"	w		dh	NV? (v)
41	W9-1040	flake	Unit 10/24-30"				chert
42	W9-1041	flake	Unit 10/24-30"	w		dh	NV (v)
43	W9-1042	flake	Unit 10/24-30"				chert
44	W9-1043	flake	Unit 10/24-30"	none	1.5 1.5 1.5 1.5 1.5 1.6	1.5	? (v)
45	W9-740	flake	Unit 17/12-18"	w		dh	NV (v)
46	W9-1414a	flake	Unit 18/18-24"	none	3.0 3.0 3.1 3.1 3.1 3.1	3.1	NV (v)
47	W9-1414b	flake	Unit 18/18-24"	none		nvb	NV (v)
48	W9-683	flake	Unit 19/24-30"	none	1.4 1.4 1.4 1.5 1.6 1.6	1.5	NV (v)
49	W9-1346	flake	Trench A1/6-12"	none	3.6 3.6 3.6 3.6 3.8 3.8	3.7	NV (v)
50	W9-1354	flake	Trench A2/18-24"	none	3.6 3.8 3.8 4.0 4.0 4.0	3.9	NV (v)
51	W9-1373a	flake	Trench A5/6-12"	none	3.2 3.2 3.3 3.3 3.3 3.3	3.3	? (v)
52	W9-1373b	flake	Trench A5/6-12"	none	4.4 4.5 4.5 4.7 4.7 4.7	4.6	? (v)
53	W9-1398	flake	Trench A5/18-24"	w		dh	NV (v)
54	W9-1411	flake	Bldg 1/fill	none	3.7 3.8 3.8 4.0 4.1 4.1	3.9	BH? (v)
55	W9-111	flake	surface	w		dh	NV (v)
56	W9-1413	biface frag	surface	none	3.2 3.2 3.3 3.3 3.4 3.5	3.3	CD? (v)
57		flake	Exp. F/burial 4	none	4.6 4.6 4.7 4.7 4.8 4.9	4.7	NV? (v)
58		biface frag	Outro coll/surface	none	2.4 2.4 2.5 2.5 2.5 2.6	2.5	NV? (v)
59		biface frag	Outro coll/surface	none	4.0 4.0 4.1 4.2 4.2 4.2	4.1	BH? (v)
60	W9-969	uniface	Unit 10/6-12"	none	3.8 3.8 4.0 4.1 4.1 4.1	4.0	NV (v)
61	A	flake	Outro coll/surface	none	4.5 4.5 4.6 4.7 4.7 4.7	4.6	BH? (v)
62	B	flake	Outro coll/surface	none	1.6 1.6 1.8 1.8 1.9 1.9	1.8	A (v)
63	C	flake	Outro coll/surface	none	4.8 4.9 4.9 5.1 5.1 5.2	5.0	NV (v)
64	D	flake	Outro coll/surface	w	7.0 7.0 7.1 7.1 7.3 7.4	7.2	NV (v)
65	E	flake	Outro coll/surface	w	4.1 4.3 4.3 4.4 4.4 4.4	4.3	NV (v)
66	F	biface frag	Outro coll/surface	none	5.2 5.2 5.3 5.3 5.3 5.4	5.3	BH? (v)
67	G	biface frag	Outro coll/surface	none	4.4 4.4 4.4 4.5 4.6 4.6	4.5	NV (v)
68	H	biface frag	Outro coll/surface	none	4.8 4.8 4.9 4.9 5.1 5.1	4.9	NV (v)
69	W9-1253b	chunk	Unit 3/12-18"	none	4.1 4.2 4.2 4.2 4.2 4.3	4.2	? (v)
70	W9-1186	flake	Unit 5/6-12"	w	6.6 6.6 6.6 6.7 6.8 6.8	6.7	
71	W9-968	flake	Unit 10/6-12"	w		OH	
72	W9-998	flake	Unit 10/12-18"	w	4.8 5.0 5.0 5.1 5.1 5.3	5.1	
73	W9-1033	flake	Unit 10/24-30"	w	2.1 2.3 2.3 2.4 2.4 2.4	2.3	

Lab Accession No.: 87-HS55 Technician: Thomas M. Origer

Washington
State University

Department of Chemical Engineering, Pullman, Washington 99164-2710 / 509-335-4332

RADIOCARBON DATING LABORATORY

WASHINGTON STATE UNIVERSITY
Pullman, Washington, 99164-2710
Office: (509) 335-4731
Lab: (509) 335-2417

SAMPLE REPORT FORM - FINAL REPORT

NAME OF SUBMITTER

Richard T. Fitzgerald

DATE RECEIVED

April 29, 1987

DATE REPORTED

September 21, 1987

WSU ACCOUNT NUMBER

15L 3813 1002 #6

WSU SAMPLE NUMBER	YOUR SAMPLE NUMBER	^{14}C AGE, YEARS B.P.
3635	CA-SC1-65 Burial 1 30-36"	5995 ± 150
3636	CA-SC1-65 Burial 2 36-42"	6450 ± 160

The samples were counted in a 100cc detector at 3 atm. for about 7 days. The samples were equivalent to about 120 mg of carbon. YW.

Sample Processed by: Welter
Sample Calculated by: Welter/Sheppard
Sample Reported by: Sheppard

NOTE: All analyses are based upon the Libby half-life (5570 ± 30 years) for radiocarbon. To convert ages to the half-life of 5730 years, multiply the age given above by 1.03. Zero age date is A.D. 1950. (Reference: Editorial Comment, RADIOCARBON, Vol. 7, 1965.)

Appendix D.

Table I
SCI-65 Fire Cracked Rock
Trench & Units 2-4

Trench

Trench	Depth	Count	Weight*
A	0-6	1	0.463
A1	6-12	2	0.156
A4	6-12	1	0.282
A5	6-12	1	0.141

Unit 3

Depth	Count	Weight
12-18	1	101
18-24	10	1.92
19.5-30	5	0.969
30-36	1	1.6
36-42	1	0.49

Unit 2

Depth	Count	Weight
6-12	4	0.96
12-18	5	2.87
18-24	2	0.615
24-30	7	0.787

Unit 4

Depth	Count	Weight
0-6	4	0.421
6-12	9	3.4
12-18	13	1.47
30-36	1	0.232

* Weight in Kilograms

Table 2
SCI-65 Fire Cracked Rock
Units 5-10

Unit 5

Depth	Count	Weight*
12-18	4	0.482
18-24	2	0.543

Unit 6

Depth	Count	Weight
0-6	1	0.351
6-12	7	1.8
12-18	7	1.52

Unit 7

Depth	Count	Weight
6-12	4	0.425
24-30	3	0.398

Unit 8

Depth	Count	Weight
24-30	4	0.382

Unit 9

Depth	Count	Weight
0-6	20	1.69
6-12	14	2.8
12-18	31	5.4

Unit 10

Depth	Count	Weight
0-6	18	2.8
6-12	10	4
12-18	4	267
18-24	2	144

* Weight in Kilograms

Table 3
SCI-65 Fire Cracked Rock
Units 11-16

Unit 11

Depth	Count	Weight*
6-12	7	1.32
12-18	17	3.37
18-24	7	0.632

Unit 12

Depth	Count	Weight
0-6	3	0.633
6-12	12	3.2

Unit 13

Depth	Count	Weight
0-6	7	3
6-12	6	1.6
12-18	12	2
18-24	1	0.188

Unit 14

Depth	Count	Weight
0-6	1	0.278
6-12	4	0.958
12-18	10	1

Unit 15

Depth	Count	Weight
12-18	5	0.2

Unit 16

Depth	Count	Weight
12-18	28	5.4

* Weight in Kilograms

Table 4
SCI-65 Fire Cracked Rock
Units 17-20

Unit 17

Depth	Count	Weight*
0-6	10	1.8
6-12	15	4.6
12-18	2	0.4
18-24	2	0.31

Unit 18

Depth	Count	Weight
0-6	2	0.209
6-12	3	0.6

Unit 19

Depth	Count	Weight
6-12	12	2.2
18-24	2	0.13
24-30	3	0.21
30-36	10	1
36-42	3	0.418

Unit 20

Depth	Count	Weight
0-6	18	2.8
6-12	11	1
12-18	3	0.395

* Weight in Kilograms